Dear Sir

I have to acknowledge the receipt of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensable as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.
[1] A
[2] B

[2] An appropriate explanation is written, such as defining special isosceles right triangles, or appropriate work is shown, such as using legs of six and finding the hypotenuse.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[3] __________

[4] D
[5] A
[6] D
[7] B

[2] 20, and appropriate work is shown, such as using the formula $S = r\theta$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 20, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[8] __________

[9] __________

[10] D


[2] $-3 \leq x \leq 8$ or an equivalent expression, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but only $x \leq 8$ or $-3 \leq x$ is found.
or [1] $-3 \leq x \leq 8$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[12] __________

[13] __________

[14] C

[2] $nd = 350$ or an equivalent equation and $\$87.50$, and appropriate work is shown, such as the equation $350 = 4d$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] A correct equation is written, but no further correct work is shown.
or [1] $\$87.50$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[15] __________
[2] Maximum, and an appropriate reason is given, such as the value of $a$ is negative (less than 0) or the graph opens downward.

[1] Minimum, but an appropriate reason is given, based on an incorrect equation, such as an error in finding the axis of symmetry.

[0] Maximum or minimum, but no reason or an inappropriate reason is given.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[16] $-4 \pm 3i$, and appropriate work is shown.

[1] The quadratic formula is used correctly, but one computational error is made.

or [1] $\frac{-8 \pm 6i}{2}$, but appropriate work is shown.

or [1] $-4 \pm 3i$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[17] D____

[18] D____

[19] D____

[20] C____

[21] C____

[6] A correct scatter plot, $y = (0.002)(1.070)^t$, and $\$1.52$ or an equivalent answer, and appropriate work is shown.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] A correct scatter plot is shown, but an incorrect equation of equal difficulty is used, but an appropriate fare for 1998 is determined, based on the incorrect equation.

or [4] A correct scatter plot with a function other than exponential is used, but an appropriate equation and fare derived from that equation are shown.

[3] A correct scatter plot is shown, and an appropriate fare based on the scatter plot is found, but no equation or work is shown.

[2] Only a correct scatter plot is shown.

[1] $\$1.52$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] $\frac{51}{243}$, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but the probabilities for the teams are switched.

or [2] Correct substitution is made, but no further work is shown.

or [2] Correct substitution is made, but an incorrect mathematical operation is used, such as multiplication instead of addition.

or [2] The probability for “at most three” or “more than 3” is found, but appropriate work is shown.

[1] $\frac{40}{243}$, and exactly three games are shown.

or [1] $\frac{51}{243}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[22] The inverse function is graphed correctly.

[1] One graphing error is made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[23] B____

[24] B____

[25] C____

[26] C____

[27] D____

[28] C____

[29] A____

[30] C____

[31] A____
[6] 120 and 4.2, and appropriate work is shown, such as substituting $t = 0$ into the equation and solving the equation $-5t^2 - 8t + 120 = 0$.

[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] 120 and 4.2, but no work is shown to find the amount of water, but appropriate work is shown to find the amount of time.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] Appropriate work is shown, and the amount of water is found correctly, but one conceptual error is made in finding the amount of time.
or [4] The amount of time is found correctly, and appropriate work is shown, but the amount of water is not found.
or [4] The amount of water is found correctly, and appropriate work is shown, and a correct substitution into the quadratic formula is made, but the amount of time is not found.

[3] Appropriate work is shown, but one conceptual error is made in finding the amount of time, and one computational error is made in finding the amount of water.
or [3] The mean and standard deviation are calculated correctly and appropriate work is shown, but the number of presidents in the specified interval is found incorrectly.
or [3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The mean and standard deviation are calculated correctly, but the number of presidents is not found.
or [3] Mean = 3.6, standard deviation = 2.9, and 31, and appropriate work is shown, such as an explanation of how the solutions were found.
or [3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The mean and standard deviation are calculated correctly, but an appropriate number of presidents is found.
or [3] Appropriate work is shown, but one conceptual error is made, such as using the sample standard deviation.
or [3] The mean and standard deviation are calculated incorrectly, but an appropriate number of presidents is found.
or [2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] The mean and standard deviation are calculated correctly, but the number of presidents is not found.
or [2] The mean and standard deviation are calculated incorrectly, but an appropriate number of presidents is found.
or [2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] Mean = 3.6, standard deviation = 2.9, and 31, but no work is shown.
or [2] Mean = 3.6 or standard deviation = 2.9 or 31, but no work is shown.
or [2] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
or [2] 4, and appropriate algebraic work is shown.
or [2] 4, but a method other than algebraic is used.
or [2] 4, but no work is shown.
or [1] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
or [1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] $3^{2x} = 3^{2(x+4)}$ is written, but no further correct work is shown.
or [1] 4, but a method other than algebraic is used.
or [1] 4, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
or [0] Mean = 3.6, standard deviation = 2.9, and 31, but no work is shown.
or [0] Mean = 3.6 or standard deviation = 2.9 or 31, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] 1.4, and appropriate work is shown, such as finding the axis of symmetry.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] 1.4, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[42] D

[2] 56, and appropriate work is shown, such as \( \frac{1}{2} \cdot 14 \cdot 16 \cdot \sin 30 \).
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 56, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[44] 

[2] \( \Delta \) HOC and opposite, and an appropriate explanation is written.
[1] The image of \( \Delta \) EOA is identified incorrectly, but the type of isometry is appropriate, and an appropriate explanation is written.
or [1] The difference between a direct and opposite isometry is explained correctly, but no further correct work is shown.
or [1] \( \Delta \) HOC, but no explanation or an incorrect explanation is written.
or [0] Opposite, but no further correct work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[45] 

[46] A

[47] B

[48] C

[2] \( v = \frac{\pi \ell^3}{8} \), and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] \( v = \frac{\pi \ell^3}{8} \), but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[49] 

[2] 0.341 or 34.1% or an equivalent answer, and appropriate work is shown.
[1] 0.682 or 0.841 or some other probability related to one standard deviation from the mean is shown.
or [1] 0.341 or 34.1% or an equivalent answer, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[50] 

[2] 6, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but the negative root is not rejected.
or [1] A correct equation is written, but no further correct work is shown.
or [1] An incorrect equation of equal difficulty is solved appropriately.
or [1] 6, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] (-5,-7), and appropriate work is shown, such as stating the coordinates of each transformation or graphing each transformation.
[1] Appropriate work is shown, but one computational or graphing error is made. or [1] Appropriate work is shown, but one conceptual error is made, such as performing the translation before the reflection. or [1] Only one of the transformations is performed correctly. or [1] (-5,-7), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[52] ______________________

[53] B

[2] \( \frac{1}{x-1} \), and appropriate work is shown.
[1] Appropriate work is shown, but one computational or factoring error is made. or [1] Appropriate work is shown, but one conceptual error is made. or [1] \( \frac{1}{x-1} \), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[54] ______________________

[55] B

[6] A complete and correct proof that includes a conclusion is written.
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect. or [5] \( \triangle BEA \cong \triangle CED \) is proven or \( \triangle BEC \) is proven to be isosceles, but no further correct work is shown.
[4] A proof is written that demonstrates a good understanding of the method of proof, but two statements and/or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect. or [2] A proof is written that demonstrates understanding of the method of proof, but one conceptual error is made, and one statement or reason is missing or is incorrect.
[1] Only one correct relevant statement and reason are written.
[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[56] ______________________

[57] C

[58] A

[59] B

[60] D

[61] A
[2] $\frac{28}{4096}$ or an equivalent answer, and appropriate work is shown, such as evaluating the expression $4C_3\left(\frac{1}{8}\right)^3\left(\frac{7}{8}\right)^1$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The expression $4C_3\left(\frac{1}{8}\right)^3\left(\frac{7}{8}\right)^1$ is written, but no further correct work is shown.

or [1] $\frac{28}{4096}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] Appropriate work is shown, and an appropriate concluding statement is made to prove quadrilateral $ABCD$ is a rhombus.

[3] The proof is completed appropriately, but one computational error is made, but an appropriate concluding statement is made.

or [3] Appropriate work is shown to prove quadrilateral $ABCD$ is a rhombus, but the concluding statement is missing, incomplete, or incorrect.

[2] The proof is completed appropriately, but more than one computational error is made, but an appropriate concluding statement is made.

or [2] Appropriate work is shown, but one of the formulas used is incorrect.

or [2] Appropriate work is shown to prove quadrilateral $ABCD$ is a parallelogram, and an appropriate concluding statement is made, but the sides are not proved to be equal.

or [2] Quadrilateral $ABCD$ is proved to be a rhombus by assuming quadrilateral $ABCD$ is a parallelogram.

[1] Appropriate work is shown to prove quadrilateral $ABCD$ is a parallelogram, and the concluding statement is missing, incomplete, or incorrect.

or [1] The definition of a rhombus is stated, but no proof is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[63] 

[2] $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[64] 

[2] $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $\frac{4}{3}$ or $1\frac{1}{3}$ or $1.\overline{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[65] B_____

[66] B_____

[2] 0.3 or an equivalent answer, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but no answer is found.
or [1] 0.3 or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[67] __________

[1] Answer given, but not rounded correctly.
or [1] Correct answer only, no work shown.
or [1] Shows correct substitution, but answer is incorrect.
or [1] Log equation, no substitution of values.
[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[68] or [0] Substitutes 3 for L.

[69] C_____

[4] $y = 2 \sin \frac{1}{2}x + 3$ or $y = -2 \sin \frac{1}{2}x + 3$, and appropriate work is shown.
[3] The fact that c is equal to 3 is not recognized, resulting in an answer of $y = 2 \sin \frac{1}{2}x$ or $y = -2 \sin \frac{1}{2}x$.
or [3] The values of a, b, and c are determined correctly, and appropriate work is shown, but the equation is not written.
or [3] The value of a or c is determined incorrectly, but the value of b is determined correctly, and appropriate work is shown, and an appropriate equation is written.
[2] Only the value of b is determined correctly, but appropriate work is shown, and an appropriate equation is written.
or [2] Only the values of a and c are determined correctly, but appropriate work is shown, and an appropriate equation is written.
[1] The value of a or c is determined incorrectly, and the value of b is not determined or is determined incorrectly, but appropriate work is shown, and an appropriate equation is written.
or [1] $y = 2 \sin \frac{1}{2}x + 3$ or $y = -2 \sin \frac{1}{2}x + 3$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[70] __________

[71] A_____
[6] $\frac{8}{3}$, and appropriate work is shown.

[5] Appropriate work is shown, but one computational error is made.

[4] Appropriate work is shown, but two or more computational errors are made.

[3] Appropriate work is shown, but one conceptual error is made, such as not factoring out -1 when canceling out $2 - x$.

[2] Appropriate work is shown, but one conceptual error and one computational error are made.

[1] $\frac{8}{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] Interval from 13 - 27, and correctly drawn and labeled curve with the correct explanation.

or [2] A statement explaining how to interpret the curve and the correct answer, but no curve drawn.


or [1] Has the correct answer based on an incorrect curve.

or [1] Just has a correct answer with no curve drawn, and no explanation of the curve.

or [0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[74] A____

[73] ________________

[72] ________________

[4] Both equations are graphed correctly and the description of the transformation $a \rightarrow b$ is correct, such as $T_{(4,3)} \circ r_{-x-axis}$ or $r_{y=3} \circ T_{(4,3)}$ or $T_{(4,3)} \circ R_{180^\circ}$ or an equivalent explanation, such as a shift right of 4 followed by a reflection over the x-axis followed by a shift up of 3.

[3] Both equations are graphed correctly, but only one transformation is shown or described correctly.

[2] Both equations are graphed correctly, but no further correct work is shown.

[1] Only one equation is graphed correctly, and no composition formula or explanation is shown.

or [1] The correct composition formula or explanation is shown, but no graphs or incorrect graphs are drawn.

or [1] Both equations are graphed incorrectly, but an appropriate composition formula or explanation is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[76] ________________

[75] ________________

[74] A____

[73] ________________

[72] ________________

[71] ________________

[2] 65, and appropriate work is shown, such as $P(10) = 80(0.98)^{10}$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 65, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[79] B____

[78] ________________

[77] A____

[76] ________________

[75] ________________

[74] A____

[73] ________________

[72] ________________
[2] $\frac{-4}{5}$ or -0.8, and appropriate work is shown.

[1] $\frac{4}{5}$ or 0.8, and appropriate work is shown, but the quadrant was not taken into consideration.

or [1] $\frac{-4}{5}$ or -0.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[80] ______

[81] A_____

[82] A_____

[83] D_____

[84] A_____

[4] 15.13, and appropriate work is shown, such as solving $2,500 = 4(2.7)^{0.584r}$.

[2] 12, and appropriate work is shown, such as solving $2,500 = 4(2.7)^{0.584r}$.

[1] Appropriate work is shown, but the answer is not rounded or is rounded to 11.

or [1] Appropriate work is shown, but one computational error is made.

or [1] 12, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[87] ______

[88] B_____

[89] B_____

[4] $3.8 \leq x \leq 15.2$, and appropriate work is shown, such as using the quadratic formula or sketching the graph of the parabola and the line.

[3] Appropriate work is shown, but one computational, rounding, or graphing error is made.

or [3] $3.8 < x < 15.2$, and appropriate work is shown.

[2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The graph of the parabola and the line are sketched correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.

or [1] Correct substitution is made into the quadratic formula, but no further correct work is shown.

or [1] The graph of the parabola is sketched correctly, but no further correct work is shown.

or [1] 15.13, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[88] ______

[89] B_____)
[4] An appropriate diagram is drawn, and a correct proof is written in statement-reason or paragraph form, such as stating that $\triangle AOB$ cannot have two right angles or that two perpendiculars cannot be drawn to $PA$ from point $O$.

[3] An appropriate diagram is drawn and an appropriate reason is written to show $OA \perp PA$, but one statement or reason is incomplete or is incorrect, but an appropriate conclusion is drawn.

[2] An appropriate diagram is drawn, and an appropriate reason is written to show $OA \perp PA$, but one statement and one reason are incomplete or are incorrect, but an appropriate conclusion is drawn.

[1] An appropriate diagram is drawn, but the proof contains circular reasoning.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[90] ____________

[91] A_____

[92] D_____

[4] Both parabolas are graphed correctly with the line of symmetry $x = 3.5$ drawn and labeled as $x = 3.5$.

[3] $y = -x^2 + 9$ is graphed incorrectly, but an appropriate translation is drawn, and an appropriate line of symmetry is drawn and labeled correctly.

or [3] $y = -x^2 + 9$ and its translation are graphed correctly, but no line of symmetry or an incorrect line of symmetry is drawn for the translation or no equation or an incorrect equation is shown for the line of symmetry.

[2] $y = -x^2 + 9$ is graphed correctly, but its translation is graphed incorrectly, but an appropriate line of symmetry is drawn and labeled correctly.

or [2] $y = -x^2 + 9$ is graphed incorrectly, but an appropriate translation is graphed, but an incorrect line of symmetry is drawn.

[1] $y = -x^2 + 9$ and its translation are graphed incorrectly, but an appropriate line of symmetry is drawn and labeled correctly.

or [1] $y = -x^2 + 9$ is graphed correctly, but an incorrect translation and line of symmetry are drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[93] ____________

[94] C_____

[95] A_____

[96] D_____

[97] D_____
[4] 5,513 and a correct diagram is drawn, and appropriate work is shown, such as using the Law of Cosines.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] 5,513, and appropriate work is shown, but no diagram is drawn.

or [3] Appropriate work is shown, but the calculations are performed in radians, resulting in an answer of 6,698.

or [3] An incorrect diagram is drawn, but an appropriate solution is found using the Law of Cosines.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown, but an incorrect substitution is made into the Law of Cosines, but an appropriate solution is found.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] Correct substitution is made into the Law of Cosines, but no further correct work is shown.

or [1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] A correctly labeled diagram is drawn, but no further correct work is shown.

or [1] 5,513, but no work is shown and no diagram is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[98] __________________________

[99] A

[100] C

[101] B

[102] C

[103] __________________________

[104] __________________________

[2] 50, and appropriate work is shown, such as \( \overrightarrow{AC} = 140, \overrightarrow{BC} = 40 \), and

\[ m\angle CPA = \frac{1}{2} (140 - 40). \]

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] \( m\overrightarrow{AC} \) and \( m\overrightarrow{BC} \) are found correctly, but no further correct work is shown.

or [1] 50, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[105] __________________________

[106] A
[4] $1 \leq t \leq 3$, and appropriate work is shown, such as $-16t^2 + 64t + 4 \geq 52$.

[3] Appropriate work is shown, but one computational error is made.

or [3] An incorrect inequality is written, but the resulting quadratic inequality is solved appropriately.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] The quadratic equation $-16t^2 + 64t + 4 = 52$ is solved appropriately, and both solutions are found.

[1] An incorrect quadratic equation of equal difficulty is solved appropriately, but one computational error is made.

or [1] $1 \leq t \leq 3$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] $\frac{-a}{2+a}$ or $\frac{a}{-2-a}$, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or simplification error is made.

[2] Appropriate work is shown, but two or more computational or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as not recognizing that -1 is a factor.

[1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.

or [1] $0.624$ or $62.4\%$, and appropriate work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 0.624 or 62.4%, and appropriate work is shown.

[1] The correct standard deviations of -1.5 and +0.5 are found, but an incorrect probability is calculated.

or [1] Appropriate work is shown, but one computational error is made.

or [1] 0.624 or 62.4%, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] $\frac{-a}{2+a}$ or $\frac{a}{-2-a}$, but no work is shown.

[3] Appropriate work is shown, but one computational or simplification error is made.

[2] Appropriate work is shown, but two or more computational or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as not recognizing that -1 is a factor.

[1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.

or [1] $0.624$ or $62.4\%$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[110] D____

[111] C____

[112] B____
[4] \[\frac{\pi}{6}\] and \[\frac{5\pi}{6}\] and 10, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] \[x = 0.52\] and \[x = 2.62\] or \[x = 30^\circ\] and \[x = 150^\circ\] and 10, and appropriate work is shown.

or [3] \[\frac{\pi}{6}\] and \[\frac{5\pi}{6}\], and appropriate work is shown, but the maximum height is missing.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] \[x = 0.52\] and \[x = 2.62\] or \[x = 30^\circ\] and \[x = 150^\circ\], and appropriate work is shown, but the maximum height is missing.

or [2] \[\frac{\pi}{6}\] or \[\frac{5\pi}{6}\] and 10, and appropriate work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] \[30^\circ\] or \[150^\circ\] and 10, and appropriate work is shown.

or [1] \[\frac{\pi}{6}\] and \[\frac{5\pi}{6}\] and 10, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] .7564 or an equivalent answer, and appropriate work is shown, such as finding the sum of the exact probabilities that five, six, or seven seeds will sprout.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] The probability that at most five seeds will sprout is calculated correctly, and appropriate work is shown.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The three exact probabilities are found correctly, but they are not added.

or [2] The sum of only two of the three probabilities is found correctly, such as exactly six plus exactly seven, and appropriate work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The probability that exactly five seeds will sprout is determined appropriately.

or [1] The substitution for the sum of the three probabilities is indicated, but no further correct work is shown.

or [1] .7564 or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[118] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 4 \( \frac{1}{4} \) or 4.25, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[120] A

[121] An appropriate reflection of \( f(x) \) in the line \( y = x \) is sketched, and the coordinates of one point are stated correctly.

or [1] An appropriate graph is sketched, but no coordinates or incorrect coordinates are stated.

or [1] A reflection in some other line is sketched, but appropriate coordinates are stated.

or [1] An incorrect graph is sketched, based on an error in plotting one of the points, but appropriate coordinates are stated.

or [1] An incorrect graph is sketched, based on an error in plotting one of the points, but appropriate coordinates are stated.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[122] A

[123] C

[124] Appropriate work is shown, such as \( (a + bi)(a - bi) = a^2 + b^2 \).

[1] The conjugate is incorrect, but multiplication and substitution for \( i^2 \) are appropriate.

or [1] The conjugate is correct, but one or more errors in multiplication and/or substitution for \( i^2 \) are made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[125] [4] \( (f \circ g)(x) = 4x^{-\frac{1}{3}} \) or \( (8x^{-\frac{1}{3}})^{\frac{2}{3}} \) or an equivalent answer and \( (f \circ g)(27) = \frac{4}{3} \) or an equivalent answer, and appropriate work is shown.

[3] Simplification is shown to at least \( 4x^{-\frac{1}{3}} \), but one computational error or an error in the Law of Exponents is made when finding \( (f \circ g)(27) \).

[2] \( (f \circ g)(x) \) is determined correctly, but \( (f \circ g)(27) \) is not found or is found incorrectly.

or [2] \( \frac{4}{3} \) or an equivalent answer, and appropriate work is shown, but an expression for \( (f \circ g)(x) \) is not found or is found incorrectly.

[1] \( 4x^{-\frac{1}{3}} \) and \( \frac{4}{3} \) or equivalent answers, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
[0] The “given” and/or the “prove” statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[126] [127] D
[128] A

[129] [130] [131] B

[2] 282.8 using an appropriate method such as law of cosines, Pythagorean Theorem, right triangle trig or special right triangle 45, 45, 90.
[1] Gives a correct answer of 282.8 with no work shown.
or [1] Gives an incorrectly rounded answer such as 283, or 282.84, or 282.
or [1] Uses the Pythagorean Theorem correctly, but makes an incorrect substitution for one of the sides, and then rounds correctly.
or [1] Uses an appropriate method, but makes a calculation mistake and then rounds answer correctly.
[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[6] 8,200, and appropriate work is shown, such as using the Law of Cosines or Hero(n)'s formula.
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] The Law of Cosines is used to find an angle, but no further correct work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
[1] A correct substitution is made into the Law of Cosines, but no further correct work is shown.
or [1] 8,200, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] 330, and appropriate work is shown, such as solving \( \sin \frac{13}{250} = \sin \frac{37}{y} \) and calculating \( \cos 50 = \frac{x}{668.8288536} \) and subtracting 100.

[5] Appropriate work is shown, but one computational or rounding error is made.

or [5] Appropriate work is shown, but 100 is not subtracted from the answer.

or [5] An incorrect trigonometric function is used, but the rest of the work is appropriate.

[4] The Law of Sines is used incorrectly, such as using the wrong angle measure, but an appropriate distance from the rocks is found.

[3] The Law of Sines is used correctly, but no answer or an incorrect answer is found.

[2] The Law of Sines is used without finding the angles correctly, and no answer or an incorrect answer is found.

[1] Only a correct diagram is drawn.

or [1] 330, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[132] ______

[133] A ______

[134] C ______

[2] 6.9, and appropriate work is shown, such as \( 2.4 \cdot 165 \cdot \frac{\pi}{180} \).

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the calculations are performed in radians.

or [1] Correct substitution is made into the equation for the length of the arc, but no further correct work is shown.

or [1] 6.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[135] ______

[136] C ______

[2] Both \( f(x) \) and \( f^{-1}(x) \) are graphed correctly and at least one is labeled.

[1] Appropriate work is shown, but one graphing error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as graphing the inverse as a reflection over an axis.

or [1] \( f(x) \) is graphed incorrectly, but an appropriate graph is drawn for \( f^{-1}(x) \).

or [1] A correct equation for \( f^{-1}(x) \) is written, but no graphs are drawn.

[0] \( f(x) \) is graphed correctly, but no further correct work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[137] ______

[138] ______

[139] B ______

[140] D ______
[4] \(24 + 8\sqrt{2} + 8\sqrt{3}\), and appropriate work is shown, such as labeling the diagram using special right triangle rules or right triangle trigonometry.

[3] Appropriate work is shown, but one computational error is made or the answer is not in simplest radical form.

or [3] The measures of the four segments are found correctly, but the perimeter is not found or is found incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The measures of three segments are found correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] The measures of two segments are found correctly, but no further correct work is shown.

or [1] \(24 + 8\sqrt{2} + 8\sqrt{3}\), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[141]

[142] A

[2] \(307\), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown to find the value of the reference angle, but no further correct work is shown.

or [1] \(307\), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[143]

[144] B

[145] B

[2] \(r = \frac{3V}{4\pi}\) or \(r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}\) or an equivalent answer, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] \(\frac{3V}{4\pi}\) or \(\left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}\) or an equivalent answer is found, and appropriate work is shown, but an equation is not written.

or [1] \(r = \frac{3V}{4\pi}\) or \(r = \left(\frac{3V}{4\pi}\right)^{\frac{1}{3}}\) or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[146]

[147] B

[4] (-8, 4) and 18, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect dilation.

or [2] The center and radius are found appropriately for an incorrect center and radius of the original equation.

or [2] (-8, 4), and appropriate work is shown, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] 18, and appropriate work is shown, but no further correct work is shown.

or [1] (-8, 4) and 18, but no work is shown.

[0] (-8, 4) or 18, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 4.3-5.3, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the answer is not stated as an interval.
or [3] Appropriate work is shown, but the answer is expressed in inches.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An appropriate inequality, such as 
\[-3.25 \leq \frac{|h - 5.75|}{2} \leq 3.25,\]
is written, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] Only half of the inequality is solved, but an appropriate answer is found and expressed to the nearest tenth of a foot.
or [1] 4.3-5.3, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[154] C____

[156] A____

[157] B____

[2] 3, and appropriate work is shown, such as 
\[\frac{10}{\sin 53^\circ} = \frac{b}{\sin 14^\circ}.\]
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] The proportion \(\frac{10}{\sin 53^\circ} = \frac{b}{\sin 14^\circ}\) is written, but no further correct work is shown.
or [1] An incorrect proportion of equal difficulty is solved appropriately.
or [1] 3, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
4. \( x = 7 \), and appropriate algebraic work is shown or a correct sketch of the graph of the circles is drawn.

3. Appropriate work is shown, but one computational or graphing error is made, but an appropriate equation is written.

or 3. The two points of intersection are correctly identified, but the equation is missing or is incorrect.

2. Appropriate work is shown, but two or more computational or graphing errors are made.

or 2. Appropriate work is shown, but one conceptual error is made.

or 2. Both circles are graphed correctly, but no further correct work is shown.

1. Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or 1. One circle is graphed correctly, but no further correct work is shown.

or 1. \( x = 7 \), but no work or sketch is shown.

0. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

5. 80 and 9.2, and appropriate work is shown.

4. Appropriate work is shown, but one computational or rounding error is made.

3. Appropriate work is shown, but two or more computational or rounding errors are made.

or 4. Appropriate work is shown, but one conceptual error is made in solving for one of the values.

or 4. 80, and appropriate work is shown, but the length of \( PT \) is not found or is found incorrectly.

or 4. The measure of all three arcs and the length of \( PT \) are found correctly, but the measure of \( \angle P \) is not found or is found incorrectly.

3. Appropriate work is shown, but one conceptual error is made and one computational or rounding error are made.

2. Appropriate work is shown, but one conceptual error is made in solving for each value.

or 2. 80 and 9.2, but no work is shown.

or 2. 9.2, and appropriate work is shown, but no further correct work is shown.

or 2. The measures of all three arcs are found correctly, but no further correct work is shown.

1. 80 or 9.2, but no work is shown.

0. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 10 and 1975, 1985, and 1995, and appropriate work is shown or an appropriate explanation is written.

[3] Appropriate work is shown, but one computational or graphing error is made.

or [3] 10, and appropriate work is shown, but only two of the years are found.

[2] Appropriate work is shown, but two or more computational or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as graphing an incorrect function.

or [2] An incorrect equation of equal difficulty is solved appropriately.

or [2] 1975, 1985, and 1995, and appropriate work is shown or an appropriate explanation is written, but the minimum snowfall is not found.

[2] 10, and appropriate work is shown, but only one of the years is found.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or [1] 10, and appropriate work is shown or an appropriate explanation is written, but the years are not found.

or [1] 10 and 1975, 1985, and 1995, but no work is shown.

[0] 10 or 1975, 1985, and 1995, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[164] A______

[165] A______

[166] B______

[167] D______

[168] D______

[169] D______

[2] 0, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 0, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[170] D______

[171] B______

[172] D______

[173] D______

[174] A______

[175] A______
[176] D

[2] 7, and appropriate work is shown, such as $2^3 = x + 1$.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] $2^3 = x + 1$ is written, but no further correct work is shown.
or [1] 7, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[177] C

[2] 161, and appropriate work is shown, such as $500x > \frac{3,200,000}{x} + 60,000$.
[3] Appropriate work is shown, but one computational error is made or -40 is not rejected.
[2] A correct inequality is given in standard form, but it is not solved.
[1] An incorrect quadratic inequality of equal difficulty is solved appropriately.
or [1] 161, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[178] C

[2] $6.85$, and appropriate work is shown.
[1] The correct rate for the first 5 minutes and the correct rate for each additional minute is shown, but the cost of a 30-minute call is not found.
or [1] Appropriate work is shown, but one computational error is made.
or [1] $6.85$, but no work is shown.
[0] The student calculates either the rate for the first 5 minutes or the rate for each additional minute, but no further work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[179] C

[2] $95$, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as calculating g(h(4)).
or [1] $95$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[180] C

[2] $95$, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as calculating g(h(4)).
or [1] $95$, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] 105, and appropriate work is shown, such as $\frac{7\pi}{12} = \frac{180}{\pi}$.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 105, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[188] D

[190] C

[4] 5 and -4, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

[2] The correct log equation, $\log_4 \frac{x^2 + 3x}{x + 5} = \log_4 4$, is shown, but no further work or incorrect work is shown.

[1] One correct logarithmic step is shown, such as $\log_4 \frac{x^2 + 3x}{x + 5}$.

or [1] 5 and -4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[191] C

[192] C

[193] D

[194] D

[4] $y = -0.58x + 1185.09$ and 19.9, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct linear equation is written, but no further correct work is shown.

or [2] An incorrect linear equation is written, but an appropriate percentage is found.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 19.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
An appropriate scatter plot is drawn, and either \( y = 276.67(1.21)^x \) and $15,151,000 or 
\( y = 276673.91(1.21)^x \) and $15,152,000.

Appropriate work is shown, but one computational error is made.
or
Appropriate work is shown, but one error is made in rounding the coefficients or 
by substituting an incorrect value of \( x \) for the year 2005.
or
Appropriate work is shown, but an incorrect nonlinear function for the regression 
equation is written, but an appropriate salary is found.
or
No scatter plot or an incorrect scatter plot is drawn, but the correct regression 
equation is written, and the correct salary is found.

Appropriate work is shown, but two or more computational errors are made.
or
No scatter plot or an incorrect scatter plot is drawn, and one rounding error is made, 
but the correct regression equation is written, and an appropriate salary is found.
or
Appropriate work is shown, but a linear function for the regression equation is written, 
but an appropriate salary is found.
or
An appropriate scatter plot is drawn, and the correct regression equation is written, 
but no further correct work is shown.
or
An appropriate scatter plot is drawn, and the correct salary is found, but no work or 
regression equation is shown.
or
An appropriate scatter plot is drawn, but an incorrect regression equation is 
written, but an appropriate salary is found.
or
No scatter plot or an incorrect scatter plot is drawn, and an incorrect regression equation is 
written, but an appropriate salary is found.
or
An appropriate scatter plot is drawn, but no further correct work is shown.
or
A zero response is completely incorrect, irrelevant, or incoherent or is a correct 
response that was obtained by an obviously incorrect procedure.

\(-7+i\), and appropriate work is shown, 
such as \((-2+i)(3+i)\).

Appropriate work is shown, but one computational error is made.
or
\(-7+i\), but no work is shown.
or
\((-2+i)(3+i)\) is shown but not multiplied, 
or the values are added instead of multiplied.
or
A zero response is completely incorrect, irrelevant, or incoherent or is a 
correct response that was obtained by an obviously incorrect procedure.

A

C

A

29 hammers to make a profit and 45 
hammers to make a profit of $100, and 
appropriate work is shown.
or
29 hammers to make a profit of $100 is determined correctly, and 
appropriate work is shown.
or
Either the number of hammers to make 
a profit or the number of hammers to make a 
profit of $100 is determined correctly, and 
appropriate work is shown.
or
The correct equation and inequality or 
the correct equations are written, but no 
further correct work is shown.
or
29 and 45, but no work is shown and the 
answers are not labeled.
or
A zero response is completely incorrect, irrelevant, or incoherent or is a correct 
response that was obtained by an obviously incorrect procedure.
[203] 14,000, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct equation such as
\[ \log_{10} \frac{t}{6000} = \log_{2} 0.5 \]
is written, but no further correct work is shown.
[1] The correct substitutions are made, but no further correct work is shown.
or [1] 14,000, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[204] 41,583, and appropriate work is shown.
[1] Appropriate work is shown, but one conceptual error or one computational error is made.
or [1] 41,583, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[205] D

[2] 11, and appropriate work is shown, such as \( f(1) = 4 \) and \( g(4) = 11 \).
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as solving for \( f(g(1)) \).
or [1] 11, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[206] 44.6 and \( \overline{L} = 43.2 \), the line of best-fit equation \( (y = -1.007559x + 88.137149) \) is shown, and an appropriate justification of point \((\overline{W}, \overline{L})\) fitting or not fitting, depending on the rounding of the equation, is given.

[5] \( \overline{W} \) or \( \overline{L} \) is incorrect, but the rest of the work is appropriate.
or [5] All conditions of the problem are met, except it is not stated whether \((\overline{W}, \overline{L})\) lies or does not lie on the line of best fit.
or [5] \( \overline{W} \) and \( \overline{L} \) and the equation of the line of best fit are correct, but one error results in an incorrect conclusion, such as the calculation or interchanging of \( \overline{W} \) and \( \overline{L} \).
[4] Both \( \overline{W} \) and \( \overline{L} \) are incorrect, but the rest of the work is appropriate.
or [4] \( \overline{W} \) and \( \overline{L} \) are correct, a correct scatter plot is drawn, a correct line of best fit is drawn, \((\overline{W}, \overline{L})\) is plotted correctly, and a statement indicating that the point does or does not fit the line is given, with an appropriate explanation, but no equation is used.
or [4] All conditions of the problem are met, except for the justification of whether \((\overline{W}, \overline{L})\) lies on the line.
[3] \( \overline{W} \) and \( \overline{L} \) are correct, but the equation of the line of best fit is stated incorrectly, and no further work is shown.
or [2] Only \( \overline{W} \) and \( \overline{L} \) are found correctly.
or [1] Only one mean is found correctly.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[207] D

[208] B

[209] D

[210] D
[6] A correct graph is drawn, 90 and 45, and appropriate work is shown.
[5] Appropriate work is shown to answer all three parts of the question, but one computational or graphing error is made.
[4] Appropriate work is shown, but two or more computational or graphing errors are made.
[3] A correct graph is drawn, and 90 or 45, and appropriate work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
[1] 90 or 45, and appropriate work is shown. or [1] 90 and 45, but no graph is drawn.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[211] A____
[212] C____
[213] B____

[214] D____
[215] B____
[216] D____

[217] A____
[4] 438, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Correct substitution is made into the Law of Cosines or the Law of Sines, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 438, but no work is shown.

[0] Right triangle trigonometry is used inappropriately.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[223] A_____

[224] D_____

[225] B_____

[226] B_____

[4] \(x = 80, \; y = 20.8, \; \text{and} \; y = 0.25x + 0.8, \; \text{and appropriate work is shown to prove that} \; (x, y) \; \text{is a point on the line of regression.} \)

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

[1] \(x = 80, \; y = 20.8, \; \text{and} \; y = 0.25x + 0.8, \; \text{but no work is shown.} \)

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[227] A_____

[228] A_____

[229] B_____

[230] A_____

[231] B_____

[2] 5, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[232] B_____

[233] B_____

[2] 0.42, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct equation is written, but \(\sin B\) is not found.

or [1] 0.42, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[234] B_____

[235] A_____
[4] 8, and appropriate work is shown, such as solving the proportion $\frac{10+x}{12} = \frac{12}{x}$.

[3] Appropriate work is shown, but one computational error is made.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The proportion $\frac{10+x}{12} = \frac{12}{x}$ is written, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] 8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[237] A

[240] D

[238] B

[241] E
[242] C
[2] 40, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 40, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[243]

[244] C
[4] 5.3, and appropriate work is shown, such as solving the equation \((x + 6)(x + 8) = 150\) by using a table or the quadratic formula.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate solutions are found, but the negative root is not rejected.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] The correct quadratic equation in standard form, \(x^2 + 14x - 102 = 0\), is written, but no further correct work is shown.
or [1] An incorrect quadratic equation is solved appropriately.
or [1] 5.3, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[245]

[246] 67, and appropriate work is shown, such as \(A = \frac{1}{2} (11)(13) \sin 70^\circ\).
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 67, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[247] B
[2] 25, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] The solution is incomplete, such as only the correct percent is shown.
or [1] 25, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[248]
[4] 2 ± i, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made, but the result is expressed as a complex number in simplest $a + bi$ form.

or [3] Appropriate work is shown, but the roots are not expressed in simplest $a + bi$ form.

or [3] Appropriate work is shown, but only one complex root, in simplest $a + bi$ form, is found.

[2] Appropriate work is shown, but one computational error is made, resulting in a solution that is not a complex number.

or [2] Appropriate work is shown, but two or more computational errors are made, but the result is expressed as a complex number in simplest $a + bi$ form.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] An incorrect quadratic formula is used, but the result is expressed as a complex number in simplest $a + bi$ form.

[1] Incorrect substitution is made into the quadratic formula, such as $a = 1$, $b = 5$, and $c = -4$, but the resulting equation is solved appropriately.

or [1] $2 \pm i$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[249] B

[250] 

[251] D

[252] C

[253] 

[254] A

[255] C

[6] The vertices $A'(-1,1)$, $B'(4,-2)$, $C'(3,-5)$, and $D'(-2,-2)$ are stated and a complete and correct proof that includes a conclusion is written.

[5] The vertices are stated, and a proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect.

or [5] A complete proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but the vertices of $A'B'C'D'$ are not stated.

[4] The vertices are stated, and a proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

[3] The vertices are stated, and a proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two reasons are missing or are incorrect.

[2] The vertices are stated, and some correct relevant statements about the proof are made, but three or four statements or reasons are missing or are incorrect.

[1] The vertices $A'(-1,1)$, $B'(4,-2)$, $C'(3,-5)$, and $D'(-2,-2)$ are stated, but no proof is written.

[0] The “given” and/or the “prove” statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[256] $\frac{918}{1024}$ or an equivalent answer, and
appropriate work is shown, such as
$5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5 + 5C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^4 + 5C_2\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3$.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] $5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5 \cdot \left(\frac{4}{4}\right)^4$, and
$5C_2\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^3$ are evaluated, but the values are
not added.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as finding the probability of "not telling the truth at most twice" or the probability of "telling the truth at least twice."

or [2] $5C_0\left(\frac{1}{4}\right)^0\left(\frac{3}{4}\right)^5 \cdot \left(\frac{4}{4}\right)^4$, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] Appropriate work is shown to find $\frac{270}{1024}$, the probability of telling the truth exactly twice out of five times.

or [1] $\frac{918}{1024}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[257] D

[258] A

[259] [2] 4.4, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Only the constant of variation, 220, is found.
or [1] 4.4, but no work is shown.
or [0] Direct variation is used.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[260] [4] 32.8, and appropriate work is shown.
[3] Appropriate work is shown, but one computational, rounding, or graphing error is made.
or [3] An incorrect substitution is made, but appropriate work is shown and an appropriate solution is found.
or [2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as incorrect application of a logarithm rule.
or [1] Correct substitutions are made, but no further correct work is shown.
or [1] 32.8, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[261] B
[2] \( \frac{3}{2} \), and appropriate work is shown.

[1] Appropriate work is shown, but one conceptual error or one computational error is made.

or [1] \( \frac{3}{2} \), but a graphic solution is provided.

or [1] \( \frac{3}{2} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] \( y = 42.2326x^{-0.4494} \) and 4.9, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] A correct regression equation is written and 4.9, but the substitution is not shown.

or [3] The expression \( 42.2326x^{-0.4494} \) is written and 4.9, and the substitution is shown.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as not changing 2 minutes to 120 seconds.

or [2] An incorrect power regression equation is solved appropriately, and the substitution is shown.

or [2] A correct regression equation is written, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] 4.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] The side equals 2.3 and the area equals 25.5, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but one incorrect formula is used, such as using an incorrect trigonometric function, but appropriate answers are found.

or [2] Appropriate work is shown to find the correct side, but no further correct work is shown.

[1] The radius equals 3 and the central angle equals 45°, but no further correct work is shown.

or [1] The side equals 2.3 and the area equals 25.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[264] A

[265] B

[266] C

[267] D

[268] A

[269] B

[270] C

[271] D

[272] A

[263] \( \frac{x + 4}{4} \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] \( \frac{x + 4}{4} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[274] A_____
[275] D_____

a [2] Appropriate sketches of the functions are shown, and the horizontal line tests are used to explain why the statement is true. or [2] An explanation is given that the inverse of g is a function and the inverse of f is not a function, which includes a definition of the relationship between a function and its inverse or the vertical line test. or [2] Appropriate sketches of the inverses are shown that use the vertical line test to explain why the statement is true. or [2] The correct inverses are found algebraically, and appropriate explanations are given. [1] An explanation is given that indicates only that g is a 1:1 function or that g passes the horizontal line test. or [1] An explanation is given that indicates only that f is not a 1:1 function or that f does not pass the horizontal line test. b [2] 3.2, and appropriate work is shown. [1] Appropriate work is shown, but one computational or rounding error is made. or [1] 3.2, but no work is shown. a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[276] [277]

[278] A_____

[2] b = 6 by determining the slopes of both lines, sets \( \frac{2}{b} = -\frac{1}{3} \) (i.e. \( -3 \)). or [2] b = 6 by determining the product of the slopes = -1.

[1] Sets \( \frac{2}{b} = -3 \) and solves for \( b = \frac{-2}{3} \).

or [1] Finds slope of perpendicular as \( \frac{1}{3} \), but does not solve b. or [1] b = 6 and no work shown. [0] Does not identify slopes. or [0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.
[2] 65,797.36, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] An incorrect derivation of the equation is solved appropriately.
or [1] 65,797.36, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[280] D______

[281] B______

[282] 2] 13.3, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made.
or [1] The correct value is substituted for n, and the equation is converted to exponential form, but it is not solved.
or [1] 13.3, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[283] _______

[4] Two, and the paths are sketched and labeled correctly, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or graphing error is made, but the appropriate number of points of intersection is stated.
or [3] Only one path is sketched correctly in the correct interval, but the number of points of intersection is not stated or is stated incorrectly.
or [3] The paths are sketched correctly in the correct interval, but the number of points of intersection is not stated or is stated incorrectly.
or [3] The paths are sketched correctly in the correct interval, but the correct interval is used, and an appropriate number of points of intersection is stated.
or [2] Only one path is sketched correctly in the correct interval, and the number of points of intersection is not stated or is stated incorrectly.
or [2] Only one path is sketched appropriately in an incorrect interval, but an appropriate number of points of intersection is stated.
or [1] A basic sine and cosine curve are sketched, but they do not have the correct traits of the equation, but an appropriate number of points of intersection is stated.
or [1] One path is sketched correctly in the correct interval, but the second graph is not sketched.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[284] _______

[285] C______

[286] A______
[2] \( \frac{15,120}{78,125} \) or 19.35% or an equivalent answer, and appropriate work is shown, such as \( \cdot C_3(0.6)^3(0.4)^4 \).

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct expression, such as \( \cdot C_3(0.6)^3(0.4)^4 \), is written, but no further correct work is shown.

or [1] An incorrect expression of equal difficulty is evaluated appropriately.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[287]  

[288] D  

[4] A complete and correct proof that includes a concluding statement is written.

[3] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement or reason is missing or is incorrect or the concluding statement is missing.

[2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

[1] Some correct relevant statements about the proof are made, but two or three statements and/or reasons are missing or are incorrect.

[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[289]  

[290]  

[291]  

[4] 10, and appropriate work is shown, such as solving \( \frac{x}{4} = \frac{4}{x+6} \).

[3] Appropriate work is shown, but one computational or factoring error is made.

or [3] Appropriate work is shown to find \( x = 2 \), but no further correct work is shown.

[2] Appropriate work is shown, but two or more computational or factoring errors are made.

or [2] Appropriate work is shown to find 2 and \(-8\), but the negative value is not rejected, and no further correct work is shown.

or [2] A correct right triangle proportion is written, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.

or [1] 10, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[290]  

[291]  

[2] 9.42, and appropriate work is shown, such as changing the angle to radians and finding s.

[1] The formula \( s = r \theta \) is stated, but 54° is not converted to radian measure.

or [1] Appropriate work is shown, but one computational or rounding error is made.

or [1] 9.42, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] $-\frac{17}{2}$ or an equivalent answer, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but only the positive value is found.
or [1] $-\frac{17}{2}$ or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[292] C

[2] $y = -2\cos x$ or an equivalent equation is written.
[1] Appropriate work is shown, but one conceptual error is made.
or [1] Amplitude $= 2$ and frequency $= 1$, but no further correct work is shown.
or [1] The expression $-2\cos x$ is written.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[293] C

[294] B

[295] A
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[301] obviously incorrect procedure.

[302] obviously incorrect procedure.

[303] obviously incorrect procedure.

[304] obviously incorrect procedure.
[2] 6.9, and appropriate work is shown, such as using special right triangles, the Law of Cosines, or the Law of Sines.

[1] Appropriate work is shown, but one computational or rounding error is made. or [1] Appropriate work is shown, but one conceptual error is made. or [1] 6.9, but no work is shown. [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[305] D____

[306] D____

[307] D____

[4] 21 by 23, and appropriate work is shown, such as solving the equation $765 = 3(x - 4)(x - 6)$. [3] Appropriate work is shown, but one computational error is made. or [3] Appropriate work is shown, but only one dimension is found. [2] Appropriate work is shown, but two or more computational errors are made. or [2] Appropriate work is shown, but one conceptual error is made. or [2] An incorrect equation of equal difficulty is solved appropriately, and appropriate dimensions are found. or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made. or [1] An incorrect equation of equal difficulty is written, and one computational error is made, but appropriate dimensions are found. or [1] An incorrect equation of equal difficulty is solved appropriately, but one computational error is made when finding the length. or [1] 21 by 23, but no work is shown. [0] 21 or 23, but no work is shown. or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[308] D____

[309] D____

[2] Two, and appropriate work is shown or an appropriate diagram is drawn. [1] Appropriate work is shown, but one computational error is made. or [1] Appropriate work is shown, but one conceptual error is made. or [1] Appropriate work is shown, but only one correct solution is found. or [1] Two, but no work is shown. [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[310] C

[311] A

[312] C

[2] \( \frac{40}{243} \) or an equivalent fraction or .1646, and appropriate work is shown, such as 
\( \frac{5}{3} C \left( \frac{1}{3} \right) \left( \frac{2}{3} \right)^2 \).

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as finding the probability of choosing at least three even-numbered channels.

or [1] \( \frac{40}{243} \) or an equivalent fraction or .1646, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[313] D

[2] \( k > \frac{1}{3} \), and appropriate work is shown, such as the solution of \( 4 - 4(3)(k) < 0 \).

[1] Appropriate work is shown, but one conceptual error or one computational error is made.

or [1] Appropriate work is shown, but the answer is written as \( k < \frac{1}{3} \).

or [1] \( k > \frac{1}{3} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[314] D

[2] \( \frac{40}{243} \) or an equivalent fraction or .1646, and appropriate work is shown, such as 
\( \frac{5}{3} C \left( \frac{1}{3} \right) \left( \frac{2}{3} \right)^2 \).

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] \( \frac{40}{243} \) or an equivalent fraction or .1646, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[315] A

[3] A correct quadratic equation is written and appropriate work is shown, but one computational or simplification error is made.

or [3] An incorrect quadratic equation of equal difficulty is solved appropriately.

[2] A correct quadratic equation is written and appropriate work is shown, but two or more computational or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.

[1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] \( \frac{40}{243} \) or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[316] A

[3] \( -\frac{3 \pm \sqrt{37}}{7} \) or an equivalent answer, and appropriate work is shown.

[3] A correct quadratic equation is written and appropriate work is shown, but one computational or simplification error is made.

or [3] An incorrect quadratic equation of equal difficulty is solved appropriately.

[2] A correct quadratic equation is written and appropriate work is shown, but two or more computational or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.

[1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] \( \frac{40}{243} \) or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] $y = 1.018.2839(0.5969)^x$ and 16, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] $y = 1.018.2839(0.5969)^x$ and 16, but the substitution is not shown.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An appropriate regression equation is written, but the number of coins returned after the eighth trial is not found.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] An incorrect regression equation is written, but the number of coins returned after the eighth trial is found appropriately.
or [1] $y = 1.018.2839(0.5969)^x$ and 16, but no work is shown.
[0] $y = 1.018.2839(0.5969)^x$ or 16, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

B______

[4] 7.5 and 9, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as using 7.7, the sample standard deviation.
or [2] The population standard deviation and mean are found correctly, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] 7.5 and 9, but no work is shown.
or [0] 7.5 or 9, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

C______

[2] 135, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown to find 9, the number of periods, but it is not converted to minutes.
or [1] 135, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

B______
[2] \( 7 + 7\sqrt{5} \) or \( 7(1 + \sqrt{5}) \), appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made, or the answer is not expressed in simplest radical form.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] \( 7 + 7\sqrt{5} \) or \( 7(1 + \sqrt{5}) \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[324] C

[325] A

[326] A

[6] A complete and correct proof that includes a concluding statement is written.

[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement or reason is missing or is incorrect or no concluding statement is written.

or [5] \( \frac{WT}{HT} = \frac{AT}{CT} \) or an equivalent proportion is proven, but no further correct work is shown.

[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.

[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.

or [3] \( \Delta WAT \sim \Delta HCT \) is proven, but no further correct work is shown.

[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.

[1] Only one correct statement and reason are written, other than the given and/or the prove statements.

[0] A zero response is completely incorrect, irrelevant or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[327] D

[328] D
[2] 30, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as finding only half the area of the parallelogram.
or [1] The altitude of the parallelogram is found to be 3, but no further correct work is shown.
or [1] 30, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[330] D

[4] Triangles $ABC$ and $A''B''C''$ are graphed and labeled correctly. [Students are not required to state the coordinates $A''(6,-6)$, $B''(-4,-10)$, and $C''(-2,6).$]
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] Only triangle $A''B''C''$ is graphed and labeled correctly.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] Triangle $ABC$ is graphed and labeled correctly, and either the rotation or dilation is graphed and labeled correctly.
or [2] The coordinates $A''(6,-6)$, $B''(-4,-10)$, and $C''(-2,6)$ are stated, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] Triangle $ABC$ is graphed and labeled correctly, but no further correct work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[331] ____________

[332] D

[6] Complete and correct proof (statement and reason or paragraph form).
[5] 1 statement and/or reason incorrect/incomplete, but leads to the conclusion.
[4] No or incorrect conclusion drawn to correct proof of parallel lines $OR$ and $SE$. or [4] 2 statements and/or reasons incorrect/incomplete, but leads to proper conclusion.
[3] Partial proof, missing more than two steps, with correct conclusion.
[1] Gives proper assumption and conclusion only.
[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[333] ____________

[334] A
[4] 720,500 is the population in 1980. 1.022 represents a growth rate of 2.2% added to the current population, and the population will reach the given number in 2015, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] 720,500 and 1.022 are explained correctly, and 2015 is found as the year, but no work is shown to indicate how the year was obtained.

or [3] Either 720,500 or 1.022 is explained correctly, and 2015 is found as the year, and appropriate work is shown.

or [3] 720,500 and 1.022 are explained correctly, but 35.167 years is found as an answer, but appropriate work is shown.

or [2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] 720,500 and 1.022 are not explained or are explained incorrectly, but 2015 is found as the year, and appropriate work is shown.

or [2] 720,500 and 1.022 are explained correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] Either 720,500 or 1.022 is explained correctly, but no further correct work is shown.

or [1] 35.167 or 35 years, and appropriate work is shown, but the year is not found, and no explanations or incorrect explanations are given.

or [1] 2015, but no work is shown.

or [1] 35.167 or 35 years, and appropriate work is shown, but the year is not found, and no explanations or incorrect explanations are given.

or [1] 2015, but no work is shown.

or [1] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] a \( y = 0.8344648562x + 14.64960064 \) or an equivalent answer expressed to three significant digits

and b 80, and appropriate work is shown.

[3] One computational error is made or one rounding error is made with one of the numbers in the equation, such as truncating or not giving at least three significant digits.

[2] Only the correct answer for either part a or part b is found.

or [2] Appropriate work is shown, but more than one computational or rounding error is made.

[1] 78 is substituted into an incorrect linear equation, but it is evaluated appropriately.

or [1] \( y = 0.8344648562x + 14.64960064 \) and 80, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[336] \( \binom{9}{64} \), and appropriate work is shown, such as \( \binom{3}{2} (\frac{3}{4})^1 \).

[1] Only \( \binom{3}{2} (\frac{3}{4})^1 \) is shown.

or [1] Appropriate work is shown, but one computational error is made.

or [1] \( \frac{9}{64} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[337]
A correct indirect proof is written with appropriate statements and reasons.

[1] The assumption that \( \overline{AT} \) is perpendicular to \( \overline{CD} \) is written, but no further correct work is shown.

or [1] A method other than an indirect proof is used to show that \( \overline{AT} \) is not perpendicular to \( \overline{CD} \).

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[338] 

[339] C

[340] A

[341] B

[342] C

[6] \( y = -6.2x + 12,451.2; \) 20.2 thousand; and 2008; and appropriate work is shown.

[5] The correct equation is shown, but only the number of gallons or the year is correct.

[4] The slope and \( y \)-intercept are incorrect, but the slope is negative and the number of gallons and the year are appropriate, based on the incorrect equation.

[3] The slope and \( y \)-intercept are incorrect, but the slope is negative, but only the number of gallons or the year is appropriate, based on the incorrect equation.

[2] The correct equation is shown, but the number of gallons and the year are not determined or are determined incorrectly.

or [2] The incorrect equation \( y = 6.2x + 12,451.2 \) is shown, but appropriate work is shown for the number of gallons and the year.

[1] An incorrect equation is shown with a negative slope, and the number of gallons and the year are not determined.

or [1] 20.2 thousand and 2008, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[343] 

[4] .8503056 or an equivalent answer, and appropriate work is shown, such as \( C_6(9)^6(1)^1 + C_7(9)^7(1)^0 \).

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] The two individual probabilities are calculated correctly, but they are not added.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] The incorrect equation \( y = 6.2x + 12,451.2 \) is shown, but appropriate work is shown for the number of gallons and the year.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The expression \( C_6(9)^6(1)^1 + C_7(9)^7(1)^0 \) is written, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error is made, such as finding the probability of at most 6 days.

or [2] The expression \( C_6(9)^6(1)^1 + C_7(9)^7(1)^0 \) is written, but no further correct work is shown.

[1] Appropriate work is shown to find .3720087, the probability of exactly 6 days, but no further correct work is shown.

or [1] .8503056 or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 116, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the supplement of the correct answer, 64, is found.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] The correct substitutions are made into the Law of Cosines, but no further correct work is shown.
or [1] 116, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[345] B

[346] B

[347] B

[348] B

[349] B

[350] C

[2] 18, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] The equation \( \log_b \frac{36}{2} = \log_b x \) is written, but the value of \( x \) is not found.
or [1] 18, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[351] C

[352] D

[353] C

[6] 0, 146, and 214, and appropriate work is shown.
[5] Appropriate work is shown, but one computational, rounding, factoring, or graphing error is made.
or [5] Appropriate work is shown, and the equation is solved for 0 and 146, but 214 is not found.
or [5] Appropriate work is shown to find the correct solutions, but 360 is included.
[4] Appropriate work is shown, but two or more computational, rounding, factoring, or graphing errors are made.
or [4] Appropriate work is shown, but the equation is solved for 0, 146, and 360.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] Appropriate work is shown, and the equation is factored correctly, but no further correct work is shown.
or [3] Appropriate work is shown, but one conceptual error and one computational, rounding, factoring, or graphing error are made.
or [2] 6\( \cos^2 x - \cos x - 5 = 0 \) is written, but no further correct work is shown.
or [2] 0, 146, and 214, but no work is shown.
or [1] 0, 146, and 214, but no work is shown.
or [0] 0 or 146 or 214, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[354] A

[355] B

[356] B
[4] Time of maximum height = 2.45, maximum height = 31.39, time when it hit the ground = 4.98, and appropriate algebraic or graphic work is shown. [Answers for time, in seconds, may vary based on method of solution.]

[3] Appropriate algebraic or graphic work is shown, but one computational or graphing error is made.
or [3] The times are found correctly, but the maximum height is incorrect.

[2] The rock’s maximum height and the time it takes to reach that height are found correctly, but the time it takes to hit the ground is incorrect.
or [2] The time it takes the rock to hit the ground is found correctly, but the maximum height and the time it takes to reach that height are incorrect.

[1] Time of maximum height = 2.45, maximum height = 31.39, time when it hit the ground = 4.98, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[362] [4] \( (x - 20)^2 + (y - 8)^2 = 16 \) and the ellipse is sketched correctly.

[3] Appropriate work is shown, but one computational or graphing error is made.

[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The equation of the circle is written correctly or the ellipse is sketched correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[357] [4] \( \frac{41}{59,049} \), and appropriate work is shown, such as \( 5C_3(\frac{1}{9})^3 + 5C_4(\frac{1}{9})^4(\frac{8}{9})^1 \).

[3] Appropriate work is shown, but one computational error is made.
or [3] The combination includes an incorrect setup for determining the probability of hitting the bull’s-eye five times but a correct setup for determining the probability of hitting the bull’s-eye four times, but an appropriate probability is found.

[2] The probability of “exactly 4” is found.
or [2] The probability of “at most 3” is found.

[1] A probability of \( \frac{1}{9} \) is found, based on the area of the two circles.
or [1] \( \frac{41}{59,049} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[364] D
[2] A correct graph of f(x) for x<0 is drawn.
[1] One conceptual error is made, such as reflecting f(x) over an axis.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[365] A complete and correct proof that includes a concluding statement is written.

[4] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect or the concluding statement is missing.

or [3] Two pairs of angles are proven congruent, but the triangles are not proven similar.

[2] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.

or [2] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made, such as using an incorrect method to prove that two angles are congruent.

or [2] ∠E and ∠ABC are proven congruent, but the remainder of the proof is missing or is incorrect.

[1] Some correct relevant statements about the proof are made, such as showing that ∠CAB and ∠ABE are congruent, but the remainder of the proof is missing or is incorrect.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[366] 6,246 and a correct diagram is drawn, and appropriate work is shown, such as the use of the Law of Sines twice or the Law of Sines followed by right triangle trigonometry or another valid method.

[6] Appropriate work is shown, but one computational or rounding error is made.

[5] One of the two unknown sides of the triangle is calculated correctly and appropriate work is shown, but an incorrect method is used for calculating the altitude.

[4] A correct diagram is drawn, and the Law of Sines is used, but one computational or rounding error is made, and the altitude is not found.

[2] 6,246 and a correct diagram is drawn, but no further work is shown.

or [2] A correct diagram is drawn, but the assumption is made that the altitude bisects the base, and an appropriate altitude is found.

[1] Only a correct diagram is drawn, and no further correct work is shown.

or [1] 6,246, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[367] B

[368] B

[369] B

[370] C

[371] A

[372] B

[2] –17, and appropriate work is shown.

[1] Appropriate work is shown, but one conceptual error or one computational or graphing error is made.

or [1] –17, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[373]
[4] $-1 \pm i\sqrt{6}$, and appropriate work is shown, such as appropriately substituting for $a$, $b$, and $c$ in the quadratic formula, solving the equation, and simplifying the answer correctly.

[3] Appropriate work is shown, but one computational or simplification error is made.

[2] Appropriate work is shown, but two or more computational or simplification errors are made.

or

[2] Appropriate work is shown, but one conceptual error is made, such as writing the quadratic formula incorrectly.

[1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.

or

[1] $-1 \pm i\sqrt{6}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] Both equations are graphed correctly over the specified domain and the interval $-\frac{\pi}{3} \leq x \leq \frac{\pi}{3}$ is identified.

[3] Appropriate work is shown, but one computational or graphing error is made.

or

[3] Both equations are graphed correctly over the specified domain, but the interval is not identified or is written as $-1.0472 \leq x \leq 1.0472$ or $-60^\circ \leq x \leq 60^\circ$ or $-\frac{\pi}{3} < x < \frac{\pi}{3}$.

[2] Appropriate work is shown, but two or more computational or graphing errors are made.

or

[2] Appropriate work is shown, but one conceptual error is made, such as graphing $y = 4 \sin x$.

or

[2] The equation $y = 4 \cos x$ is graphed correctly over the specified domain, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or

[1] $-\frac{\pi}{3} \leq x \leq \frac{\pi}{3}$, but no work is shown and no graphs are drawn.

[0] The equation $y = 2$ is graphed correctly, but no further correct work is shown.

or

[0] $-1.0472 < x < 1.0472$ or $-60^\circ < x < 60^\circ$

or

$-\frac{\pi}{3} < x < \frac{\pi}{3}$, and no work is shown.

or

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[376] C

[377] A

[378] C

[379] B

[380] D
[4] -1, and appropriate work is shown.
[3] Appropriate work is shown, but one computational, factoring, or simplification error is made.
[2] Appropriate work is shown, but two or more computational, factoring, or simplification errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as not factoring out -1 or not multiplying by the reciprocal.
[1] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.
or [1] -1, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[381] Incorrect procedure.

[382] A

[383] A

[6] Either a correct Euclidean proof is written, with a concluding statement that the diagonals bisect each other, or a correct analytic proof using coordinate geometry is written, with a concluding statement that the diagonals bisect each other.

[5] One reason is omitted or incorrect.
or [5] Appropriate work is shown, but one computational error is made.
or [4] The appropriate triangles are proven to be congruent, but the corresponding parts and a final statement that indicates why the diagonals are bisected are omitted.
or [4] Appropriate work is shown, but two computational errors are made.
or [4] A correct analytic proof using coordinate geometry is written, but no concluding statement is made.
or [3] An appropriate conclusion is drawn, including a statement that indicates why the diagonals are bisected; but only a partial proof is written, with two steps missing, and errors in the statements or reasons are made.
or [3] An analytic proof using coordinate geometry with more than two errors is written, but an appropriate concluding statement is made.
or [3] The diagram in an analytic proof is labeled incorrectly or numerically, but the rest of the proof is correct.
or [2] Statements for the Euclidean proof are written, but no valid reasons are given.
or [2] A congruence proof is written with some valid statements and reasons, but a concluding statement that the diagonals bisect each other is not made.
or [1] A correctly labeled diagram for a Euclidean proof is shown, but no proof is written.
or [1] An analytic proof using coordinate geometry with more than two errors is written, but no concluding statement is made.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] $6.15, and appropriate work is shown, such as solving simultaneous equations or using a trial-and-error method.

[3] $2.95 (movie) and $3.20 (game) are found, but they are not added. 
or [3] Appropriate work is shown, but one computational error is made.

[2] The system of equations is set up correctly, but one conceptual error leads to an appropriate solution. 
or [2] $2.95 (movie) or $3.20 (game), and appropriate work is shown.

[1] $6.15, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[385] 

[4] Yes, and appropriate work is shown, and an appropriate justification is given.

[3] Appropriate work is shown, and an appropriate justification is given, but one computational error is made, or the negative value of t is not rejected.

[2] An appropriate graph or equation is shown, such as $16t^2 - 8t - 15 = 0$.

[1] An incorrect graph or equation of equal difficulty is used, but an appropriate solution is found.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[386] 

[387] C____

[388] A____

[389] C____

[390] A____

[391] B____

[4] 4.1 and the equation $T = 8 \cos t + 78$ is graphed correctly and appropriate work is shown to determine the amount of time, such as using the table function of the graphing calculator or estimating (3.9-4.3 hours) based on the graph.

[3] The equation $T = 8 \cos t + 78$ is graphed correctly and the correct intervals are stated, but the number of hours is not found or is incorrect.

[2] The equation $T = 8 \cos t + 78$ is graphed correctly, but no further correct work is shown.

or [2] The equation $T = 8 \cos t + 78$ is graphed incorrectly, but an appropriate number of hours is found, based on the incorrect graph.

[1] 4.1, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[392] 

[393] D____
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement or reason is missing or is incorrect, or the concluding statement is missing.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[5] \( \triangle BAM \cong \triangle CDM \) is proven, but no further correct work is shown.

or [5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
[0] The "given" and/or the "prove" statements are rewritten in the style of a formal proof, but no further correct relevant statements are written.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[396] 
[397]
[4] A correct table of values is provided, a correct graph is drawn, and 670; 12, and appropriate work is shown, such as extending the graph or solving algebraically.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] A correct table of values is provided, a correct graph is drawn, and 670, but no further correct work is shown.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] 670 and 12, but an algebraic solution is provided.
or [2] 670 and 12, but either the graph is not drawn or the table of values is not provided.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] A correct graph is drawn, but no further correct work is shown.
or [1] A correct table of values is provided, but no further correct work is shown.
or [1] 670 and 12, but no work is shown and no graph is drawn.
[0] 670 or 12, but no work is shown and no graph is drawn.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[400] C
[401] D
[402] D
[403] C
[404] B

[2] x - 2, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] x - 2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[405]
[2] The slopes of $\overline{RA}$ and $\overline{PT}$ are calculated correctly, and appropriate work is shown, and the statement is made that since their slopes are equal, the lines are parallel.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, and the slopes are shown to be equal, but no concluding statement is written.

[0] A statement is written that lines with equal slopes are parallel, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 5, and appropriate algebraic work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] 5 and 0, and appropriate work is shown, but the zero is not rejected.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as squaring $x - 1$ incorrectly.

or [2] 5, but a method other than an algebraic solution is used, such as graphing or trial and error with at least three trials and appropriate checks.

or [2] A correct quadratic equation is written in standard form, such as $0 = x^2 - 5x$, but no further correct work is shown.

or [2] An incorrect quadratic equation of equal difficulty is solved appropriately.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] An incorrect equation of a lesser degree of difficulty is solved appropriately.

or [1] 5, but no work is shown.

[0] 5 and 0, and no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] $y = 451.431x^{-0.243}$ and 272, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] $y = 451.431x^{-0.243}$, but 7, instead of 8, is substituted for $x$ to find the number of new cases.
or [3] $y = 451.431x^{-0.243}$ and 272, but no work is shown to find the number of cases.
or [3] The expression $451.431x^{-0.243}$ is written, and appropriate work is shown to find 272, but no equation is written.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The correct regression equation is written, but no further correct work is shown.
or [2] An incorrect regression equation of equal difficulty is solved appropriately for the number of new cases, and appropriate work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] An incorrect regression equation of a lesser degree of difficulty is solved appropriately for the number of new cases, and appropriate work is shown.
or [1] The expression $451.431x^{-0.243}$ is written, but no further correct work is shown.
or [1] 272, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[408] __________

[409] __________

[410] __________

[411] __________

[412] B

[413] D

[414] C

[415] C

[2] $-4 \leq C \leq 36$, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but only one extreme value is found.
or [1] $-4 \leq C \leq 36$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] Correct scatter plot including labeled axes, equation of best fit ($V = 22.5P^{-1}$), and at $P = 2.5$, the value of $V$ is 9.

[5] All correct but:
No or improper labels on axes.
or Incorrectly plotted points.
or Arithmetic error finding the equation or $V$.
[4] Incorrect type of function for equation.
or [4] No labels on axes and some incorrectly plotted points.
or [4] No functional value at 2.5 and single graphing error.
[3] Completely incorrect graph, but correct equation and functional value at 2.5.
or [3] Correctly drawn graph, but no or incorrect equation, and no or incorrect functional value at 2.5.
or [2] Correct equation only.
[1] Correct value at 2.5, but no work shown.
or [1] Correct scatter plot but minor errors on intervals of axes.
[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[416] D______

[417] D______

[420] A______

[421] C______

[422] C______

[4] 91.5, and appropriate work is shown, such as using the Law of Sines to find either side of the obtuse triangle and then using the sine function to find the height of the lighthouse.

[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The angles in the obtuse triangle are found incorrectly, but appropriate work is shown, and an appropriate height of the lighthouse is found.

[2] Appropriate work is shown, but more than one computational or rounding error is made.
or [2] A correct length of a side of the obtuse triangle is found, but no further correct work is shown.

[1] An appropriate equation is set up for one triangle, but it is not solved.
or [1] 91.5, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[423] D______

[424] D______
[4] 2, and appropriate work is shown, such as determining that the 108 square feet and the new length of $AB$ is 16 feet.

[3] Appropriate work is shown, but one computational error is made.

or [3] The area of the original triangle and the new length of side $AB$ are found correctly, but the length is not subtracted to find the difference.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown, but one computational error is made, and the length is not subtracted to find the difference.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] The area of the original triangle is found correctly, but no further correct work is shown.

or [1] 2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.


[3] 3, and appropriate work is shown, but one graphing error is made.

or [3] A correct graph is drawn and the points 0.5 and 3.5 are identified, but the difference is not calculated.

[2] Appropriate work is shown, but two or more graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] 3, but a method other than a graphic solution is used.

[1] Appropriate work is shown, but one conceptual error and one graphing error are made.

or [1] A correct graph is sketched with $t = 0$ to $t = 4$, but no further correct work is shown.

or [1] 3, but no work is shown and no graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 68, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 68, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] (0,0) and \( \left( \frac{1}{2}, \frac{1}{2} \right) \), and both graphs are drawn correctly.

[3] Both graphs are drawn correctly, but one or both points of intersection are stated incorrectly.

or [3] The graph of \( y = 2x^2 \) is incorrect, but the inverse is appropriate or correct, and the appropriate points of intersection are stated correctly.

[2] Both points of intersection are found correctly, using an algebraic solution.

or [2] The graph of \( y = 2x^2 \) is incorrect, but the inverse is appropriate or correct, but no further work is shown.

or [2] The graph of \( y = 2x^2 \) is correct, but the inverse is incorrect, but the appropriate points of intersection are stated.

or [2] The graph of \( y = 2x^2 \) is incorrect, but the inverse is correct, but the points of intersection are not stated or are incorrect.

[1] Both graphs are incorrect, but the points of intersection are appropriate, based on the incorrect graphs.

or [1] The graph of \( y = 2x^2 \) is correct, but the inverse is incorrect, and the points of intersection are labeled or stated incorrectly.

or [1] (0,0) and \( \left( \frac{1}{2}, \frac{1}{2} \right) \), but no work is shown.

[0] Straight lines are used as graphs of the functions.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[429] D____

[430] [4] 2003 or 2004 (since the calculator yields 15.7 either year is acceptable) and correctly solves the log problem algebraically with work shown.

[3] Algebraically solves, with work shown, for 15.7, but does not find the correct year.

or [3] Makes a computational error in solving the log problem, but uses the answer to find a year.

[2] Sketches a graph and gets 15.7, and finds the year.

or [2] Uses trail and error method (with at least 3 trials) and finds the correct year.

or [2] Tries to use logs and makes multiple mechanical errors, but finds a year.

or [2] Sets up correct log equation.

[1] Finds 15.7, or gives the year with no work shown.

or [1] Sets equation equal to 10 or 10,000,000 but does not solve.

[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[431] [2] \( r = \sqrt{\frac{Gm_2}{F}} \) or \( r = \pm \sqrt{\frac{Gm_2}{F}} \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as solving for \( r^2 \).

or [1] \( r = \sqrt{\frac{Gm_2}{F}} \) or \( r = \pm \sqrt{\frac{Gm_2}{F}} \).

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[432] D____
[4] 174, and appropriate work is shown, such as the use of the Law of Cosines.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] One conceptual error is made when applying the Law of Cosines, but an appropriate answer is found.
[1] Correct substitution is made into the Law of Cosines, but no further correct work is shown.
or [1] 174, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[433] }}

[434] C

[435] A

[2] \( \frac{1}{3} \), and appropriate algebraic work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] The equation \( (3^2)^{3x} = 3^{3x+1} \) or an equivalent equation is written, but no further correct work is shown.
or [1] \( \frac{1}{3} \), but a method other than algebraic is used.
or [1] \( \frac{1}{3} \), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[437] }}

[438] A

[439] A

[4] \( y = -35.5x + 457.5 \) and 103, and appropriate work is shown, such as substituting 10 into the regression equation.
[3] Appropriate work is shown, but one computational, rounding, or substitution error is made.
or [3] The expression \(-35.5x + 457.5\) is written and 103, and appropriate substitution is shown, but no equation is written.
or [3] \( y = -35.5x + 457.5 \) and 103, but no substitution is shown.
[2] Appropriate work is shown, but two or more computational, rounding, or substitution errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An incorrect linear regression equation is written, but an appropriate number of new cases is found.
or [2] \( y = -35.5x + 457.5 \), but no further correct work is shown.
or [2] The expression \(-35.5x + 457.5\) is written and 103, but no substitution is shown.
[1] Appropriate work is shown, but one conceptual error and one computational, rounding, or substitution error are made.
or [1] The expression \(-35.5x + 457.5\) is written or 103, but no substitution is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 6.8, and appropriate work is shown, such as using the Law of Cosines or the Law of Sines or right triangle trigonometry.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] 3.4, and appropriate work is shown, such as \( \cos 70 = \frac{x}{10} \) or \( \sin 20 = \frac{x}{10} \).
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.
or [2] Correct substitution is made into the Law of Sines or the Law of Cosines, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The measures of \( \overline{EA} \) and \( \overline{SA} \) are found correctly, but no further correct work is shown.
or [1] The measures of the three angles of triangle \( \triangle SEA \) are found correctly, but no further correct work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[440] B____

[441] B____

[442] B____

[443] B____

[444] B____
A correct graph is sketched and 1.25, and appropriate work is shown.

A correct graph is sketched, but one computational or rounding error is made in determining the time.

or [3] Appropriate work is shown, but one error is made in sketching the graph, such as the axes are not labeled or are labeled incorrectly, but the time is determined correctly.

or [3] A correct graph is sketched and appropriate work is shown to calculate the time, but the negative root is not rejected.

[2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct graph is sketched, but no further correct work is shown.

or [2] Appropriate work is shown, but one conceptual error and one computational or rounding error is made, and no graph or an incorrect graph is sketched.

or [1] Appropriate work is shown to calculate the time, but the negative root is not rejected, and no graph or an incorrect graph is sketched.

or [1] 1.25, but no graph or an incorrect graph is sketched, and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

B____

[2] 5, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as finding or [1] 5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

y = 32.35x^{0.26} and 58.9, and appropriate substitution is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] A correct regression equation is written and 58.9, but no substitution is shown.

or [3] The expression 32.35x^{0.26} is written, and appropriate work is shown to find 58.9.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] An incorrect regression equation is solved appropriately.

or [2] y = 32.35x^{0.26}, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 58.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] 56.4 and 79, and appropriate work is shown, such as using the Law of Sines and then the Law of Cosines or the Law of Sines.

[5] Appropriate work is shown, but one computational or rounding error is made.

or [5] Appropriate work is shown, and the angle between the resultant and the 50-pound force is found to be 24.4 and the force is found to be 79, but the angle between the original forces is not stated.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

or [4] Appropriate work is shown, to find 56.4, but no further correct work is shown.

[3] Appropriate work is shown, but one conceptual error is made.

or [3] Appropriate work is shown to find 24.4, but no further correct work is shown.

[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [2] Appropriate work is shown to find 24.4, but no further correct work is shown.

or [2] 56.4 and 79, but no work is shown.

[1] A complete and correctly labeled diagram is drawn to illustrate the problem, but no further correct work is shown.

or [1] 56.4 or 79, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[450] incorrect procedure.

[451] D

[452] C

[453] C

[454] 56.8 and 13, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

or [4] The Law of Cosines is used correctly to determine the magnitude of the resultant, but no further correct work is shown.

[3] Appropriate work is shown, but one conceptual error is made.

[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [2] 56.8 and 13, but no work is shown.

[1] Appropriate work is shown to find the measure of the angle, but one computational or rounding error is made, and no further correct work is shown.

or [1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.

or [1] 56.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
\[ \angle BHD = 65, \quad \angle BDG = 75, \quad \angle GDE = 55, \quad \angle C = 35, \quad \text{and} \quad \angle BOD = 100, \] and appropriate work is shown.

5. \( \angle GF \) is determined correctly, but \( \angle BD \) is determined incorrectly, but all five of the angle measures are determined appropriately.

or 5. \( \angle GF \) is determined incorrectly, but all five of the angle measures are determined appropriately, based on the incorrect arc measure.

or 5. \( \angle GF \) is determined correctly, but only four of the angle measures are determined correctly.

4. \( \angle GF \) is determined incorrectly, and only four of the angle measures are determined appropriately, based on the incorrect arc measure.

or 4. \( \angle GF \) is determined correctly, but only three of the angle measures are determined correctly.

3. \( \angle GF \) is determined incorrectly, and only three of the angle measures are determined appropriately, based on the incorrect arc measure.

or 3. \( \angle GF \) is determined correctly, but only two of the angle measures are determined correctly.

2. \( \angle GF \) is determined incorrectly, and only two of the angle measures are determined appropriately, based on the incorrect arc measure.

or 2. \( \angle GF \) is determined correctly, but only one angle measure is determined correctly.

1. \( \angle GF \) is determined incorrectly, and only one angle measure is determined appropriately.

or 1. \( \angle GF \) is determined correctly, but no further correct work is shown.

0. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] \( \frac{3}{2} \), and appropriate work is shown.

[3] Appropriate work is shown, but one computational, factoring, or simplification error is made.

[2] Appropriate work is shown, but two or more computational, factoring, or simplification errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as not factoring out \(-1\).

or [2] Appropriate work is shown, but the answer is left as \( \frac{3x - 9}{2(x - 3)} \) or as an equivalent expression.

[1] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.

or [1] Appropriate work is shown, but the answer is left as \( \frac{3x}{2(x - 3)} + \frac{9}{2(3 - x)} \).

or [1] \( \frac{3}{2} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[458] __________

[459] B

[4] 90\(^\circ\) and 270\(^\circ\), and appropriate work is shown, such as solving the equation \( 3 \cos x + 2 \sin x \cos x = 0 \) or sketching a graph and finding the \( x \)-intercepts.

[3] Appropriate work is shown, but one computational, factoring, or graphing error is made.

or [3] Appropriate work is shown, but the answers are expressed in radian measure.

[2] Appropriate work is shown, but two or more computational, factoring, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, or [2] An appropriate graph is sketched, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational, factoring, or graphing error are made.

or [1] Correct substitution is made for \( \sin 2x \), but no further correct work is shown.

or [1] 90\(^\circ\) and 270\(^\circ\), but no work is shown.

[0] 90\(^\circ\) or 270\(^\circ\), but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[460] __________

[2] \( \frac{\pi}{3} \), and appropriate work or an appropriate diagram is shown.

[1] Appropriate work is shown, but the answer is not expressed in simplest form.

or [1] A correct diagram is drawn, but no answer or an incorrect answer is found.

or [1] 60\(^\circ\), and appropriate work or an appropriate diagram is shown.

or [1] \( \frac{\pi}{3} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[461] __________

[462] D

[463] B
[464] D

[465] A

[466] B

[4] (0,1) and (1,2), and a correct graph is drawn with at least one function labeled.
[3] Appropriate work is shown, but one graphing error is made, such as plotting one point incorrectly or not labeling either function.
or [3] The graphs are drawn correctly, but only one correct solution is found or only the x- or the y-values are found correctly.
[2] Appropriate work is shown, but two or more graphing errors are made.
or [2] (0,1) and (1,2), but the solution is found by a nongraphic method.
or [2] The graphs are drawn correctly, but no correct solutions are found.
[1] The graph of only one equation is drawn correctly, and no further correct work is shown.
or [1] (0,1) and (1,2), but no work is shown.
or [0] (0,1) or (1,2), but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[467] __________

[468] A

[2] 8.5 + 7i √3, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or graphing error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 8.5 + 7i √3, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[469] __________

[470] __________

[471] D

[4] 84, and appropriate work is shown, and correct explanations are written.
[3] Appropriate work is shown, but one computational or rounding error is made, but both explanations are correct.
or [3] 84, but only one of the explanations is correct.
or [2] 84, but both explanations are only partially correct.
or [1] 84, but both explanations are missing or are incorrect.
or [1] One correct explanation is written, but no further correct work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[472] __________

[473] __________

[474] B

[475] C
[476] B____

[2] 255, and appropriate work is shown, such as \( g(3) = 3^2 - 1 \) and \( f(8) = 2^8 - 1 = 255 \).
[1] Appropriate work is shown, but one computational error is made.
or [1] One conceptual error is made, such as evaluating \((g \circ f)(3)\).
or [1] 255, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[477] [2] 6, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made, such as evaluating \((g \circ f)(5)\) resulting in an answer of 24.78270016.
or [1] 6, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[478] [2] 3, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] \(8^2 = x + 1\), but no further correct work is shown.
or [1] 3, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[479] A____

[480] C____

[481] A____

[482] D____

[483] D____

[484] [4] 41, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] One incorrect formula is used, but an appropriate answer is found.
or [2] Appropriate work is shown, but one computational and one rounding error are made.
[1] 41, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[485] D____

[486] A____

[487] C____

[488] A____

[489] D____

[490] D____
[4] (3,4), (4,3), (-3,-4), and (-4,-3), and appropriate graphs are drawn.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] Appropriate graphs are drawn, but only two or three points of intersection are identified.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as only graphing half of the hyperbola and finding two points of intersection.
or [2] Appropriate graphs are drawn, but no points of intersection are identified.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] Either the circle or the hyperbola is graphed correctly, but no further correct work is shown.
or [1] (3,4), (4,3), (-3,-4), and (-4,-3), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[487] [488] A
[489] B
[490] C

[491] [492] B
[493] C
[494] C

[4] (0,1) and (3,8), and both graphs are sketched correctly.
[3] Appropriate work is shown, but one graphing error is made, but all appropriate points of intersection are identified.
[2] Appropriate work is shown, but two or more graphing errors are made, but all appropriate points of intersection are identified.
or [2] Appropriate work is shown, but one conceptual error is made, such as failing to draw the graph over the specified interval, resulting in only one point of intersection.
or [2] Both graphs are sketched correctly, and the two points of intersection are indicated, but the coordinates are not stated or are stated incorrectly.
[1] Only the graph of the exponential function is sketched correctly, and no further correct work is shown.
or [1] (0,1) and (3,8), but no graph is sketched.
or [0] (0,1) or (3,8), but no graph is sketched.
or [0] Only the line is graphed correctly.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] 30 and 150, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but only 30 or 150 is found.
or [1] 30 and 150, but no work is shown.
[0] 30 or 150, but no work is shown.
or [0] The value of \( \sin \theta \) is shown to be \( \frac{1}{2} \).
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] Correct graphs, relationship, domain, and range:
f\( (x) \) and g\( (x) \) are reflections in the line \( y = x \)
or f\( (x) \) and g\( (x) \) are inverses.
and Domain of g: The set of all real numbers such that \( x > 0 \).
and Range of g: The set of all real numbers.
[3] Correct graphs and relationship; incorrect domain and/or range.
or [3] Correct graphs, domain, and range; incorrect relationship.
or [3] One correct graph; correct relationship, domain, and range.
[2] Correct graphs; incorrect relationship, and domain and/or range.
or [2] Incorrect graphs; correct relationship and domain and range.
or [2] One correct graph and either relationship, or domain and range correct.
[1] No graphs, or incorrect graph with correct relationship.
or [1] No graphs, or incorrect graphs with correct relationship.
or [1] One correct graph only.
[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[503] B

[497] B
[498] B
[499] C
[500] B
[501] C
[4] (2,300) and (-3,240), and appropriate algebraic work is shown.
[3] Appropriate work is shown, but one computational or factoring error is made.
or [3] The x-values of 2 and -3 are found correctly, but only one y-value is found, correctly.
[2] Appropriate work is shown, but two or more computational or factoring errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The x-values of 2 and -3 are found correctly, but no further correct work is shown.
or [2] (2,300) or (-3,240), and appropriate algebraic work is shown.
or [2] (2,300) and (-3,240), but a method other than an algebraic solution is used.
[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.
or [1] A method other than an algebraic solution is used, and one error is made.
or [1] (2,300) and (-3,240), but no work is shown.
or [0] (2,300) or (-3,240), but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

C______

[2] A graph is sketched that maps (-3,5) to (-6,10), (0,1) to (0,2), and (1,3) to (2,6).
[1] One graphing or computational error is made, but an appropriate graph is sketched.
or [0] A graph is sketched that represents a dilation of only x or y.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

B______

[2] 2.6, and appropriate work is shown, such as solving the equation algebraically, graphically or using trial and error with at least three trials and appropriate checks.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.
or [1] -2, but no work or fewer than three trials and appropriate checks are shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

B______
[4] 234, and appropriate work is shown, such as using the Law of Sines.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown, but one substitution error is made, such as using $m \angle FAB$.

or [3] Appropriate work is shown, but the correct distance to station B (180 miles) is found.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Correct substitution is made into the Law of Sines, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 234, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[512] D

[513] D

[514] D

[515] D

[4] 90, 221.81, and 318.19, and appropriate work is shown, such as solving the equation $3 \sin^2 \theta - \sin \theta - 2 = 0$.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] The equation is solved correctly for $\theta$, but only one or two of the solutions are found.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] 90, 221.81, and 318.19, and appropriate work is shown, but a graphic method is used.

or [2] Appropriate work is shown to find the values of $\sin \theta$, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] A correct quadratic equation in standard form is written, but no further correct work is shown.

or [1] 90, 221.81, and 318.19, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] The correct slopes of $AB = \frac{1}{2}$ and $CD = \frac{1}{2}$ are found, $AB \parallel CD$ is stated, and an explanation of why they are parallel is given. The correct slopes of $AD = -\frac{5}{2}$ and $BC = -\frac{1}{2}$ are found, $AD$ is not parallel to $BC$ is stated, and an explanation of why they are not parallel is given. An explanation that $ABCD$ is a trapezoid is given.

[5] The correct slopes of $AB$, $CD$, $AD$, and $BC$ are found, and $AB \parallel CD$ and $AD \not\parallel BC$ are stated, but an explanation that $ABCD$ is a trapezoid is not given.

or [5] One computational error is made in finding the slopes, but all further work is appropriate, based on the calculated slopes.

[4] The correct slope of $AB$ and $CD$ are found, and $AB \parallel CD$ is stated, but incorrect slopes of $AD$ and $BC$ are found, but an explanation of why they are not parallel is given, but an explanation that $ABCD$ is a trapezoid is not given.

or [4] More than one computational error is made in finding the slopes, but $AB$ and $CD$ are found to have equal slopes and $AD$ and $BC$ to have different slopes, but an explanation that $ABCD$ is a trapezoid is given.

[3] Incorrect slopes of $AB$, $CD$, $AD$, and $BC$ are found, such as by using an incorrect formula, $AB$ and $CD$ are found to have equal slopes and $AD$ and $BC$ to have different slopes, but an explanation that $ABCD$ is a trapezoid is given.

[2] Only the correct slopes of $AB$, $CD$, $AD$, and $BC$ are found, and appropriate work is shown.

[1] Only two correct slopes or distances are found.

[516] A ________

or [1] $AB = \frac{1}{2}$, $CD = \frac{1}{2}$, $AD = -\frac{5}{2}$, and $BC = -\frac{1}{2}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[517] ________ ________
[4] $\frac{1,472}{78,125}$, and appropriate work is shown, such as $C_6\left(\frac{2}{5}\right)^6\left(\frac{3}{5}\right)^0 + C_7\left(\frac{2}{5}\right)^7\left(\frac{3}{5}\right)^0$.

[3] Appropriate work is shown, but one computational error is made.

or [3] The probabilities for exactly six times and exactly seven times are calculated correctly, but they are not added.

or [3] The probability for at most six times is calculated correctly.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] Appropriate work is shown, but one conceptual error is made, such as multiplying the probabilities.

[1] A correct expression is written for finding the probability, but no further correct work is shown.

or [1] The probability for exactly six times is calculated correctly.

or [1] $\frac{1,472}{78,125}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[519]

[520] A ___

[521] C ___

[522] D ___

[523] B ___

[2] Mean = 31 and standard deviation = 3.2, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Either the mean or the standard deviation is determined correctly, and appropriate work is shown.

or [1] Mean = 31 and standard deviation = 3.2, but no work is shown.

[0] Mean = 31 or standard deviation = 3.2, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[524] A ___

[525] A ___

[526] A ___
[2] $\sqrt{171}$ or 13 or 13.1 or 13.08 or an equivalent answer, and appropriate work is shown, such as the use of the equation of a circle $(x^2 + y^2 = r^2)$ or the Pythagorean theorem.

[1] Appropriate work is shown, but one computational error is made.

or [1] Incorrect analysis is shown, such as $x = 5$ and $y = 14$, but the work is concluded appropriately.

or [1] A correct answer is found, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[527]

[528] B __

[529] A __

[530] B __

[531] D __

[532] C __

[533] A __

[534] C __

[4] $y = 4.194(1.068)^x$ and 112.5, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] $y = 4.194(1.068)^x$ and 112.5, but no substitution is shown.

or [3] The expression $4.194(1.068)^x$ is written and 112.5, and appropriate substitution is shown.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] $y = 4.194(1.068)^x$ but no further correct work is shown.

or [2] An incorrect regression equation of equal difficulty is solved appropriately.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] An incorrect regression equation of a lesser degree of difficulty is solved appropriately.

or [1] The expression $4.194(1.068)^x$ is written and 112.5, but no work is shown.

or [1] 112.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[535]

[536] A __

[537] A __
[6] \( \overline{JK} \parallel \overline{ML}, \overline{MJ} \neq \overline{KL}, \) and appropriate work is shown or a complete and correct proof is written, and a concluding statement is written.

[5] Appropriate work is shown and a correct concluding statement is written, but one computational error is made in determining the slopes or the lengths of the legs.

or [5] Appropriate work is shown, but the concluding statement is missing or is incomplete.

[4] Appropriate work is shown and a correct concluding statement is written, but two or more computational errors are made.

or [4] The quadrilateral is proved to be a trapezoid, but the two nonparallel sides are not proved to be unequal.

or [4] A proof is written that shows that \( \overline{JK} \parallel \overline{ML} \) and \( \overline{MJ} \neq \overline{KL} \), but the difference between a quadrilateral and a trapezoid is not addressed.

[3] Appropriate work is shown, but one conceptual error is made.

[2] The quadrilateral is proved to be a trapezoid, but one conceptual error is made, and the two nonparallel sides are not proved to be unequal.

or [2] The lengths of all four sides are found correctly, but no further correct work is shown.

or [2] The two nonparallel sides are proved to be unequal, but no further correct work is shown.

[1] The proof shows that the first set of sides is parallel, but no further correct work is shown.

or [1] JKLM is graphed correctly and the definition of an isosceles trapezoid is written, but no proof is written.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.


[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but one computational error and one rounding error are made.

or [2] The Law of Cosines is shown, but sine is used instead of cosine, such as

\[ x^2 = 3.2^2 + 5.6^2 - 2(3.2)(5.6)(\sin 40) \]

but an appropriate answer is determined, based on that error.

[1] Substitution into the Law of Cosines is used, but no further work is shown.

or [1] 3.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 5,279.61, and appropriate work is shown, such as

\[ 3500(1 + \frac{0.0825}{12})^{12 \times 5} \]

[1] Appropriate work is shown, but one computational or substitution error is made.

or [1] 5,279.61, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 7,800, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] 7,800, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] B

[1] B
[4] 4.27, and appropriate work is shown, such as solving the equation \((9 + x)(12 + x) = 216\).

[3] Appropriate work is shown, but one computational or rounding error is made. or [3] Appropriate work is shown, but the negative root is not rejected. or [2] Appropriate work is shown, but two or more computational or rounding errors are made. or [2] Appropriate work is shown, but one conceptual error is made. or [2] A correct equation is written in standard form, but no further correct work is shown. or [2] An incorrect quadratic equation of equal difficulty is solved appropriately. or [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made. or [1] An incorrect quadratic equation of a lesser degree of difficulty is solved appropriately. or [1] 4.27, but no work is shown. or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[551] ____________


[547] ____________

[548] A_____ [549] C____

[2] 20.1, and appropriate work is shown. [1] Appropriate work is shown, but one computational or rounding error is made. or [1] Appropriate work is shown, but one conceptual error is made. or [1] The time when the ball reaches its maximum height is found correctly, but no further correct work is shown. or [1] 20.1, but no work is shown. [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[550] ____________

[551] B____
[6] A correct scatter plot, \( y = 0.62x + 29.18 \), \( r = 0.92 \), and 83; and appropriate work is shown.

[5] Appropriate work is shown, but one computational or rounding error is made.

or [5] A correct scatter plot, equation, and score are shown, but no \( r \)-value is found.

[4] A correct scatter plot and equation are shown, but the \( r \)-value and score are missing or incorrect.

or [4] An incorrect equation is shown, but all further work is appropriate.

or [4] The scatter plot is missing or incorrect, but all further work is appropriate.

[3] The scatter plot is incorrect, but a correct equation and either a correct \( r \)-value or score are found.

or [3] The scatter plot is correct, but an incorrect equation and either an appropriate \( r \)-value or score based on the incorrect equation are found.

[2] Only a correct scatter plot is shown, and all further work is missing or incorrect.

or [2] Only a correct equation is shown, and all further work is missing or incorrect.

[1] An incorrect equation is shown, but an appropriate score is found.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

\[ y = 379.92(1.04)^x \] and 562, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] \( y = 379.92(1.04)^x \) and 562, but the substitution is not shown to find the value of the stock.

or [3] The expression \( 379.92(1.04)^x \) is written and 562, but no work is shown.

or [2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] A correct regression equation is written, but no further correct work is shown.

or [2] An incorrect exponential regression equation of equal difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.

or [2] An incorrect exponential regression equation of equal difficulty is written, but no further correct work is shown.

or [2] A correct regression equation is written, but one conceptual error and one computational or rounding error are made.

or [1] An incorrect regression equation of a lesser degree of difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.

or [1] The expression \( 379.92(1.04)^x \) is written, but no further correct work is shown.

or [1] 562, but no work is shown.

or [1] An incorrect regression equation of a lesser degree of difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.

or [1] The expression \( 379.92(1.04)^x \) is written, but no further correct work is shown.

or [1] 562, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

\[ y = 379.92(1.04)^x \] and 562, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] \( y = 379.92(1.04)^x \) and 562, but the substitution is not shown to find the value of the stock.

or [3] The expression \( 379.92(1.04)^x \) is written and 562, but no work is shown.

or [2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] A correct regression equation is written, but no further correct work is shown.

or [2] An incorrect exponential regression equation of equal difficulty is written, but an appropriate substitution is made, and an appropriate value of the stock is found.

or [2] An incorrect exponential regression equation of equal difficulty is written, but no further correct work is shown.

or [2] A correct regression equation is written, but one conceptual error and one computational or rounding error are made.

or [2] The expression \( 379.92(1.04)^x \) is written and 562, but no work is shown.

or [2] A correct regression equation is written, but no further correct work is shown.
[2] \(- \frac{x - 3}{10x + 2}\) or an equivalent answer in simplest form, and appropriate work is shown.
[1] Either the numerator or the denominator is factored completely.
or [1] Appropriate work is shown, but \(\frac{3 - x}{x - 3} = -1\) is not recognized.
or [1] \(- \frac{x - 3}{10x + 2}\) or an equivalent answer in simplest form, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[565] B

[566] D

[567] 

[4] 0.15 hour or 9 minutes or an appropriately rounded answer, and appropriate work is shown, such as using the Law of Cosines.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] The correct distance along County Route 21 is found, but no further work or incorrect work is shown.
or [2] Appropriate work is shown, but one computational and one rounding error are made.
[1] The Pythagorean theorem is used to find the distance along County Route 21, and this distance is used to compare travel times.
or [1] 0.15 hour or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[568] 

[569] C

[570] C

[571] 

[572] C

[573] B

[574] D
[2] $y = 1.08x - 2125$ or an equivalent equation is written.

[1] One conceptual error is made, such as writing a regression equation that is not linear.

or [1] The expression $1.08x - 2125$ is written, but no equation is written.

or [1] The correct values are identified for $a$ and $b$, but no equation is written.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[575]

[2] $-\frac{3}{5}$, and appropriate work is shown, such as $\cos(x + 180) = \cos x \cos 180° - \sin x \sin 180° = \frac{3}{5}(-1) - \frac{4}{5}(0)$.

or [2] $-\frac{3}{5}$, and angle $x$ is found, and correct substitution leads to $\cos(x + 180)$.

[1] Appropriate work is shown, but one computational error is made.

or [1] $\cos x = \frac{4}{5}$ is found, but substitution errors are made.

or [1] $-\frac{3}{5}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[576]

[577] D

[578] C

[580] B

[581] D

[582] C

[583] B

[2] $-40x^2y^3$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $-40x^2y^3$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[579]

[4] 88, and appropriate work is shown, such as $\frac{y}{\sin 32} = \frac{100}{\sin 33}$ and $\sin 65 = \frac{x}{y}$.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as setting up an incorrect proportion.

or [2] The hypotenuse of one of the right triangles is found correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The obtuse triangle is treated as a right triangle, but an appropriate height is found for the tower.

or [1] 88, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[582]
[6] \(- (x - 3), \ - x + 3, \text{ or } 3 - x\), and appropriate work is shown.
[5] Appropriate work is shown, but one computational, factoring, or simplification error is made.
[4] Appropriate work is shown, but two computational, factoring, or simplification errors are made.
or [4] \(x - 3\), and appropriate work is shown.
[3] Appropriate work is shown, but three or more computational, factoring, or simplification errors are made.
or [3] Appropriate work is shown, but one conceptual error is made, such as not multiplying by the multiplicative inverse.
[2] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.
[1] \(- (x - 3), \ - x + 3, \text{ or } 3 - x\), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[5] \(- \frac{s}{r(r + s)}, \text{ or } \frac{s}{r^2 + rs}\), and appropriate work is shown.
[4] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] Appropriate work is shown, but the answer is not expressed in simplest form.
or [1] \(- \frac{s}{r(r + s)} \text{ or } \frac{s}{r^2 + rs}\), but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[590] D_____
[591] D_____
[592] D_____
[593] D_____
[594] C_____

[595] D_____
[596] D_____
[597] A_____
[598] C_____
[599] D_____
[36] Finds 3 + i\sqrt{3} and 3 - i\sqrt{3}, or 3 + 1.73i and 3 - 1.73i by using the quadratic formula or some other valid method.

[3] Finds a correct answer, but does not simplify.

[3] Uses a correct procedure, but makes an arithmetic mistake or simplifies improperly.

[3] Finds incorrect roots based upon a mistake in the quadratic formula which keeps the discriminant negative.

[2] Writes a correct equation:
\[ x^2 - 6x + 12 = 0, \]
and a correct discriminant of \(i\sqrt{12}\) or \(2i\sqrt{3}\), but incorrect roots.

[2] Uses a correct procedure, but makes more than one error.

[1] Writes the correct equation only.

[1] Obtains correct answer, but no work is shown.

[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[4506] and shows an appropriate application of the Law of Cosines such as
\[ a^2 = 1146.75^2 + 3746.75^2 - 2(1146.75)(3746.75)\cos 125.2^\circ. \]

[3] Makes an appropriate application of the Law of Cosines, but does not add the wall length to the distances. (answer 4086)

[3] Uses the appropriate method, but makes a minor mathematical or rounding error.

[3] 4506 showing a correct diagram but showing no Law of Cosines.

[2] Correctly uses the Law of Cosines, with or without the wall added, but does not find the square root.


[2] Finds the distance between the ends of the two walls (answer 438) using the Law of Sines or Cosines.

[1] Obtains the correct answer of 4506, but does not show any work.

[1] Sets up diagram with correct sides (1146.75 and 3746.75) and angle, but does not solve problem.

[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.
Math B Regents Exam Questions at Random

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[4] .994, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The probabilities are calculated correctly, but they are not added.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as finding the probability that at most three flights will be on time.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] Appropriate work is shown to find exactly three flights will be on time.
or [1] .994, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.


[608] B____

[609] D____

[4] \( f(x) = 98.8571x + 737.3333 \) or \( y = 98.8571x + 737.3333 \) and day 14, and appropriate substitution is made, such as \( 2050 = 98.8571x + 737.3333 \).
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] A correct linear regression equation is written and day 14, but no substitution is made.
or [3] The expression \( 98.8571x + 737.3333 \) is written and day 14, but no equation is written.
or [2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct linear regression equation is written, but no further correct work is shown.
or [2] An incorrect equation of equal difficulty is solved appropriately.
or [1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The expression \( 98.8571x + 737.3333 \) is written, but no further correct work is shown.
or [1] Day 14, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[610] incorrect procedure.

[611] D____
[2] An appropriate explanation is given, such as:
One very high or very low score in either class would have a great effect on the range for that class, but might not affect the median at all. The range is the difference between the two most extreme values, the lowest and the highest. The median, being the middle value, is not very sensitive to outliers or to extreme values.
or [2] Specific examples are shown to illustrate the situation.
[1] An understanding of median and range is demonstrated, but the specific situation is not explained.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 50, and appropriate work is shown, such as \(2(1 + 3 + 5 + 7 + 9)\).
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but \((1 + 3 + 5 + 7 + 9)\) is not multiplied by 2, resulting in an answer of 25.
or [1] 50, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[6] \(y = 0.01021x - 1.66787, 4.56, \) and 913, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] The expression \(0.01021x - 1.66787\) is written and 4.56 and 913 are found, and appropriate work is shown.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] A correct equation is written, but either the gross earnings or the number of theaters is not found, but appropriate work is shown.
or [4] An incorrect equation of equal difficulty is written, but appropriate answers are found, and appropriate work is shown.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] \(y = 0.01021x - 1.66787, 4.56, \) and 913, but no work is shown.
or [3] The expression \(0.01021x - 1.66787\) is written and either 4.56 or 913 is found, and appropriate work is shown.
or [3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] A correct equation is written, but no further correct work is shown.
or [2] 4.56 and 913, but no work is shown.
or [1] The expression \(0.01021x - 1.66787\) is written, but no further correct work is shown.
or [1] Either 4.56 or 913, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 60°, and an appropriate sketch is drawn, and appropriate work is shown.
[3] A correct sketch is shown, and $\overline{AB}$ is correct.
or [3] A correct sketch is shown, but one computational error is made, leading to an incorrect $\overline{AB}$, but $\overline{CB}$ is appropriate, based on the incorrect $\overline{AB}$.
[2] A correct sketch is shown, but an incorrect procedure is used to find either the correct or incorrect $\overline{AB}$, but $\overline{CB}$ is appropriate, based on the incorrect $\overline{AB}$.
or [2] An incorrect sketch is shown, but an appropriate $\overline{CB}$ is found, based on the incorrect sketch.
[1] Only a correct sketch is shown.
or [1] 60°, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[616] 

[617] A______
[618] B______
[619] C______
[620] B______
[621] B______

[622] [4] 90 and 270, and appropriate work is shown, such as solving $\sin^2 \theta = 1 + \cos \theta$.
[3] Appropriate work is shown, but one computational error is made or the answers are expressed in radians.
or [3] Appropriate work is shown, but 180 is not rejected as a solution.
or [3] Appropriate work is shown, but only one solution is found.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] An incorrect trigonometric substitution is made, but the equation is solved appropriately.
or [2] A trigonometric equation set equal to zero is written, but no further correct work is shown.
or [2] 90 and 270, but a graphic solution is provided.
[1] The equation $\sin^2 \theta - \cos \theta - 1 = 0$ is found, but no further correct work is shown.
or [1] A graphic solution is provided, and one computational or graphing error is made.
or [1] 90 and 270, but no work is shown.
or [0] 90 or 270, but no work is shown.
or [0] 90, 180, and 270, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
16 or 16:9 is found by determining the ratio of their radii and the correct areas ratio.

[3] Incorrectly identifies radian measure, but produces a ratio based on areas.

or [3] Incorrect statement of correct area ratio such as 9:16.

[2] Gets correct ratio of radii, but uses $C = 2\pi r$, instead of $A = \pi r^2$, giving answer of 4:3.

[1] Finds correct ratio of radii, 4:3 only.

or [1] $\frac{16}{9}$ with no work.

[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[4] $\frac{60}{729}$ or $\frac{20}{243}$ or .0823, and appropriate work is shown, such as $\frac{2}{3}^2 \left(\frac{1}{3}\right)^4$.

[2] Substitution with $r = 30$ is shown and the order of operations is used incorrectly and an exponential function is maintained, but $t$ is solved for appropriately, using logs.

[1] Substitution with $r = 0.3$ is shown, resulting in $0.2 = 0.7t$, but no further work is shown.

or [1] 4.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[4] 4.5, and appropriate work is shown, such as using logs to solve the equation $0.2 = 0.7t$.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] The order of operations is used incorrectly and an exponential function is maintained, but $t$ is solved for appropriately, using logs.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct trigonometric equation is written, but no further correct work is shown.

or [1] A correct trigonometric equation is written, but no further correct work is shown.

or [1] $1.15$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[4] $\frac{x}{\sin 130} = \frac{0.75}{\sin 30}$.

[2] $\frac{60}{729}$ or $\frac{20}{243}$ or .0823, and appropriate work is shown, such as $\frac{2}{3}^2 \left(\frac{1}{3}\right)^4$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct trigonometric equation is written, but no further correct work is shown.

or [1] 1.15, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[629] B_____

[631] B_____

[630] B_____

[631] B_____
[4] 60, 109.5, 250.5, 300, and appropriate work is shown algebraically or graphically.
[3] Appropriate work is shown, but one computational, factoring, graphing, or rounding error is made.
or [3] Appropriate work is shown, but only three correct values of $\theta$ are found.
[2] Appropriate work is shown, but two or more computational, factoring, graphing, or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] Appropriate work is shown, but only two correct values of $\theta$ are found.
[1] Appropriate work is shown, but one conceptual error and one computational, factoring, graphing, or rounding error are made.
or [1] Appropriate substitutions are made and the equation is written in standard form, but no further correct work is shown.
or [1] 60, 109.5, 250.5, 300, but no work is shown.
[0] 60 or 109.5 or 250.5 or 300, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 75, and appropriate work is shown, such as determining the mean (278.5833333) and the standard deviation for the sample (3.14667309).
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the standard deviation for the population ($\sigma$) is used.
or [3] The mean, standard deviation for the sample, and interval are determined correctly, but an error is made in determining the percentage.
or [3] The mean and standard deviation for the sample are determined correctly, but an appropriate percentage is determined for an incorrect interval.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The mean and standard deviation for the sample are determined correctly, but no further correct work is shown.
or [2] Either the mean or the standard deviation for the sample is determined incorrectly, but an appropriate percentage is found.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The standard deviation for the sample is determined correctly, but no further correct work is shown.
or [1] 75, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[2] A complete and correct explanation is written, such as stating that since the graph lies entirely above the x-axis, there is no point on the graph where $y = 0$.

[1] An incomplete or partially correct explanation is written, such as stating that the equation has imaginary roots.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 28, and appropriate work is shown, such as substituting into the given equation or solving the equation graphically.

[3] Appropriate work is shown, but one computational, rounding, or graphing error is made.

or [3] Appropriate work is shown, but 56, the value of $2\theta$, is given as the answer.

[2] Appropriate work is shown but two or more computational, rounding, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

[1] Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.

or [1] Appropriate work is shown to find the value of $2\theta$, but no further correct work is shown.

or [1] 28, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[638]

[639] A ___

[640] C ___
[4] \( \frac{2}{3} \pm \frac{i \sqrt{11}}{3} \), and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown to obtain \( \frac{4 \pm 2i \sqrt{11}}{6} \), but no further correct work is shown.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as the incorrect use of the quadratic formula.

or [2] Appropriate work is shown to obtain \( \frac{4 \pm \sqrt{-44}}{6} \), but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] A correct substitution is made into the quadratic formula, but no further correct work is shown.

or [1] \( \frac{2}{3} \pm \frac{i \sqrt{11}}{3} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[643] \( \frac{51}{243} \) or an equivalent answer, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as finding the probability for at most three times.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] An incorrect expression of a lesser degree of difficulty is evaluated appropriately, such as finding the probability for exactly three times.

or [1] \( \frac{51}{243} \) or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[643] \( \frac{51}{243} \) or an equivalent answer, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown to obtain \( \frac{4 \pm 2i \sqrt{11}}{6} \), but no further correct work is shown.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as the incorrect use of the quadratic formula.

or [2] Appropriate work is shown to obtain \( \frac{4 \pm \sqrt{-44}}{6} \), but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] A correct substitution is made into the quadratic formula, but no further correct work is shown.

or [1] \( \frac{2}{3} \pm \frac{i \sqrt{11}}{3} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[643] \( \frac{51}{243} \) or an equivalent answer, and appropriate work is shown.
[4] 287,457, and appropriate work is shown, such as using trigonometry and the area formula or the Law of Sines and the area formula.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using an incorrect trigonometric function.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The length of the altitude or the length of a leg is found correctly, but no further correct work is shown.

or [1] Correct, substitutions are made into the Law of Sines, but no further correct work is shown.

or [1] 287,457, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[649] 

[2] \( \frac{5\pi}{4} \) or an equivalent answer in radian measure, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 225 or 225°, but appropriate work is shown.

or [1] The measure of the angle in a counterclockwise rotation is found, resulting in an answer of \( \frac{3\pi}{4} \).

or [1] \( \frac{5\pi}{4} \) or an equivalent answer in radian measure, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[650] 

[651] C_____

[4] 41.4, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] A correct substitution is made into the Law of Cosines, but no further correct work is shown.

or [1] 41.4, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[652] 

[653] A_____

[654] C_____

[655] B_____

[2] \( 18 - 4i \), and appropriate work is shown, such as \( (8 + 8i) + (10 - 12i) \).

[1] Appropriate work is shown, but one computational or graphing error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A graphic solution is drawn, but the sum is not expressed in \( a + bi \) form.

or [1] 18 - 4i, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[656] 

[657] A_____

[658] B_____

[659] C_____

[660] C_____

[661]
[661] C 
[662] D 
[663] B 

[2] 18, and appropriate work is shown, such as an algebraic or a graphic solution or trial and error with at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational or graphing error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The trial-and-error method is used and at least six systematic trials and appropriate checks are shown, but no solution is found.

[1] 18, but no work or fewer than three trials with appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[664] 

[665] B 
[666] A 
[667] C 
[668] A 
[669] D 

[2] -3 + i, and an appropriate graph is drawn.

[1] The sum is found incorrectly, but an appropriate graph is drawn.

or [1] -3 + i, but no graph or an incorrect graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[670] 

[671] D 
[672] C 
[673] B 
[674] B 

[675] A 

[4] The reasons for all four steps are correct, such as:
Step 3: Perpendicular line segments form right angles.
Step 6: If two parallel lines are cut by a transversal, the alternate interior angles are congruent.
Step 8: \( AAS \cong AAS \).
Step 9: Corresponding parts of congruent triangles are congruent.

[3] The reasons for only three steps are correct.

[2] The reasons for only two steps are correct.

[1] The reason for only one step is correct.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[676] 

[677] A 
[678] D 

[4] 11.8, and an appropriate application of the Law of Cosines is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] The Law of Cosines is correctly applied, but the square root is not found.

[2] The Law of Cosines is applied correctly, and correct substitutions are shown, but no further work is shown.

or [2] Appropriate work is shown, but more than one computational error is made.

[1] The diagram is set up with the correct sides and angles, and the Law of Cosines is written, but substitution is not made.

or [1] The diagram is set up with the correct sides and angles, but no further work is shown.

or [1] 11.8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[679] 

[680] C
[681] D_____

4. Correct graph of \( d(t) = \sin t \) over the specified interval and a correct equation written.
3. Correct graph with an incorrect equation, such as \( y = \sin x \), or graph contains minor flaws.
2. Incorrect trig graph with an appropriate equation such as \( y = -\sin x \).
or 2. Correct trig graph with incorrect equation or no equation, such as \( d(t) = \cos t \).
1. Identifies sine function correctly, but no work and no graph are shown.
or 1. Recognizes the graph as a form of the sine function, such as \( d(t) = -\sin t \) and graph contains minor flaws.
0. A zero response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[682] 94, and appropriate work is shown.
3. Appropriate work is shown, but one computational or rounding error is made.
2. Appropriate work is shown, but two or more computational or rounding errors are made.
or 2. Appropriate work is shown, but one conceptual error is made.
or 2. An incorrect equation of equal difficulty is solved appropriately.
or 2. The expression 999.9725(1.0493)^x is written, but no further correct work is shown.
1. Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or 1. The expression 999.9725(1.0493)^x is written, but no further correct work is shown.
or 1. An incorrect equation of a lesser degree of difficulty is solved appropriately.
or 1. 1,367, but no work is shown.
0. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[684] 2. More than 6 hours, and appropriate work is shown, using a graphic or algebraic solution.
1. Appropriate work is shown, but one computational error or an error in analyzing the results is made.
or 1. More than 6 hours, but no work is shown.
0. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[685] ______

[686] D______
[4] 8.7 standard deviation, 70% within one standard deviation, and “Yes,” and appropriate work is shown, and an appropriate justification is given.

or [4] 8.7 standard deviation, 70% within one standard deviation, and “No,” and appropriate work is shown, and an appropriate justification is given.

[3] One error is made in determining the standard deviation or the percent, but all the other work is appropriate.

[2] 8.7 and 70%, and appropriate work is shown, but no justification is given.

or [2] The standard deviation is determined correctly, but more than one error is made when calculating the percent, but the justification is appropriate.

[1] The standard deviation is determined correctly, but no further work is shown.

or [1] The standard deviation is determined incorrectly, but the percent is appropriate, based on the incorrect standard deviation.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 210° and 330°, and appropriate work is shown.

[3] Correct substitution and factoring are shown, with at least the reference angle of 30° found.

or [3] Correct substitution is shown, and the equation is put in standard form and factored correctly, but an incorrect reference angle is used to find appropriate answers.

or [3] An incorrect quadratic equation is solved correctly, and appropriate angles are determined.

[2] Correct substitution is shown, and the equation is put in standard form and factored correctly, but no angles are found.

[1] Correct substitution is shown, but the equation is not factored or is factored incorrectly.

or [1] 210° and 330°, but no work is shown.

[0] 210° or 330° or 30°, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[688] ____________

[689] D____
[6] 26 and 33,443, and appropriate work is shown, such as using the Law of Cosines and finding the area of the triangle. [Allow full credit if the student uses 26 and finds $A = 33,509$.]

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

or [4] Appropriate work is shown, but one conceptual error is made.

or [4] Appropriate work is shown to find 26, but no further correct work is shown.

[3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [3] The area is found using Hero(n)’s formula, but no further correct work is shown.

[2] Appropriate work is shown, but two conceptual errors are made.

or [2] 26 and either 33,509 or 33,443, but no work is shown.

[1] Appropriate work is shown, but two conceptual errors and one computational or rounding error are made.

or [1] A correct substitution is made into the Law of Cosines, but no further correct work is shown.

or [1] 26 or 33,509 or 33,443, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] .3087 or an equivalent answer, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as evaluating $\sqrt{C_3(0.3)^3(0.7)^2}$.

or [1] .3087 or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] \( \frac{2}{1} \) or 2:1 or an equivalent ratio, and appropriate work is shown.

[5] Appropriate work is shown, but one computational error is made, but an appropriate ratio is found.

or [5] Appropriate work is shown, but the answer is not written as a ratio.

or [5] Appropriate work is shown, but the ratio is reversed or is simplified incorrectly.

[4] Appropriate work is shown, but two or more computational errors are made, but an appropriate ratio is found.

or [4] Correct measures are found for all the arcs and the angles, and appropriate work is shown, but no ratio is found.

or [4] Correct measures are found for all the arcs, but the measure of one angle is found incorrectly, but an appropriate ratio is found.

[3] One conceptual error is made, but appropriate work is shown, and an appropriate ratio is found.

or [3] Correct measures are found for all the arcs, but the measures of both angles are found incorrectly, but an appropriate ratio is found.

[2] Correct measures are found for all the arcs, but no further correct work is shown.

[1] Only the value of \( x \) is found correctly, and appropriate work is shown.

or [1] \( \frac{2}{1} \) or 2:1 or an equivalent ratio, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 8, and appropriate work is shown, such as 5(70) = 43.75\( x \).

[1] 4, and $87.50 is used instead of $43.75 per person.

or [1] Appropriate work is shown, but one computational error is made.

or [1] 8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[694] B

[695] B

[696] B

[697] D

[698] D

[699] A
[6] 561.3 and 43.3, and appropriate work is shown, such as using the Law of Cosines and the Law of Sines.
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
[3] Appropriate work is shown, but one conceptual error is made.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
[1] Correct substitutions are made into the Law of Cosines, but no further correct work is shown.
or [1] 561.3 and 43.3, but no work is shown.
[0] 561.3 or 43.3, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] 11,052 and 14, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] 14, and appropriate work is shown, but the amount of money he will have after 2 years is not found.
[2] Appropriate work is shown, but more than one computational or rounding error is made.
or [2] 11,052, and appropriate work is shown, and a correct log equation, such as
\[ \log 2 = 0.05 \times \log 2.718 \]
is written, but it is not solved.
[1] 11,052, and appropriate work is shown, but the number of years to double his investment is not found or is found incorrectly.
or [1] Appropriate substitutions are made for both equations, but neither equation is solved.
or [1] 11,052 and 14, but no work is shown.
or [0] 11,052 or 14, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[701] C

[702] –2 and –1, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
or [3] Appropriate work is shown, but only one value of \( q \) is found.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as squaring only the left side of the equation.
[1] Appropriate work is shown, but one conceptual error and one computational error are made.
or [1] –2 and –1, but no work is shown.
or [0] –2 or –1, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] Maximum height = 64 and time = 4, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or graphing error is made.
or [3] The correct time is found, and appropriate work is shown, but the maximum height is not found.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The maximum height is found correctly, and appropriate work is shown, but an incorrect value is found for \( t \).
or [2] Appropriate work is shown, but only the time that the maximum height occurs is found, and the quadratic equation \( 64t - 16t^2 = 0 \) is factored, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.
or [1] Appropriate work is shown, but only the time that the maximum height occurs is found, or the quadratic equation \( 64t - 16t^2 = 0 \) is factored.
or [1] Maximum height = 64 and time = 4, but no work is shown.
[0] Maximum height = 64 or time = 4, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[704] A

[705] A

[706] A

[707] D

[708] D

[709] B

[710] C
[2] \( \frac{8}{3} \) and \( -\frac{4}{3} \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] \( 3x - 2 = 6 \) and \( 3x - 2 = -6 \), but no further correct work is shown.

or [1] \( \frac{8}{3} \) or \( -\frac{4}{3} \), and appropriate work is shown.

or [1] \( \frac{8}{3} \) and \( -\frac{4}{3} \), but no work is shown.

[0] \( \frac{8}{3} \) or \( -\frac{4}{3} \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[711] [713] D____
[714] C____
[715] A____

[2] \( 300 \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] \( 300 \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[716] 

[717] A____

[2] \( \frac{1}{m^4} \) or \( \left( \frac{1}{m} \right)^4 \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made,

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the answer is expressed with a negative exponent, such as \( m^{-4} \).

[1] \( \frac{1}{m^4} \) or \( \left( \frac{1}{m} \right)^4 \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[718] 

[719] D____
[720] A____
[721] A____

[6] \( 8 \), and appropriate work is shown, such as a correctly labeled graph, a table of values, or an algebraic solution.

[5] Appropriate work is shown, but one computational or graphing error is made.

[4] Appropriate work is shown, but two or more computational or graphing errors are made.

or [4] Appropriate work is shown, and the correct values of \( t \) where the height of the tide is 7 are identified (2 and 10), but the correct number of hours is not stated.

[3] Appropriate work is shown, but one conceptual error is made.

or [3] A correct table or graph is constructed, but no further correct work is shown.

[2] Appropriate work is shown, but one conceptual error and one computational or graphing error are made.

or [2] The correct values of \( t \) (2 and 10) and 8 are written, but no work is shown.

[1] 8, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[712] 

[713] D____
[714] C____
[715] A____

[2] \( \frac{1}{m^4} \) or \( \left( \frac{1}{m} \right)^4 \), and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made,

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the answer is expressed with a negative exponent, such as \( m^{-4} \).

[1] \( \frac{1}{m^4} \) or \( \left( \frac{1}{m} \right)^4 \), but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[718] 

[719] D____
[720] A____
[721] A____
[4] $1 \pm i\sqrt{6}$, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown, but the solution is expressed as $\frac{2 \pm 2i\sqrt{6}}{2}$.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Appropriate work is shown, but the solution is expressed as $\frac{2 \pm \sqrt{-24}}{2}$.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] A correct substitution is made in the quadratic formula, but no further correct work is shown.

or [1] $1 \pm i\sqrt{6}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

---

[722] C

---

[723] C

---

[724] C
[4] 65.27, and appropriate work is shown, such as \( \frac{100}{\sin 100} = \frac{x}{\sin 40} \).

[3] Appropriate work is shown, but one computational or rounding error is made. or [3] Appropriate work is shown, but calculations are performed in radians, resulting in an answer of –147.15.

[2] Appropriate work is shown, but two or more computational or rounding errors are made. or [2] Appropriate work is shown, but one conceptual error is made, such as the use of an incorrect trigonometric function. or [2] An incorrect diagram is drawn, but appropriate work is shown, and an appropriate answer is found. [1] A correctly labeled diagram is drawn, but no further correct work is shown. or [1] 65.27, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure. 

\[ \text{D} \]

\[ \text{A} \]
[4] The graph of \( y = 3 \sin 2x \) or the graph of \( y = -3 \sin 2x \) is drawn.

[3] Appropriate work is shown, but one graphing error is made, such as not drawing the graph over the entire interval.

[2] Appropriate work is shown, but two or more graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as graphing \( y = \sin 2x \) or \( y = 3 \sin x \).

[1] Appropriate work is shown, but one conceptual error and one graphing error are made.

or [1] The equation \( y = 3 \sin 2x \) or \( y = -3 \sin 2x \) is written, but no graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[6] 312 and 30,642, and appropriate work is shown, such as using the Law of Cosines and the area formula.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] Appropriate work is shown, but two or more computational or rounding errors are made.

or [4] Appropriate work is shown, but one conceptual error is made.

or [4] Appropriate work is shown, but the square root is not computed to find the length of the third side, but an appropriate area is found.

or [4] The length of the third side is found correctly, but no further correct work is shown.

[3] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

[2] The area of the triangle is found correctly, but no further correct work is shown.

or [2] 312 and 30,642, but no work is shown.

[1] Appropriate work is shown to find the area of the triangle, but one computational or rounding error is made, and no further correct work is shown.

or [1] 312 or 30,642, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[733]

[734] A_____

[735] C_____

[736] A____
[4] $A = 1.5, B = 0.5, \text{ and } D = 6.5 \text{ or an equivalent answer, and appropriate work is shown or an appropriate explanation is given for each number found.}$

[3] Correct answers are found, but appropriate work is shown or an appropriate explanation is given for only two of the numbers found.

[2] Only two correct answers are found, but appropriate work is shown or an appropriate explanation is given for the two answers.

[1] Only one correct answer is found, but appropriate work is shown or an appropriate explanation is given for that answer.

or [1] $A = 1.5, B = 0.5, \text{ and } D = 6.5 \text{ or an equivalent answer, but no work is shown.}$

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[737] ____________

[738] $A _____$

[2] $r = \frac{3V}{4\pi}$ or an equivalent answer, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $r = \frac{3V}{4\pi}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[739] ____________

[740] $B _____$

[741] $B _____$

[742] $D _____$

[743] $D _____$

[2] The Adams School, and an appropriate explanation is given, such as the standard deviation is a measure of dispersion, which is how much the scores, on the average, differ from the mean. Therefore, the school with the smaller standard deviation would have the more consistent scores.

[1] The Adams School, but an incomplete explanation is given, or the school is not stated, but an appropriate explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 11.6, and appropriate work is shown, such as the use of logarithms, graphing, or trial and error with at least three trials and appropriate checks.

[3] Appropriate work is shown, but one computational, rounding, or graphing error is made.

[2] Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.

or [2] The trial-and-error method is attempted, and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [2] A correct logarithmic equation is written, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.

or [1] A correct substitution is made into the compound interest formula, but no further correct work is shown.

or [1] A correct graph is drawn, but no further correct work is shown.

or [1] 11.6, but no work or only one trial with an appropriate check is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] $1\frac{1}{4}$ or an equivalent answer, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $1\frac{1}{4}$ or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 20, and appropriate work is shown or an appropriate explanation is written.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 20, but no work is shown or no explanation is written.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 42, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] 42, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] A

[746] D

[747] A

[748] A

[749] A

[750] A

[751] A

[752] A
[4] 12.6, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the quadratic formula is incorrect.
[2] An appropriate equation is shown and put in standard form, but the quadratic formula is not used correctly.
or [2] An appropriate equation is shown and put in standard form, but no further work is shown.
or [2] Appropriate work is shown, but more than one computational error or one computational and one rounding error are made.
[1] An appropriate equation is shown, but all other work is missing or is incorrect.
or [1] 12.6, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[753] D________
[754] D____
[755] B____
[756] D____
[757] D____
[758] A____
[759] C____

[4] 590.5 and 652.6, and appropriate work is shown, such as \(|d - 620| \leq 0.05d\).
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] 590.5 or 652.6, and appropriate work is shown.
[1] 590.5 and 652.6, but no work is shown.
or [0] 590.5 or 652.6, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[760] D____
[761] D____
[762] D____

[2] 1.5 and a correct diagram is drawn, and appropriate work is shown.
[1] Appropriate work is shown and a correct answer is found, but an incorrect diagram is drawn.
or [1] A correct diagram is drawn, but no further correct work is shown.
or [1] An incorrect diagram is drawn, but an appropriate answer is found.
or [1] 1.5, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[763] C____
[764] C____
[765] C____
[766] B____
[767] B____
[768] D____
[4] 16.2 and 10, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the sample standard deviation(s) is used, resulting in answers of 16.7 and 10.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] 16.2 and 10, but no work is shown.
[0] 16.2 or 10, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[769] D_____

[770] ______

[4] \( c(x) = 0.06x^2 \) or an equivalent equation; width = \( \sqrt{115} \) inches or an equivalent, length = \( 3\sqrt{115} \) inches or an equivalent, and height = \( \frac{3}{2}\sqrt{115} \) inches or an equivalent, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
or [3] One or more dimensions are represented incorrectly, but all further work is appropriate.
or [3] The correct function is found and solved for \( x \), but no further work is shown.
[2] The dimensions are represented correctly, but the equation is incorrect, but all further work is appropriate.
or [2] The dimensions are represented correctly, and the correct function is written, but further work is incomplete or is incorrect.
[1] The dimensions are represented correctly, but the function is written and solved incorrectly.
or [1] \( \sqrt{115}, 3\sqrt{115} \), and \( \frac{3}{2}\sqrt{115} \), but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[771] ______

[772] B_____

[773] C_____
[6] 30, 150, and 270, and appropriate work is shown.
[5] Appropriate work is shown, but one computational error is made.
[4] The correct equation is shown, but only two correct solutions are found.
[3] The correct equation is shown, but only one correct solution is found.
[2] The correct equation is solved for $x$, but no further work is shown.
[1] The correct equation is shown, but no further work is shown.
or [1] 30, 150, and 270, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[774] C

[775] A

[776] D

[777] B

[778] D

[7] 0.345, and appropriate work is shown, such as solving the equation $\theta = \frac{1.38}{4}$.

[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 0.345, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[780] B

[2] A correct graph is drawn to represent $2 + 6i$.

[1] Appropriate work is shown, but one computational or graphing error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] The sum $2 + 6i$ is written, but no graph is drawn.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[781] C

[6] 2,700, and appropriate work is shown, such as using the Law of Cosines and finding the area of the triangle.

[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but more than one computational or rounding error is made.
or [4] Appropriate work is shown, and the area of the triangle is determined correctly, but the dollar amount is not determined or is determined incorrectly.
or [4] The Law of Cosines is used correctly to determine an angle, but an incorrect procedure is used to find the area, and an appropriate dollar amount is found.
or [4] The Law of Cosines is used incorrectly to determine an angle, but a correct procedure is used to find the area, and an appropriate dollar amount is found.
or [3] The Law of Cosines is used correctly to determine an angle, but an incorrect procedure is used to find the area, and the dollar amount is not determined or is determined incorrectly.
or [2] The Law of Cosines is used correctly to determine an angle, but no further correct work is shown.
or [1] A correct equation using the Law of Cosines is written, but no further correct work is shown.
or [1] 2,700, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
A

1. Appropriate work is shown, but one computational, rounding, or graphing error is made.

2. Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

3. Either 16,600 or 11.3 is found, and appropriate work is shown, but the other answer is not found.

1. Appropriate work is shown, but one conceptual error and one computational, rounding, or graphing error are made.

2. Appropriate work is shown, but two or more computational, rounding, or graphing errors are made.

3. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

C

1. $\frac{1}{m+1} - \frac{1}{m-1}$, and appropriate work is shown.

2. $15 < x < 60$, and appropriate work is shown, such as solving the algebraic inequality $-10x^2 + 750x - 9000 > 0$ or a graphic solution.

3. $15 < x < 60$, and more computational or simplification errors are made.

4. $0 < x < 60$, and appropriate work is shown, such as solving the algebraic inequality $-10x^2 + 750x - 9000 > 0$ or a graphic solution.

5. $0 < x < 60$, and more computational or simplification errors are made.

6. $0 < x < 60$, and more computational or simplification errors are made.

7. A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[799] D______

[800] C______
a [2] The equation $2y = 2x^2 - 4$ is graphed correctly over the required interval and labeled.
[1] An appropriate graph is shown, but less than the required interval is drawn.
or [1] An appropriate graph is shown, but one coordinate is calculated incorrectly.
b [2] A correct composition of transformations of the graph drawn in part a is sketched and labeled.
[1] Only one of the transformations is correct.
or [1] The composition of transformations is correct, but done in reverse order.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.


[4] $y = -34739.71292x + 313309.0909$ and $209,090$, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] An incorrect linear equation with a negative slope is written, but an appropriate price is found for three blocks from the beach.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] A correct linear function is written, but no further correct work is shown.
or [2] An incorrect linear equation with a positive slope is written, but an appropriate price is found for three blocks from the beach.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] 209,090, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] $x^2 + 5x + 6 = 0$ or an equivalent equation and -3 and -2, and appropriate work is shown, such as using the sum and product formulas or factoring the equation.

[3] Appropriate work is shown, but one computational or factoring error is made.

or [3] The expression $x^2 + 5x + 6 = 0$ is written and -3 and -2, and appropriate work is shown.

[2] Appropriate work is shown, but two or more computational or factoring errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct quadratic equation is written, and appropriate work is shown, but the roots are not found.

or [2] Appropriate work is shown to find -3 and -2, but no quadratic equation is written.

[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.

or [1] $x^2 + 5x + 6 = 0$ or an equivalent equation and -3 and -2, but no work is shown.

[0] A correct quadratic equation or -3 and -2, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[6] A complete and correct proof that includes a concluding statement is written, such as showing that $\overline{AB}$ is parallel to $\overline{CD}$ and that $\overline{BC}$ is not parallel to $\overline{AD}$ by finding their slopes and using the distance formula to show that the two nonparallel sides are equal.

[5] Appropriate work is shown, but one computational error is made.

[4] Appropriate work is shown, but two or more computational errors are made.

or [4] Appropriate work is shown, but one conceptual error is made, such as using an incorrect formula.

or [4] The slopes of all four sides are found correctly and the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, but no conclusion is stated.

or [4] A proof is written that correctly shows $ABCD$ is a trapezoid, but it is not proved to be isosceles.

[3] The slopes of only one pair of sides are found correctly, but the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, and an appropriate conclusion is stated.

or [3] A correct numerical illustration is given in lieu of a proof of the general case.

[2] The slopes of only one pair of sides are found correctly, but the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, and appropriate work is shown, but no conclusion is stated.

or [1] Either the slopes or the lengths of $\overline{AD}$ and $\overline{BC}$ are found correctly, but no conclusion is stated.

or [1] The correct definition of an isosceles trapezoid is written, but no further correct work is shown.

[0] The slopes of $\overline{AB}$ and $\overline{DC}$ are found correctly, but no further correct work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[6] A complete and correct proof is shown, such as the example below:

<table>
<thead>
<tr>
<th>Statements</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chords $\overline{AE}$ and $\overline{CD}$ of circle $O$ intersect at $E$, and chords $\overline{AB}$ and $\overline{CD}$ are drawn.</td>
<td>1. Given</td>
</tr>
<tr>
<td>2. $\angle A \cong \angle C$</td>
<td>2. Inscribed angles of a circle that intersect the same arc are congruent.</td>
</tr>
<tr>
<td>3. $\angle AED \cong \angle CEB$</td>
<td>3. Vertical angles are congruent.</td>
</tr>
<tr>
<td>4. $\angle AED \cong \angle CEB$</td>
<td>4. AA $\cong$ AA</td>
</tr>
<tr>
<td>5. $\frac{AE}{CE} = \frac{ED}{EB}$</td>
<td>5. Corresponding sides of similar triangles are in proportion.</td>
</tr>
<tr>
<td>6. $(AE)(EB) = (CE)(ED)$</td>
<td>6. In a proportion, the product of the means equals the product of the extremes.</td>
</tr>
</tbody>
</table>

[5] $\triangle AED$ and $\triangle CEB$ are correctly proved to be similar, and the appropriate proportion is written with justification.

or [5] A correct proof is shown, but one of the justifications is missing or is incorrect.

[4] $\triangle AED$ and $\triangle CEB$ are correctly proved to be similar, but no further work is shown.

[3] A correct proof is shown, but more than one justification is missing or is incorrect.

[2] The triangles are said to be similar, and the conclusion is written.

[1] Only one correct statement and justification are given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[810]

[2] A mapping is drawn that maps at least one element of set $A$ to more than one element of set $B$, and an appropriate explanation of the difference between functions and relations is written.

[1] An appropriate mapping is drawn, but no explanation is written.

or [1] An incorrect mapping is drawn, but an appropriate explanation is written.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[811]

[812] B

[813]

[2] $\frac{x + 3}{3}$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] $\frac{x + 3}{3}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[814]

[2] 77.9, and appropriate work is shown, such as evaluating $\frac{1}{2}ab\sin C$.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] Appropriate work is shown, but one conceptual error is made, such as writing $\cos C$.

or [1] 77.9, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[815]

[4] 65.7, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 65.7, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[816]

[817] B
[818] C
[819] C

[4] 4, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
or [3] Appropriate work is shown, but \( x = -1 \) is not rejected.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The correct quadratic equation is written in standard form, but no further correct work is shown.
or [2] A quadratic equation of equal difficulty is solved appropriately.
[1] Both sides of the equation are squared correctly, but no further correct work is shown.
or [1] 4, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[820] C
[821] C
[822] B

[6] 6, and appropriate work is shown, such as determining the area of the field, using Heron’s formula or using the Law of Cosines to determine one angle of the triangle, followed by \( A = \frac{1}{2}ab \sin C \), and then

\[ A \div 6000. \]

[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] Appropriate work is shown to find the area of the triangle, but the number of bags of fertilizer is not found.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] The Law of Cosines is used to find an angle, and substitution is made into the correct area equation, but no further correct work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] The Law of Cosines is used to find an angle, but no further correct work is shown.
[1] Correct substitution is made into the Law of Cosines, but no further correct work is shown.
or [1] 6, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[823] B
[824] B
[825] B
60 and 104, and appropriate work is shown either algebraically or graphically.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[826] A

[827] A

[828] A

-4b, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or simplification error is made.

[2] Appropriate work is shown, but two or more computational or simplification errors are made.

[1] Appropriate work is shown, but one conceptual error and one computational or simplification error are made.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[829] A

[830] A

[831] C

[832] C

[833] C
[4] .00046 or \( \frac{46}{100,000} \) or an equivalent answer, and appropriate work is shown.
[3] Appropriate work is shown, but one computational error is made.
or [3] Appropriate work is shown, but the probability of hitting at most four home runs is found.
[2] Appropriate work is shown, but two or more computational errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The probabilities of hitting exactly four and exactly five home runs are found, but the probabilities are not added.
[1] Appropriate work is shown, but the probability of hitting exactly four home runs is found.
or [1] Correct substitution into the Bernoulli equation for exactly four and exactly five home runs is made, but no further correct work is shown.
or [1] .00046 or \( \frac{46}{100,000} \) or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

\[ p = 8.1875t + 72.7860, \text{ 1993, and 220.2, and appropriate work is shown.} \]
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] The expression \( 8.1875t + 72.7860 \) is written and 1993 and 220.2 are found, and appropriate work is shown.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] A correct equation is written, but either the year or the predicted value for 2008 is not found, but appropriate work is shown.
or [4] An incorrect equation is solved appropriately.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] \( p = 8.1875t + 72.7860, \text{ 1993, and 220.2, but no work is shown.} \)
or [3] The expression \( 8.1875t + 72.7860 \) is written and either 1993 or 220.2 is found, and appropriate work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] A correct equation is written, but no further correct work is shown.
or [2] 1993 and 220.2, but no work is shown.
[1] The expression \( 8.1875t + 72.7860 \) is written, but no further correct work is shown.
or [1] 1993 or 220.2, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[4] 116, and appropriate work is shown, such as the use of the Law of Cosines.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] Correct substitution is made into the Law of Cosines, but no further correct work is shown.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] A complete and correctly labeled diagram is drawn, but no further correct work is shown.
or [1] 116, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[841] A______

[842] C______

[2] \( \frac{5}{6} \) or 0.83, and appropriate work is shown.
[1] Appropriate work is shown, but one computational or rounding error is made, such as representing \( \frac{5}{6} \) as a terminating decimal.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] \( \frac{5}{6} \) or 0.83, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[843]

[840] C______
[4] 2011, and appropriate work is shown, such as solving a logarithmic equation or trial and error with at least three trials and appropriate checks.

[3] Appropriate work is shown, but one computational or rounding error is made.

[3] Appropriate work is shown to find $t$ but the year is not stated or is stated incorrectly.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.

or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

[1] 2011, but no work or only one trial with an appropriate check is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] An explanation is given that indicates that a set of data can represent inverse variation if the product of two variables is constant, and a correct table of values is shown.

[1] The rule for direct rather than inverse variation is stated, but an appropriate equation and table of values are shown.

or [1] An example of inverse variation is shown, but no explanation of why it is an inverse variation is given.

or [1] An explanation is given that indicates that a set of data can represent inverse variation, but no table of values is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[4] $A\overline{B}$ and $A''\overline{B''}$ are graphed and labeled correctly, $A''(0,-5)$ and $B''(-2,0)$, and a correct transformation is identified, such as $R_{180^\circ}$, $R_{-180^\circ}$, or $r(0,0)$.

[3] One error is made in graphing $A\overline{B}$, but $A''\overline{B''}$ is graphed and labeled appropriately, and an appropriate transformation is identified.

[2] $A\overline{B}$ is graphed and labeled correctly but one mistake is made in finding $A''\overline{B''}$, but an appropriate transformation is identified.

or [2] Both $A\overline{B}$ and $A''\overline{B''}$ are graphed and labeled correctly, but the transformation is missing or is incorrect.

or [1] $A\overline{B}$ is graphed and labeled correctly, but one mistake is made in finding $A''\overline{B''}$, and the transformation is missing or is incorrect.

or [1] $R_{180^\circ}$, $R_{-180^\circ}$, or $r(0,0)$, but no graph is drawn.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[844] [846] C_____

[847] D_____

[848] [849] C_____

[850] D_____

[851] B_____

[852] C_____

[853] A_____
[4] 23, and appropriate work is shown, such as using the Law of Sines.
[3] Appropriate work is shown, but one computational or rounding error is made.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as finding 17, the smaller force.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made,
or [1] 23, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[2] 70, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] The values for \( n = 1 \) through \( n = 5 \) are computed correctly, but they are not added.
or [1] 70, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[860] 
[2] \( \frac{1}{x}, \frac{1}{\sqrt{x}}, 1, \sqrt{x}, x \)
Explanation: \( \sqrt{x} \) is less than \( x \), therefore \( x > \sqrt{x} \) for values \( x > 1 \); also expressed as a fraction \( \frac{1}{\sqrt{x}} > \frac{1}{x} \) since for unit fractions the larger the denominator, the smaller the fraction.
or [2] Equivalent explanation.
or [2] Uses a numerical value for \( x \) to establish order and then ranks the correctly in terms of \( x \).
[1] Correct answer with no explanation.
or [1] At least three in the correct order with some supporting explanation.
or [1] Correctly orders an answer using a numerical value rather than "in terms of \( x \)" such as if \( x = 4 \) the order would be \( \frac{1}{4}, \frac{1}{2}, 1, 2, 4 \).
[0] Response is completely incorrect, irrelevant, or incoherent; or is a correct response that was obtained by an obviously incorrect procedure.

[861]
[6] A correct diagram is drawn and 134, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
[3] Appropriate work is shown, but one conceptual error is made.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
[1] A correct diagram is drawn, but no further correct work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

or [5] 134, and appropriate work is shown, but the diagram is not drawn or is drawn incorrectly.

or [4] A correct diagram is drawn and one correct equation using the Law of Sines is solved appropriately, but no further correct work is shown.

or [3] Appropriate work is shown, but one conceptual error is made.

or [3] An incorrect diagram is drawn, but an appropriate solution with an equal degree of difficulty is provided.

or [3] A correct diagram is drawn and correct equations are written, but no further correct work is shown.

[2] The scatter plot is completed correctly, but the coefficients of the regression equation are transposed.

or [2] The scatter plot is completed correctly, but no regression equation is given.

or [1] The scatter plot is completed correctly, but no regression equation is given.

or [1] A correct diagram is drawn, but one correct trigonometric equation is solved appropriately.

or [1] An incorrect diagram is drawn, but one correct trigonometric equation is solved appropriately.

or [1] 134, but no work is shown and no diagram is drawn.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[863] y = (4.8)(6.8)^t.

[3] Appropriate work is shown, but one graphing or rounding error is made.

[2] The scatter plot is completed correctly, but the number of months is 6, and appropriate work is shown.

or [2] x̄ = 54.2, σ = 17.6, and the number of months is incorrect, but work is shown to find an appropriate number of months.

or [2] x̄ = 54.2, σ = 17.6, but the number of months is not determined.

[1] 6, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response, that was obtained by an obviously incorrect procedure.

[864] B

[865] incorrect procedure.

[866] A

[867] C
[2] 4, and appropriate work is shown.  
[1] Appropriate work is shown, but one computational error is made.  
or [1] Appropriate work is shown, but one conceptual error is made.  
or [1] 4, but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[868] B

[4] 3 and $\frac{1}{2}$, and appropriate work is shown.  
[3] Appropriate work is shown, but one computational error is made.  
or [3] Appropriate work is shown, but only one of the values is found.  
[2] Appropriate work is shown, but two or more computational errors are made.  
or [2] Appropriate work is shown, but one conceptual error is made.  
or [2] The correct quadratic equation is written in standard form, but no further work is shown.  
or [2] An incorrect quadratic equation of equal difficulty is solved appropriately.  
[1] The Law of Sines is used, and appropriate substitution is made, but no further work is shown.  
or [1] $BC = 6.75$ and the area of $\triangle ABC = 16.7055$ or 16.71 or an equivalent answer, but no work is shown.  
or [1] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[869] B

[870] D

[4] $BC = 6.75$ and the area of $\triangle ABC = 16.7055$ or 16.71 or an equivalent answer, and appropriate work is shown, such as using the Law of Sines and the formula for the area of a triangle.  
[3] Appropriate work is shown, but one computational error is made.  
or [2] Only the correct length of $BC$ is found, and appropriate work is shown.  
or [2] The length of $BC$ is found incorrectly, but an appropriate area of the triangle is found, based on the incorrect value of $BC$.  
[1] The Law of Sines is used, and appropriate substitution is made, but no further work is shown.  
or [1] $BC = 6.75$ and the area of $\triangle ABC = 16.7055$ or 16.71 or an equivalent answer, but no work is shown.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[871] B

[872] D

[873] D
a [2] Both circles are drawn and labeled correctly.
[1] Both circles are drawn, but one conceptual error is made.
or [1] Only one circle is drawn and labeled correctly.
b [4] 0.7722345326 or an equivalent decimal answer, and appropriate work is shown, such as \[
\frac{400 - 29\pi}{400}.
\]
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The probability that point (x,y) lies inside the circles is found, and appropriate work is shown.
[2] Appropriate work is shown, but more than one computational or rounding error is made.
or [2] Only the correct areas of the square and the circles are found.
[1] Only the correct area of the square or the circles is found.
or [1] 0.7722345326 or an equivalent answer, but no work is shown.
a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
[874] A ___

[875] A ___

[876] A ___

[877] A ___

[878] D ___
[6] 19, and appropriate work is shown, such as 
\[ P(\text{at least three}) = \binom{4}{3}(0.6)^3(0.4)+\binom{4}{4}(0.6)^4 \] and 
\[ P(0) = (0.4)^4. \]

[5] Appropriate work is shown, but one computational error is made.

or [5] Correct probabilities are computed, but no answer or an incorrect answer is found.

[4] Appropriate work is shown, but two or more computational errors are made.

or [4] Only the probability for at least three strikes is found correctly, but an appropriate ratio is determined.

[3] The probability for at least three strikes is found correctly, and no further correct work is shown.

or [3] Only the probability for zero strikes is found correctly, but an appropriate ratio is determined.

[2] Only the probability for zero strikes is found correctly, and no further correct work is shown.

or [2] Only the equation for the probability for at least three strikes is written, and it is not solved.

[1] Conceptual errors are made in finding the probabilities, but an appropriate ratio is determined, based on the incorrect probabilities.

or [1] 19, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[6] 3.5, and appropriate work is shown.

[5] Appropriate work is shown, but one computational or rounding error is made.

[4] A substitution error is made, resulting in an incorrect quadratic equation of equal difficulty, but the incorrect equation is solved appropriately.

[3] A correct substitution is made, resulting in the correct quadratic equation in standard form, but the equation is not solved.

[2] A substitution error is made, resulting in an incorrect equation of equal difficulty, and one computational or rounding error is made.

[1] 3.5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[880] [2] 164.2, and appropriate work is shown.

[1] Appropriate work is shown, but one computational or rounding error is made.

or [1] 164.2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[881] [2] 2, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] 2, but a method other than an algebraic solution is used.

or [1] 2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[882] [883] D

[884] C

[885] A

[886] C
[4] Appropriate work is shown to explain why or prove the triangles are congruent.
[3] An explanation is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one reason is missing or is incorrect.
[2] An explanation is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[1] Some correct relevant statements about the method of proof are made, but two or three statements or reasons are missing or are incorrect.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[887] C _____

[888] y = 13.0134 – 7.3135 \ln x, -16, and 6, and appropriate work is shown.
[6] y = 13.0134 – 7.3135 \ln x, -16, and 6, and appropriate work is shown.
[5] Appropriate work is shown, but one computational or rounding error is made.
or [5] The expression 13.0134 – 7.3135 \ln x is written and -16 and 6 are found, and appropriate work is shown.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
or [4] A correct logarithmic regression equation is written, but either the wind chill factor or the wind speed is not found, but appropriate work is shown.
or [4] An incorrect logarithmic regression equation of equal difficulty is written, but appropriate answers are found for the wind chill factor and the wind speed, and appropriate work is shown.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] y = 13.0134 – 7.3135 \ln x, -16, and 6, but no work is shown.
or [3] The expression 13.0134 – 7.3135 \ln x is written and either -16 or 6 is found, and appropriate work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] y = 13.0134 – 7.3135 \ln x, but no further correct work is shown.
or [2] An incorrect logarithmic regression equation of equal difficulty is written, but an appropriate answer is found for either the wind chill factor or the wind speed, and appropriate work is shown.
or [2] An incorrect regression equation of a lesser degree of difficulty is written, but appropriate answers are found for the wind chill factor and the wind speed, and appropriate work is shown.
or [2] -16 and 6, but no equation is written and no work is shown.
[1] An incorrect regression equation of a lesser degree of difficulty is written, but an appropriate answer is found for either the wind chill factor or the wind speed, and

[889] wind chill factor or the wind speed, and
appropriate work, is shown.
or [1] The expression $13.0134 - 7.3135 \ln x$ is written, but no further correct work is shown.
or [1] -16 or 6, but no equation is written and no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[890] A _____

[891] B _____

[4] $3$ and $42$, and appropriate work is shown, such as a graph, substitution, or a table of values.
[3] Appropriate work is shown, but one computational or graphing error is made.
[2] Appropriate work is shown, but two or more computational or graphing errors are made.
or [2] Appropriate work is shown, but one conceptual error is made.
or [2] The number of seconds is found correctly, and appropriate work is shown, but the height is not found or is found incorrectly.
or [2] The height is found correctly, and appropriate work is shown, but the number of seconds is not found or is found incorrectly.
[1] $3$ and $42$, but no work is shown.
[0] $3$ or $42$, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[892] A _____

[893] B _____

[4] $x + \frac{3}{2}$, and appropriate work is shown.
[3] Appropriate work is shown, but one computational, factoring, or simplification error is made.
[2] Appropriate work is shown, but two or more computational, factoring, or simplification errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as failing to multiply by the reciprocal of $g(x)$ or trying to solve for $x$.
[1] Appropriate work is shown, but one conceptual error and one computational, factoring, or simplification error are made.
or [1] $x + \frac{3}{2}$, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[895] C _____

[896] C _____

[897] B _____

[4] $63$, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] Appropriate work is shown, but the supplement of the angle is found, resulting in an answer of 117.
[2] Appropriate work is shown, but more than one computational or rounding error is made.
or [2] A conceptual error is made when applying the Law of Cosines.
[1] A correctly labeled diagram is drawn, but no further correct work is shown.
or [1] $63$, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[898] C _____

[899] C _____
[4] .08 and .07, and appropriate work is shown.
[3] Appropriate work is shown, but one computational or rounding error is made.
or [3] The probability that at least four students will be on a team is found correctly, and appropriate work is shown, but the probability that exactly one student will not be on a team is not found or is found incorrectly.
[2] Appropriate work is shown, but two or more computational or rounding errors are made.
or [2] Appropriate work is shown, but one conceptual error is made, such as finding the probability that at most four or exactly four students will be on the team.
[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [1] The probability that at least one student will not be on a team is found correctly, and appropriate work is shown, but the probability that at least four students will be on a team is not found.
or [1] .08 and .07, but no work is shown.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[900] [6] A complete and correct proof that includes a conclusion is written.
[5] A proof is written that demonstrates a thorough understanding of the method of proof and contains no conceptual errors, but one statement and/or reason is missing or is incorrect.
or [5] $\triangle SEP \cong \triangle VEO$ is proven, but no further correct work is shown.
[4] A proof is written that demonstrates a good understanding of the method of proof and contains no conceptual errors, but two statements and/or reasons are missing or are incorrect.
[3] A proof is written that demonstrates a good understanding of the method of proof, but one conceptual error is made.
[2] Some correct relevant statements about the proof are made, but three or four statements and/or reasons are missing or are incorrect.
[1] Only one correct statement and reason are written.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[901] B
[902] C
[903] D
[904] D

[905] A
[906] A
[907] C
[908] C
[909] C
[2] 4, and appropriate work is shown.
[1] Appropriate work is shown, but one computational error is made.
or [1] Appropriate work is shown, but one conceptual error is made.
or [1] 4, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[910] ______

[911] C______

[912] A______

[913] D______

[914] B______

[915] D______

[916] D______

[4] \( \frac{1}{2} \) or 50\%, \( \frac{159}{100} \) or 0.159, and \( \frac{0.159}{0.977} \)
or an equivalent answer, and appropriate work is shown.
[3] Correct answers are found for either part a or part b and for part c.
[2] Correct answers are found for part a and part b, but the answer for part c is missing or is incorrect.
or [2] Only the correct answer for part b is found, and one computational or substitution error is made in determining the answer to part c.
[1] Only the correct answer for either part a or part b is found.
or [1] \( \frac{1}{2} \) or 50\%, \( \frac{159}{100} \) or 0.159, and \( \frac{0.159}{0.977} \)
or an equivalent answer, but no work is shown.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[917] ______

[6] \( \angle ACB = 36 \) and \( DOE = 39 \), and appropriate work is shown. [If trigonometry is used to find that \( \angle ACB = 35.98138002 \), allow full credit for the full display of the calculator or any correctly rounded response.]
[5] Appropriate work is shown, but one computational or rounding error is made.
[4] Appropriate work is shown, but two or more computational or rounding errors are made.
[3] Appropriate work is shown, but one conceptual error is made.
or [3] \( \angle ACB = 36 \), and appropriate work is shown, but no further correct work is shown.
or [3] \( DOE = 39 \), and appropriate work is shown, but no further correct work is shown.
[2] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.
or [2] \( \angle ACB = 36 \) and \( DOE = 39 \), but no work is shown.
[1] The measures of the arcs are found correctly, but no further correct work is shown.
or [1] \( \angle ACB = 36 \) or \( DOE = 39 \), but no work is shown.
or [0] 36 and 39, but no work is shown and the answers are not labeled.
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.