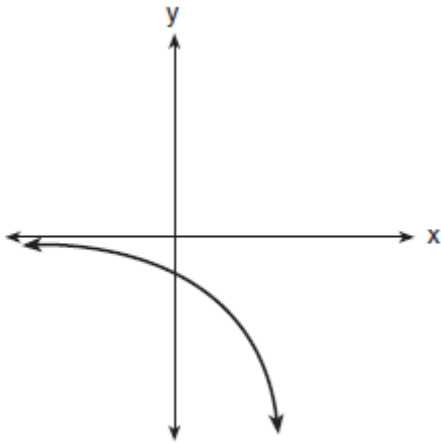1. 080901b, P.I. A2.A.52
Which equation is represented by the accompanying graph?

[A] $y = x^2 - 2$ [B] $y = 2^{-x}$

[C] $y = 2^x$ [D] $y = -2^x$

2. 080902b, P.I. A.A.41
What are the coordinates of the turning point of the parabola whose equation is $y = -x^2 + 4x + 1$?

[A] (2,13)   [B] (-2,-3)

[C] (-2,-11)   [D] (2,5)

3. 080903b, P.I. A2.A.69
The graph of the equation $y = |\sin x|$ will contain *no* points in Quadrants

[A] I and IV   [B] II and III

[C] III and IV   [D] I and II

4. 080904b, P.I. A2.A.35
What is the value of $\sum\limits_{k=0}^{2} 3(2)^k$?

[A] 43   [B] 21   [C] 19   [D] 15

5. 080905b, P.I. A2.N.6
Expressed in simplest form, $\dfrac{\sqrt{-20}}{\sqrt{5}}$ is equivalent to

[A] $2i$ [B] $\dfrac{2i}{\sqrt{5}}$ [C] $\sqrt{2i}$ [D] -2i

6. 080906b
On a graph, if point A represents $2 - 3i$ and point B represents $-2 - 5i$, which quadrant contains $3A - 2B$?

[A] IV   [B] III   [C] II   [D] I

7. 080907b, P.I. G.G.28
In the accompanying diagram of triangles BAT and FLU, $\angle B \cong \angle F$ and $\overline{BA} \cong \overline{FL}$.
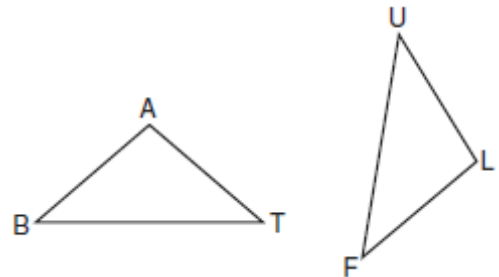
Which statement is needed to prove $\triangle BAT \cong \triangle FLU$?

[A] $\overline{BA} \parallel \overline{FL}$ [B] $\angle A \cong \angle U$

[C] $\angle A \cong \angle L$ [D] $\overline{AT} \cong \overline{LU}$

8. 080908b, P.I. G.G.61
Which type of transformation is $(x,y) \rightarrow (x+2, y-2)$?

[A] rotation   [B] translation

[C] reflection   [D] dilation

9. 080909b, P.I. A2.A.58
Which functions are positive for angles terminating in Quadrant II?

[A] sine and cosecant

[B] sine and tangent

[C] sine and cosine   [D] sine and secant

10. 080910b, P.I. A2.A.14
What is $\sqrt{\dfrac{4}{3}} - \sqrt{\dfrac{3}{4}}$ expressed in simplest form?

[A] $2\sqrt{3}$ [B] 1   [C] 0   [D] $\dfrac{\sqrt{3}}{6}$

11. 080911b, P.I. A2.A.19

Banks use the formula $A = P(1+r)^x$ when they compound interest annually. If P represents the amount of money invested and r represents the rate of interest, which expression represents $\log A$, where A represents the amount of money in the account after x years?

[A] $x \log P + \log(1+r)$

[B] $\log P + \log x + \log(1+r)$

[C] $\log P + x \log 1 + r$

[D] $\log P + x \log(1+r)$

12. 080912b

If the equation of the axis of symmetry of a parabola is $x = 2$, at which pair of points could the parabola intersect the x-axis?

[A] (-3,0) and (-1,0)   [B] (3,0) and (2,0)

[C] (3,0) and (1,0)   [D] (3,0) and (5,0)

13. 080913b, P.I. A2.A.52

Jack is driving from New York to Florida. The number of hours that he drives and the speed at which he drives are inversely proportional. Which graph could be used to describe this situation if one axis represents speed and the other represents hours?

[A]

[B]

[C]

[D]
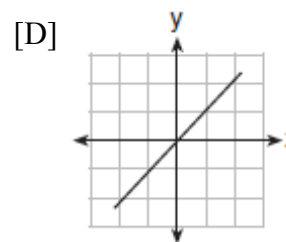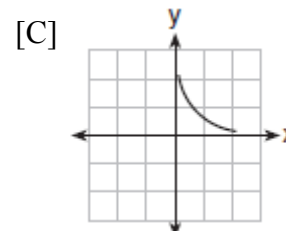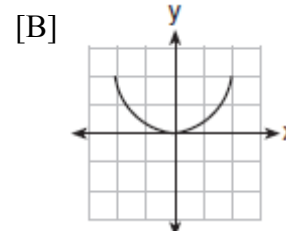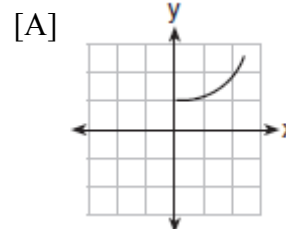
14. 080914b, P.I. G.G.31

What is the length of the altitude of an equilateral triangle whose side has a length of 8?

[A] 32   [B] $4\sqrt{2}$ [C] $4\sqrt{3}$ [D] 4

15. 080915b, P.I. A2.A.36

What is the third term in the expansion of $(3x - 2)^5$?

[A] $1,080x^2$ [B] $270x^3$

[C] $540x^3$ [D] $1,080x^3$

16. 080916b
    If the dilation D_k is an isometry, what must be the value of k?

    [A] 2   [B] -2   [C] 1   [D] 0

17. 080917b, P.I. A2.A.42
    If $f(x) = x^2$ and $g(x) = 2x + 1$, which expression is equivalent to $(f \circ g)(x)$?

    [A] $2(x+1)^2$ [B] $4x^2 + 4x + 1$

    [C] $4x^2 + 1$ [D] $2x^2 + 1$

18. 080918b, P.I. A2.A.44
    What is the inverse of the function $y = 2x - 3$?

    [A] $y = \dfrac{x+3}{2}$ [B] $y = -2x + 3$

    [C] $y = \dfrac{x}{2} + 3$ [D] $y = \dfrac{1}{2x-3}$

19. 080919b, P.I. A2.A.46
    If $a > 0$, which function represents the reflection of $y = a^x$ in the y-axis?

    [A] $y = (\dfrac{1}{a})^{-x}$ [B] $y = (\dfrac{1}{a})^x$

    [C] $y = -a^x$ [D] $x = a^y$

20. 080920b
    The graph of the equation $2x^2 - 3y^2 = 4$ forms

    [A] a hyperbola   [B] an ellipse

    [C] a circle   [D] a parabola

21. 080921b, P.I. A2.N.1
    Evaluate the expression
    $(x+3)^{\frac{1}{2}} + (x-3)^0 + (x+2)^{-\frac{2}{3}}$ when $x = 6$.

22. 080922b, P.I. A2.A.27
    Solve algebraically for x: $27^x = 9^{x+2}$

23. 080923b, P.I. A2.A.1
    Solve for the negative value of x:
    $|2x + 5| + 1 = 13$

24. 080924b
    In physics class, Esther learned that force due to gravity can be determined by using the formula $F = \dfrac{Gm_1 m_2}{r^2}$. Solve for r in terms of F, G, m_1, and m_2.

25. 080925b, P.I. G.G.51
    In the accompanying diagram of circle O, $\overline{PC}$ is a tangent, $\overline{PBA}$ is a secant, $m\overarc{AB} = 132$, and $m\overarc{CB} = 46$. Find $m\angle P$.
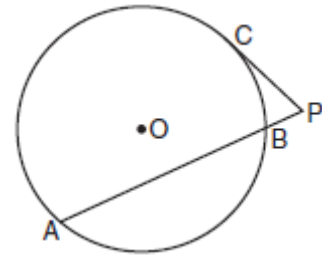
26. 080926b, P.I. A2.A.72
    The accompanying graph shows a trigonometric function. State an equation of this function.
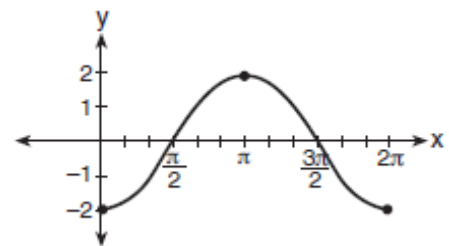
27. 080927b, P.I. A2.S.7
Kathy swims laps at the local fitness club. As she times her laps, she finds that each succeeding lap takes a little longer as she gets tired. If the first lap takes her 33 seconds, the second lap takes 38 seconds, the third takes 42 seconds, the fifth takes 50 seconds, and the seventh lap takes 54 seconds, state the power regression equation for this set of data, rounding all coefficients to the *nearest hundredth*. Using your written regression equation, estimate the number of seconds that it would take Kathy to complete her tenth lap, to the *nearest tenth of a second*.

28. 080928b, P.I. A2.S.15
Dave is the manager of a construction supply warehouse and notes that 60% of the items purchased are heating items, 25% are electrical items, and 15% are plumbing items. Find the probability that *at least* three out of the next five items purchased are heating items.

29. 080929b, P.I. A2.S.5
The heights of a sample of female students at Oriskany High School are normally distributed with a mean height of 65 inches and a standard deviation of 0.6 inch. What percent of this sample is between 63.8 inches and 66.2 inches? Above what height, in inches, would the top 2.3% of this sample population be found?

30. 080930b, P.I. A2.A.17
Express in simplest form: $\dfrac{\dfrac{5}{a+b} - \dfrac{5}{a-b}}{\dfrac{10}{a^2-b^2}}$

31. 080931b, P.I. A2.A.25
Solve the equation $3x^2 + 5 = 4x$ and express the roots in simplest $a+bi$ form.

32. 080932b, P.I. G.G.47
The drawing for a right triangular roof truss, represented by $\triangle ABC$, is shown in the accompanying diagram. If $\angle ABC$ is a right angle, altitude $BD = 4$ meters, and $\overline{DC}$ is 6 meters longer than $\overline{AD}$, find the length of base $\overline{AC}$, in meters.
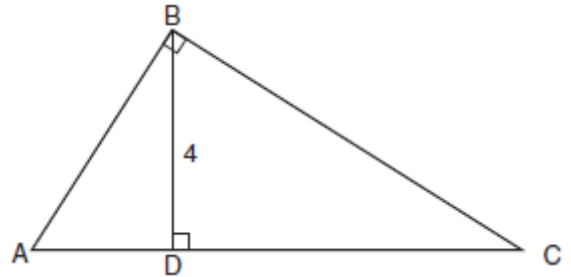
33. 080933b, P.I. G.G.69
Given: $T(-1,1)$, $R(3,4)$, $A(7,2)$, and $P(-1,-4)$
Prove: $TRAP$ is a trapezoid.
        $TRAP$ is *not* an isosceles trapezoid.
[The use of the grid is optional.]
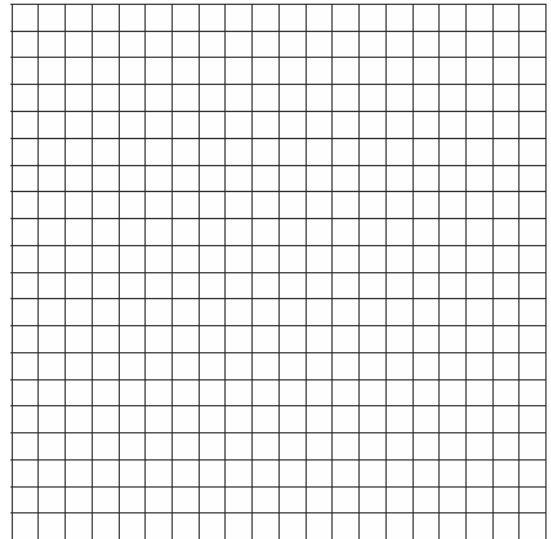
34. 080934b, P.I. A2.A.73
Firefighters dug three trenches in the shape of a triangle to prevent a fire from completely destroying a forest. The lengths of the trenches were 250 feet, 312 feet, and 490 feet. Find, to the *nearest degree*, the smallest angle formed by the trenches. Find the area of the plot of land within the trenches, to the *nearest square foot*.

[1] D

[2] D

[3] C

[4] B

[5] A

[6] D

[7] C

[8] B

[9] A

[10] D

[11] D

[12] C

[13] C

[14] C

[15] D

[16] C

[17] B

[18] A

[19] B

[20] A

[2] $4\frac{1}{4}$ or 4.25, 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] $4\frac{1}{4}$ 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
[21] incorrect procedure.

[2] 4, 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] $3^{3x} = 3^{2(x+4)}$ 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.
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously
[22] 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
[23] incorrect procedure.

[2] $r = \sqrt{\dfrac{Gm_1m_2}{F}}$ or $r = \pm\sqrt{\dfrac{Gm_1m_2}{F}}$, 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] $r = \sqrt{\dfrac{Gm_1m_2}{F}}$ or $r = \pm\sqrt{\dfrac{Gm_1m_2}{F}}$,

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

[2] 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
[25] incorrect procedure.

[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
[26] incorrect procedure.

[4] $y = 32.35x^{0.26}$ 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
[27] incorrect procedure.

[4] .68256 or $\frac{2133}{3125}$ and appropriate work is

shown, such as $_5C_3(0.6)^3(0.4)^2 +$

$_5C_4(0.6)^4(0.4)^1 + {_5}C_5(0.6)^5(0.4)^0$.

[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" or "more than
three."
or [2] $_5C_3(0.6)^3(0.4)^2 + {_5}C_4(0.6)^4(0.4)^1 +$

$_5C_5(0.6)^5(0.4)^0$, 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 the
probability for "exactly three out of five
items."

or [1] .68256 or $\frac{2133}{3125}$, 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
[28] incorrect procedure.

[4] 95.4 and 66.2, 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.
or [2] 95.4 or 66.2, and appropriate work is
shown.
[1] Appropriate work is shown, but one
conceptual error and one computational error
are made.
or [1] 95.4 and 66.2, but no work is shown.
[0] 95.4 or 66.2, 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
[29] obviously incorrect procedure.

[4] -b, 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.

or [2] $\frac{5(a-b)-5(a+b)}{10}$ is written, but no

further correct work is shown.
[1] Appropriate work is shown, but one
conceptual error and one computational or
simplification error are made.
or [1] -b, 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
[30] incorrect procedure.

[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

[31] incorrect procedure.

[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, but one conceptual error is 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

[32] incorrect procedure.

[6] A complete and correct proof with an appropriate concluding statement is written.
[5] Appropriate work is shown, but one computational or graphing error is made.
or [5] Appropriate work is shown to prove *TRAP* is a trapezoid and the lengths of the sides are found, but no concluding statement is made regarding it not being isosceles.
or [5] All calculations necessary to prove *TRAP* is a trapezoid but not isosceles are made, but one statement or reason is missing or is incorrect.
[4] Appropriate work is shown, but two or more computational or graphing errors are made.
or [4] Appropriate work is shown, but one conceptual error is made.
or [4] Appropriate work is shown to prove *TRAP* is a trapezoid with an appropriate concluding statement, but no further correct work is shown.
[3] Appropriate work is shown to find *TP*, *RA*, and the slopes of all four sides, but no conclusions are written.
[2] Appropriate work is shown, but one conceptual error and one computational, graphing, or justification error are made.
or [2] Appropriate work is shown to prove $\overline{TR} \parallel \overline{PA}$ with appropriate justification, but no further correct work is shown.
or [2] Appropriate work is shown to find the slopes of all four sides and either *TP* or *RA*, but no conclusions are written.
[1] Appropriate work is shown to find the slopes of all four sides, but no further correct work is shown.
or [1] Appropriate work is shown to find *TP* and *RA*, 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.
[33]

[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.
[34]