JEFFERSON MATH PROJECT
REGENTS AT RANDOM

The NY Algebra 2/Trigonometry Regents Exams
## Fall 2009-June 2012

www.jmap.org

Dear Sir

I have to acknolege the reciept 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 indispensible 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.

Algebra 2/Trigonometry Regents at Random

1 Which equation is sketched in the diagram below?
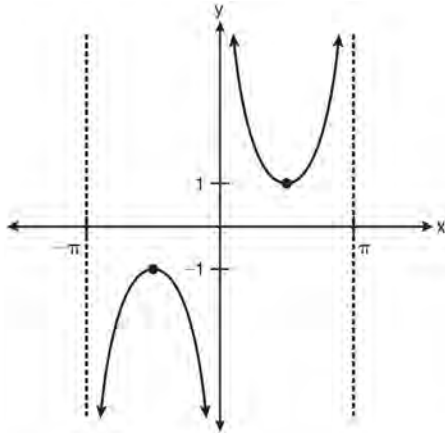
1) $y = \csc x$
2) $y = \sec x$
3) $y = \cot x$
4) $y = \tan x$

2 If $\log_4 x = 2.5$ and $\log_y 125 = -\dfrac{3}{2}$, find the numerical value of $\dfrac{x}{y}$, in simplest form.
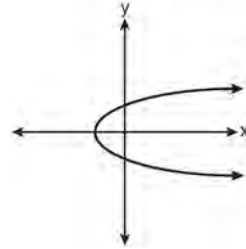
3 A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can *not* be the first digit, no digit may be repeated, and the last digit must be 5?
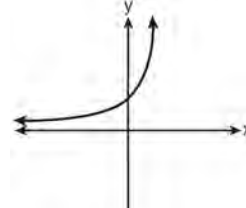1) 448
2) 504
3) 2,240
4) 2,520

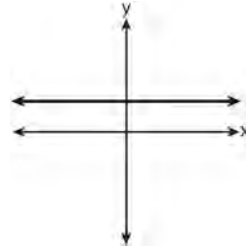4 Which graph represents a one-to-one function?
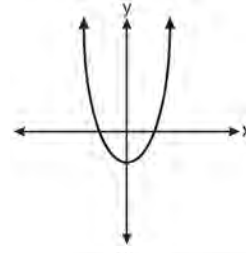
1)

2)

3)

4)

5 Which arithmetic sequence has a common difference of 4?
1) $\{0, 4n, 8n, 12n, \dots\}$
2) $\{n, 4n, 16n, 64n, \dots\}$
3) $\{n + 1, n + 5, n + 9, n + 13, \dots\}$
4) $\{n + 4, n + 16, n + 64, n + 256, \dots\}$

6 The solution set of the inequality $x^2 - 3x > 10$ is
   1) $\{x \mid -2 < x < 5\}$
   2) $\{x \mid 0 < x < 3\}$
   3) $\{x \mid x < -2 \text{ or } x > 5\}$
   4) $\{x \mid x < -5 \text{ or } x > 2\}$

7 What is the radian measure of an angle whose measure is –420°?
   1) $-\dfrac{7\pi}{3}$
   2) $-\dfrac{7\pi}{6}$
   3) $\dfrac{7\pi}{6}$
   4) $\dfrac{7\pi}{3}$

8 Find the solution of the inequality $x^2 - 4x > 5$, algebraically.

9 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is
   1) -1
   2) $-\dfrac{1}{x}$
   3) $\dfrac{1}{x^2}$
   4) $\dfrac{1}{(x-1)^2}$

10 Express $\left(\dfrac{2}{3}x - 1\right)^2$ as a trinomial.

11 The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey
   1) every third student sent to the office
   2) every third student to enter the library
   3) every third student to enter the gym for the basketball game
   4) every third student arriving at school in the morning

12 The graph below represents the function $y = f(x)$.
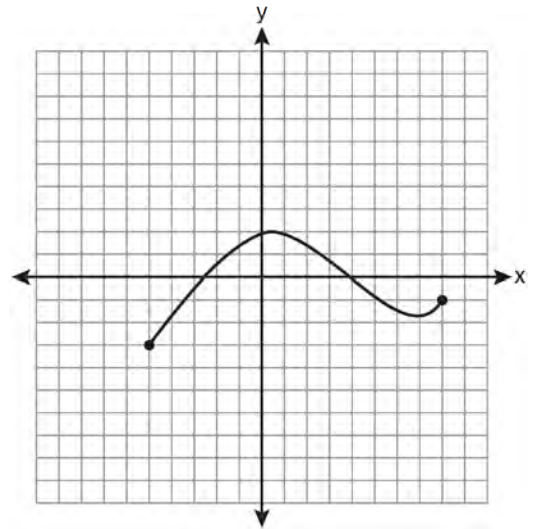
State the domain and range of this function.

13 In $\triangle ABC$, m$\angle A = 32$, $a = 12$, and $b = 10$. Find the measures of the missing angles and side of $\triangle ABC$. Round each measure to the *nearest tenth*.

2

14 The probability that the Stormville Sluggers will win a baseball game is $\frac{2}{3}$. Determine the probability, to the *nearest thousandth*, that the Stormville Sluggers will win *at least* 6 of their next 8 games.

15 The temperature, T, of a given cup of hot chocolate after it has been cooling for t minutes can best be modeled by the function below, where T_0 is the temperature of the room and k is a constant.
$$\ln(T - T_0) = -kt + 4.718$$
A cup of hot chocolate is placed in a room that has a temperature of 68°. After 3 minutes, the temperature of the hot chocolate is 150°. Compute the value of k to the nearest thousandth. [Only an algebraic solution can receive full credit.] Using this value of k, find the temperature, T, of this cup of hot chocolate if it has been sitting in this room for a total of 10 minutes. Express your answer to the *nearest degree*. [Only an algebraic solution can receive full credit.]

16 Find, to the *nearest tenth of a degree*, the angle whose measure is 2.5 radians.

17 A population of rabbits doubles every 60 days according to the formula $P = 10(2)^{\frac{t}{60}}$, where P is the population of rabbits on day t. What is the value of t when the population is 320?
1) 240
2) 300
3) 660
4) 960

18 For a given set of rectangles, the length is inversely proportional to the width. In one of these rectangles, the length is 12 and the width is 6. For this set of rectangles, calculate the width of a rectangle whose length is 9.

19 What are the domain and the range of the function shown in the graph below?
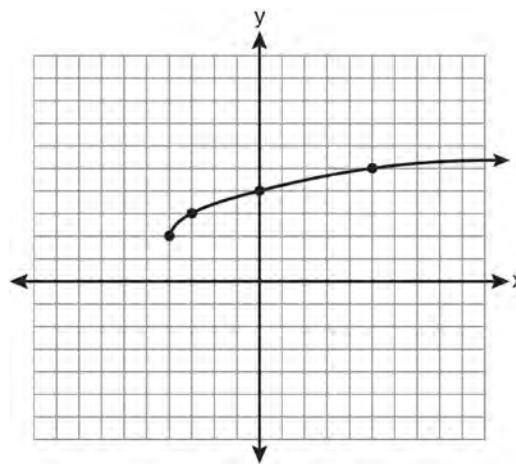
1) $\{x \mid x > -4\}; \{y \mid y > 2\}$
2) $\{x \mid x \geq -4\}; \{y \mid y \geq 2\}$
3) $\{x \mid x > 2\}; \{y \mid y > -4\}$
4) $\{x \mid x \geq 2\}; \{y \mid y \geq -4\}$

20 Perform the indicated operations and simplify completely:
$$\frac{x^3 - 3x^2 + 6x - 18}{x^2 - 4x} \cdot \frac{2x - 4}{x^4 - 3x^3} \div \frac{x^2 + 2x - 8}{16 - x^2}$$

21 Solve the equation $2\tan C - 3 = 3\tan C - 4$ algebraically for all values of C in the interval $0° \leq C < 360°$.

3

22 Solve algebraically for x: $\log_{x+3} \dfrac{x^3 + x - 2}{x} = 2$

23 Which expression represents the third term in the expansion of $(2x^4 - y)^3$?
1) $-y^3$
2) $-6x^4 y^2$
3) $6x^4 y^2$
4) $2x^4 y^2$

24 The expression $\log_5 \left(\dfrac{1}{25} \right)$ is equivalent to

1) $\dfrac{1}{2}$
2) 2
3) $-\dfrac{1}{2}$
4) -2

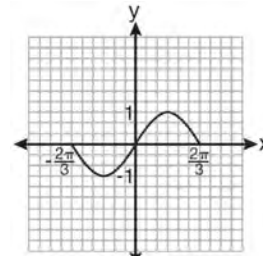25 What is the value of x in the equation $9^{3x+1} = 27^{x+2}$?
1) 1
2) $\dfrac{1}{3}$
3) $\dfrac{1}{2}$
4) $\dfrac{4}{3}$

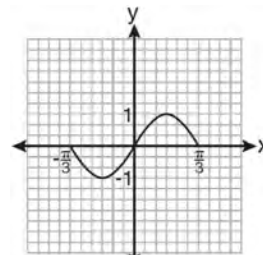26 Express the exact value of $\csc 60°$, with a rational denominator.

27 What is the range of $f(x) = |x - 3| + 2$?
1) $\{x \,|\, x \geq 3\}$
2) $\{y \,|\, y \geq 2\}$
3) $\{x \,|\, x \in \text{real numbers}\}$
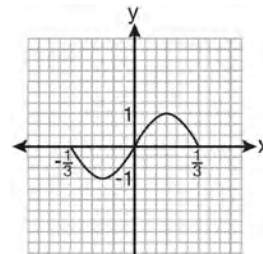4) $\{y \,|\, y \in \text{real numbers}\}$

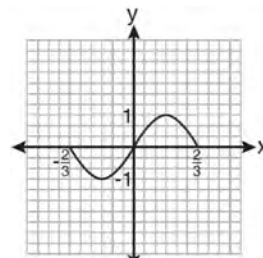28 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?

1)

2)

3)

4)

4

29 A sequence has the following terms: $a_1 = 4$,
$a_2 = 10$, $a_3 = 25$, $a_4 = 62.5$. Which formula
represents the nth term in the sequence?
1) $a_n = 4 + 2.5n$
2) $a_n = 4 + 2.5(n - 1)$
3) $a_n = 4(2.5)^n$
4) $a_n = 4(2.5)^{n-1}$

30 Which expression always equals 1?
1) $\cos^2 x - \sin^2 x$
2) $\cos^2 x + \sin^2 x$
3) $\cos x - \sin x$
4) $\cos x + \sin x$

31 If $\sin A = \dfrac{2}{3}$ where $0° < A < 90°$, what is the value
of $\sin 2A$?
1) $\dfrac{2\sqrt{5}}{3}$
2) $\dfrac{2\sqrt{5}}{9}$
3) $\dfrac{4\sqrt{5}}{9}$
4) $-\dfrac{4\sqrt{5}}{9}$

32 Assume that the ages of first-year college students
are normally distributed with a mean of 19 years
and standard deviation of 1 year. To the *nearest
integer*, find the percentage of first-year college
students who are between the ages of 18 years and
20 years, inclusive. To the *nearest integer*, find the
percentage of first-year college students who are 20
years old or older.

33 Given $\triangle ABC$ with $a = 9$, $b = 10$, and m$\angle B = 70$,
what type of triangle can be drawn?
1) an acute triangle, only
2) an obtuse triangle, only
3) both an acute triangle and an obtuse triangle
4) neither an acute triangle nor an obtuse triangle

34 A dartboard is shown in the diagram below. The
two lines intersect at the center of the circle, and
the central angle in sector 2 measures $\dfrac{2\pi}{3}$.
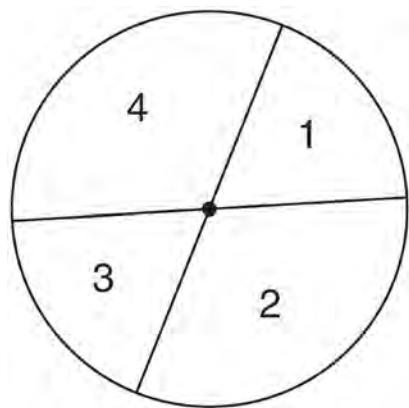
If darts thrown at this board are equally likely to
land anywhere on the board, what is the probability
that a dart that hits the board will land in either
sector 1 or sector 3?
1) $\dfrac{1}{6}$
2) $\dfrac{1}{3}$
3) $\dfrac{1}{2}$
4) $\dfrac{2}{3}$

35 Find the total number of different twelve-letter arrangements that can be formed using the letters in the word *PENNSYLVANIA*.

36 In parallelogram *BFLO*, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal $\overline{BL}$ is drawn, what is the area of $\triangle BLF$?
1) 11.4
2) 14.1
3) 22.7
4) 28.1

37 What is the solution set of the equation $|4a + 6| - 4a = -10$?
1) $\varnothing$
2) $\{0\}$
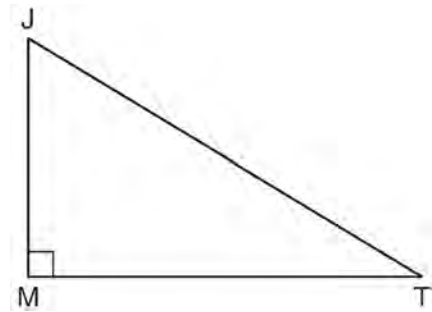3) $\left\{\dfrac{1}{2}\right\}$
4) $\left\{0, \dfrac{1}{2}\right\}$

38 If $f(x) = 4x - x^2$ and $g(x) = \dfrac{1}{x}$, then $(f \circ g)\left(\dfrac{1}{2}\right)$ is equal to
1) $\dfrac{4}{7}$
2) -2
3) $\dfrac{7}{2}$
4) 4

39 In $\triangle ABC$, $a = 3$, $b = 5$, and $c = 7$. What is $m\angle C$?
1) 22
2) 38
3) 60
4) 120

40 In the diagram below of right triangle *JTM*, $JT = 12$, $JM = 6$, and $m\angle JMT = 90$.

What is the value of $\cot J$?
1) $\dfrac{\sqrt{3}}{3}$
2) 2
3) $\sqrt{3}$
4) $\dfrac{2\sqrt{3}}{3}$

41 The conjugate of $7 - 5i$ is
1) $-7 - 5i$
2) $-7 + 5i$
3) $7 - 5i$
4) $7 + 5i$

42 The expression $2i^2 + 3i^3$ is equivalent to
   1) $-2 - 3i$
   2) $2 - 3i$
   3) $-2 + 3i$
   4) $2 + 3i$

43 If $\tan A = \dfrac{2}{3}$ and $\sin B = \dfrac{5}{\sqrt{41}}$ and angles A and B are in Quadrant I, find the value of $\tan(A + B)$.

44 Write the binomial expansion of $(2x - 1)^5$ as a polynomial in simplest form.

45 A spinner is divided into eight equal sections. Five sections are red and three are green. If the spinner is spun three times, what is the probability that it lands on red *exactly* twice?
   1) $\dfrac{25}{64}$
   2) $\dfrac{45}{512}$
   3) $\dfrac{75}{512}$
   4) $\dfrac{225}{512}$

46 Which function is one-to-one?
   1) $f(x) = |x|$
   2) $f(x) = 2^x$
   3) $f(x) = x^2$
   4) $f(x) = \sin x$

47 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.
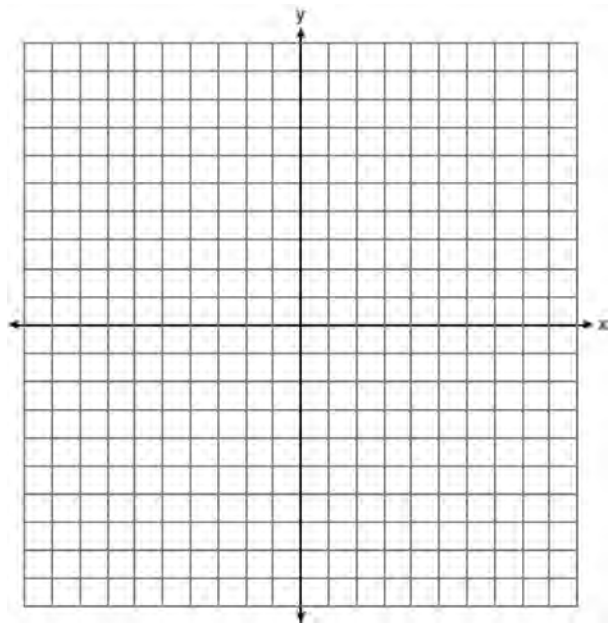
48 Three marbles are to be drawn at random, without replacement, from a bag containing 15 red marbles, 10 blue marbles, and 5 white marbles. Which expression can be used to calculate the probability of drawing 2 red marbles and 1 white marble from the bag?
   1) $\dfrac{{}_{15}C_2 \cdot {}_5 C_1}{{}_{30}C_3}$
   2) $\dfrac{{}_{15}P_2 \cdot {}_5 P_1}{{}_{30}C_3}$
   3) $\dfrac{{}_{15}C_2 \cdot {}_5 C_1}{{}_{30}P_3}$
   4) $\dfrac{{}_{15}P_2 \cdot {}_5 P_1}{{}_{30}P_3}$

49 If $\sin^{-1}\left(\dfrac{5}{8}\right) = A$, then

  1) $\sin A = \dfrac{5}{8}$

  2) $\sin A = \dfrac{8}{5}$

  3) $\cos A = \dfrac{5}{8}$

  4) $\cos A = \dfrac{8}{5}$

50 When $x^{-1} + 1$ is divided by $x + 1$, the quotient equals

  1) 1

  2) $\dfrac{1}{x}$

  3) x

  4) $-\dfrac{1}{x}$

51 Express in simplest form: $\sqrt[3]{\dfrac{a^6 b^9}{-64}}$

52 If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be

  1) $(x+3)^2 = 7$

  2) $(x-3)^2 = 7$

  3) $(x-3)^2 = 11$

  4) $(x-6)^2 = 34$

53 The diagram below shows the plans for a cell phone tower. A guy wire attached to the top of the tower makes an angle of 65 degrees with the ground. From a point on the ground 100 feet from the end of the guy wire, the angle of elevation to the top of the tower is 32 degrees. Find the height of the tower, to the *nearest foot*.
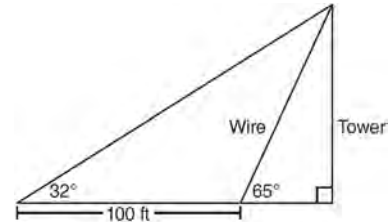
54 What is the product of $\left(\dfrac{x}{4} - \dfrac{1}{3}\right)$ and $\left(\dfrac{x}{4} + \dfrac{1}{3}\right)$?

  1) $\dfrac{x^2}{8} - \dfrac{1}{9}$

  2) $\dfrac{x^2}{16} - \dfrac{1}{9}$

  3) $\dfrac{x^2}{8} - \dfrac{x}{6} - \dfrac{1}{9}$

  4) $\dfrac{x^2}{16} - \dfrac{x}{6} - \dfrac{1}{9}$

55 What is the principal value of $\cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right)$?

  1) $-30°$

  2) $60°$

  3) $150°$

  4) $240°$

56 Which values of x are in the solution set of the following system of equations?
$$y = 3x - 6$$
$$y = x^2 - x - 6$$
1) $0, -4$
2) $0, 4$
3) $6, -2$
4) $-6, 2$

57 The roots of the equation $2x^2 + 7x - 3 = 0$ are
1) $-\dfrac{1}{2}$ and -3
2) $\dfrac{1}{2}$ and 3
3) $\dfrac{-7 \pm \sqrt{73}}{4}$
4) $\dfrac{7 \pm \sqrt{73}}{4}$

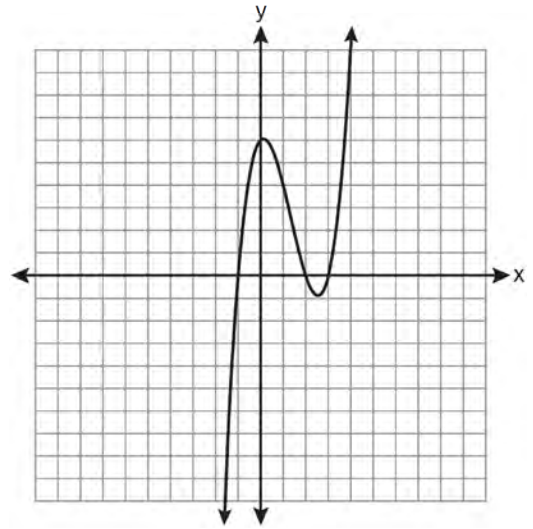58 What is the sum of the first 19 terms of the sequence $3, 10, 17, 24, 31, \ldots$?
1) 1188
2) 1197
3) 1254
4) 1292

59 Which values of x are solutions of the equation $x^3 + x^2 - 2x = 0$?
1) $0, 1, 2$
2) $0, 1, -2$
3) $0, -1, 2$
4) $0, -1, -2$

60 The graph of $y = x^3 - 4x^2 + x + 6$ is shown below.

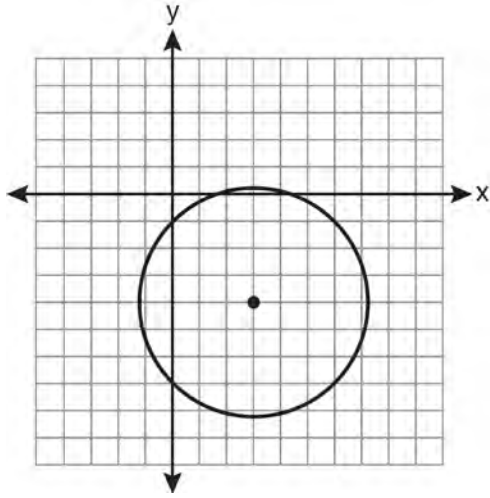What is the product of the roots of the equation $x^3 - 4x^2 + x + 6 = 0$?
1) -36
2) -6
3) 6
4) 4

61 How many distinct triangles can be formed if $m\angle A = 35$, $a = 10$, and $b = 13$?
1) 1
2) 2
3) 3
4) 0

62 For which equation does the sum of the roots equal -3 and the product of the roots equal 2?
1) $x^2 + 2x - 3 = 0$
2) $x^2 - 3x + 2 = 0$
3) $2x^2 + 6x + 4 = 0$
4) $2x^2 - 6x + 4 = 0$

63 Which equation represents the circle shown in the graph below that passes through the point $(0,-1)$?

1) $(x-3)^2+(y+4)^2=16$
2) $(x-3)^2+(y+4)^2=18$
3) $(x+3)^2+(y-4)^2=16$
4) $(x+3)^2+(y-4)^2=18$

64 The expression $\dfrac{2x+4}{\sqrt{x+2}}$ is equivalent to

1) $\dfrac{(2x+4)\sqrt{x-2}}{x-2}$

2) $\dfrac{(2x+4)\sqrt{x-2}}{x-4}$

3) $2\sqrt{x-2}$

4) $2\sqrt{x+2}$

65 Starting with $\sin^2 A + \cos^2 A = 1$, derive the formula $\tan^2 A + 1 = \sec^2 A$.

66 In which graph is θ coterminal with an angle of $-70°$?

1)

2)

3)

4)
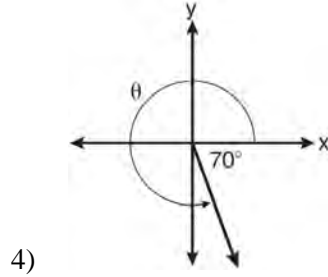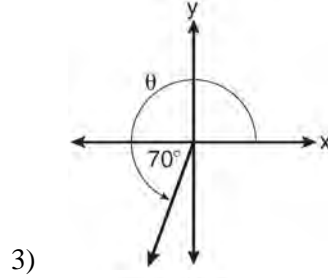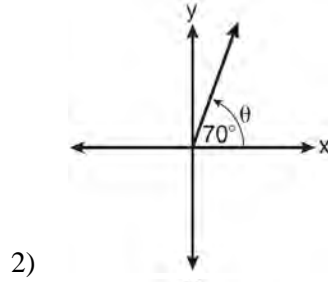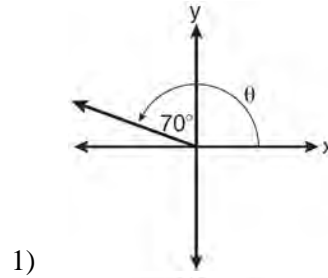
67 The minimum point on the graph of the equation $y = f(x)$ is $(-1,-3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$?
1) $(-1,2)$
2) $(-1,-8)$
3) $(4,-3)$
4) $(-6,-3)$

68 When simplified, the expression $\left(\dfrac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is

equivalent to

1) w^{-7}
2) w^2
3) w^7
4) w^{14}

69 Which expression, when rounded to three decimal places, is equal to -1.155?

1) $\sec\left(\dfrac{5\pi}{6}\right)$
2) $\tan(49°20')$
3) $\sin\left(-\dfrac{3\pi}{5}\right)$
4) $\csc(-118°)$

70 What is the number of degrees in an angle whose measure is 2 radians?

1) $\dfrac{360}{\pi}$
2) $\dfrac{\pi}{360}$
3) 360
4) 90

71 In $\triangle ABC$, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?

1) 73.7 and 106.3
2) 73.7 and 163.7
3) 78.3 and 101.7
4) 78.3 and 168.3

72 Which task is *not* a component of an observational study?

1) The researcher decides who will make up the sample.
2) The researcher analyzes the data received from the sample.
3) The researcher gathers data from the sample, using surveys or taking measurements.
4) The researcher divides the sample into two groups, with one group acting as a control group.

73 Given angle A in Quadrant I with $\sin A = \dfrac{12}{13}$ and angle B in Quadrant II with $\cos B = -\dfrac{3}{5}$, what is the value of $\cos(A - B)$?

1) $\dfrac{33}{65}$
2) $-\dfrac{33}{65}$
3) $\dfrac{63}{65}$
4) $-\dfrac{63}{65}$

74 A study shows that 35% of the fish caught in a local lake had high levels of mercury. Suppose that 10 fish were caught from this lake. Find, to the *nearest tenth of a percent,* the probability that *at least* 8 of the 10 fish caught did *not* contain high levels of mercury.

75 Solve algebraically for x: $16^{2x+3} = 64^{x+2}$

76 A population of single-celled organisms was grown in a Petri dish over a period of 16 hours. The number of organisms at a given time is recorded in the table below.

Time, hrs (x)	Number of Organisms (y)
0	25
2	36
4	52
6	68
8	85
10	104
12	142
16	260

Determine the exponential regression equation model for these data, rounding all values to the *nearest ten-thousandth*. Using this equation, predict the number of single-celled organisms, to the *nearest whole number*, at the end of the 18th hour.

77 If the amount of time students work in any given week is normally distributed with a mean of 10 hours per week and a standard deviation of 2 hours, what is the probability a student works between 8 and 11 hours per week?
1) 34.1%
2) 38.2%
3) 53.2%
4) 68.2%

78 Solve algebraically for x: $\dfrac{1}{x+3} - \dfrac{2}{3-x} = \dfrac{4}{x^2-9}$

79 The principal would like to assemble a committee of 8 students from the 15-member student council. How many different committees can be chosen?
1) 120
2) 6,435
3) 32,432,400
4) 259,459,200

80 What is a formula for the *n*th term of sequence *B* shown below?
$$B = 10, 12, 14, 16, \ldots$$
1) $b_n = 8 + 2n$
2) $b_n = 10 + 2n$
3) $b_n = 10(2)^n$
4) $b_n = 10(2)^{n-1}$

81 Express $\dfrac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}}$ in simplest radical form.

82 Howard collected fish eggs from a pond behind his house so he could determine whether sunlight had an effect on how many of the eggs hatched. After he collected the eggs, he divided them into two tanks. He put both tanks outside near the pond, and he covered one of the tanks with a box to block out all sunlight. State whether Howard's investigation was an example of a controlled experiment, an observation, or a survey. Justify your response.

12

83 Which equation is graphed in the diagram below?

(15,8)
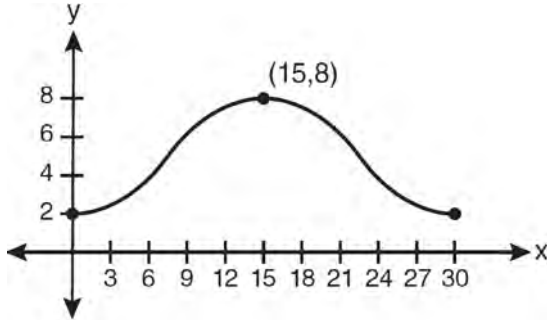
1) $y = 3\cos\left(\dfrac{\pi}{30}x\right) + 8$

2) $y = 3\cos\left(\dfrac{\pi}{15}x\right) + 5$

3) $y = -3\cos\left(\dfrac{\pi}{30}x\right) + 8$

4) $y = -3\cos\left(\dfrac{\pi}{15}x\right) + 5$

84 The product of $(3 + \sqrt{5})$ and $(3 - \sqrt{5})$ is
   1) $4 - 6\sqrt{5}$
   2) $14 - 6\sqrt{5}$
   3) 14
   4) 4

85 If p varies inversely as q, and $p = 10$ when $q = \dfrac{3}{2}$, what is the value of p when $q = \dfrac{3}{5}$?
   1) 25
   2) 15
   3) 9
   4) 4

86 The table below shows the number of new stores in a coffee shop chain that opened during the years 1986 through 1994.

Year	Number of New Stores
1986	14
1987	27
1988	48
1989	80
1990	110
1991	153
1992	261
1993	403
1994	681

Using $x = 1$ to represent the year 1986 and y to represent the number of new stores, write the exponential regression equation for these data. Round all values to the *nearest thousandth.*

87 The fraction $\dfrac{3}{\sqrt{3a^2b}}$ is equivalent to

   1) $\dfrac{1}{a\sqrt{b}}$

   2) $\dfrac{\sqrt{b}}{ab}$

   3) $\dfrac{\sqrt{3b}}{ab}$

   4) $\dfrac{\sqrt{3}}{a}$

88 Express the sum $7 + 14 + 21 + 28 + \ldots + 105$ using sigma notation.

13

89 On January 1, a share of a certain stock cost $180. Each month thereafter, the cost of a share of this stock decreased by one-third. If x represents the time, in months, and y represents the cost of the stock, in dollars, which graph best represents the cost of a share over the following 5 months?

1)

2)

3)

4)
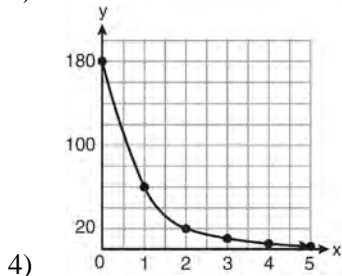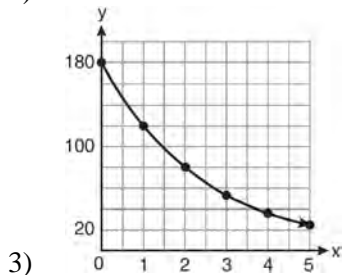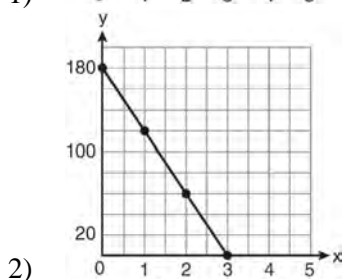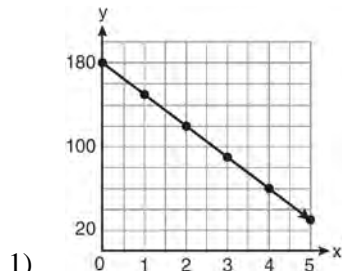
90 When $\frac{3}{2}x^2 - \frac{1}{4}x - 4$ is subtracted from $\frac{5}{2}x^2 - \frac{3}{4}x + 1$, the difference is

1) $-x^2 + \frac{1}{2}x - 5$

2) $x^2 - \frac{1}{2}x + 5$

3) $-x^2 - x - 3$

4) $x^2 - x - 3$

91 Which two functions are inverse functions of each other?

1) $f(x) = \sin x$ and $g(x) = \cos(x)$
2) $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$
3) $f(x) = e^x$ and $g(x) = \ln x$
4) $f(x) = 2x - 4$ and $g(x) = -\frac{1}{2}x + 4$

92 Which ratio represents $\csc A$ in the diagram below?
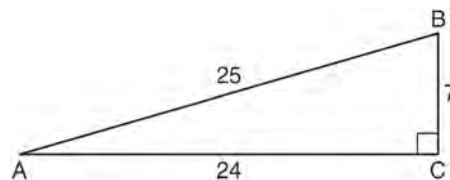
1) $\frac{25}{24}$

2) $\frac{25}{7}$

3) $\frac{24}{7}$

4) $\frac{7}{24}$

93 Which is a graph of $y = \cot x$?
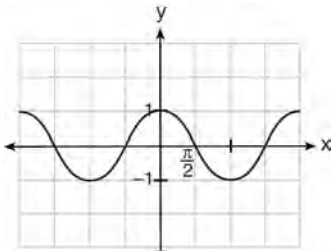
1)
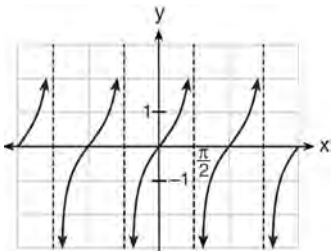
2)
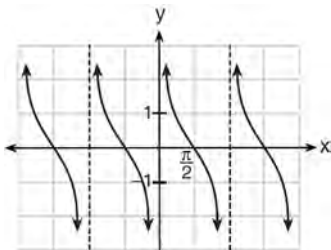
3)
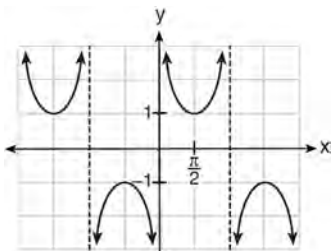
4)

94 The expression $x^{-\frac{2}{5}}$ is equivalent to

1) $-\sqrt[2]{x^5}$

2) $-\sqrt[5]{x^2}$

3) $\dfrac{1}{\sqrt[2]{x^5}}$

4) $\dfrac{1}{\sqrt[5]{x^2}}$

95 The roots of the equation $x^2 - 10x + 25 = 0$ are
1) imaginary
2) real and irrational
3) real, rational, and equal
4) real, rational, and unequal

96 In the diagram below of a unit circle, the ordered pair $\left(-\dfrac{\sqrt{2}}{2}, -\dfrac{\sqrt{2}}{2}\right)$ represents the point where the terminal side of θ intersects the unit circle.
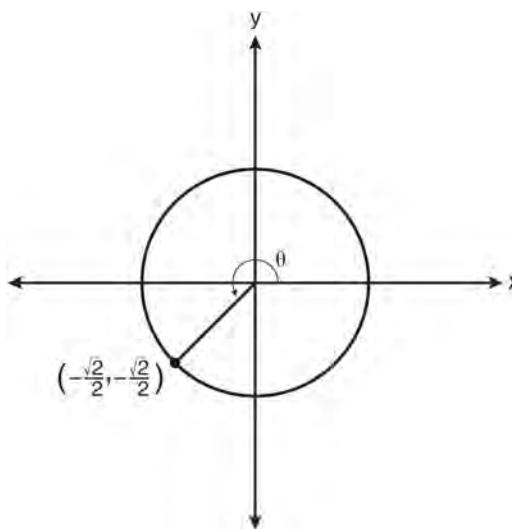
What is $m\angle\theta$?
1) 45
2) 135
3) 225
4) 240

97 Evaluate: $\displaystyle\sum_{n=1}^{3}(-n^4 - n)$

15

98 If $f(x) = x^2 - 5$ and $g(x) = 6x$, then $g(f(x))$ is equal to

1) $6x^3 - 30x$
2) $6x^2 - 30$
3) $36x^2 - 5$
4) $x^2 + 6x - 5$

99 Which statement about the graph of the equation $y = e^x$ is *not* true?

1) It is asymptotic to the *x*-axis.
2) The domain is the set of all real numbers.
3) It lies in Quadrants I and II.
4) It passes through the point $(e, 1)$.

100 Write an equation of the circle shown in the diagram below.
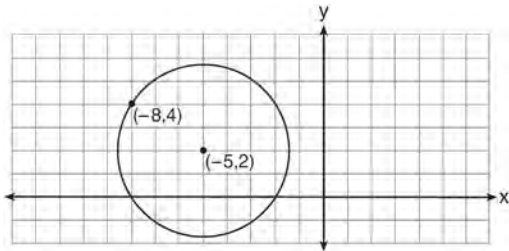
101 If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to

1) $\dfrac{1}{2} \log 5a$
2) $\dfrac{1}{2} \log 6 + \log a$
3) $\log 6 + \log a$
4) $\log 6 + 2 \log a$

102 Factor completely: $10ax^2 - 23ax - 5a$

103 Which graph does *not* represent a function?
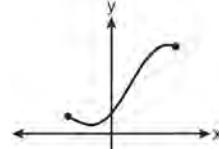
1)
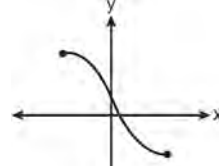
2)
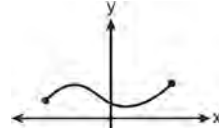
3)
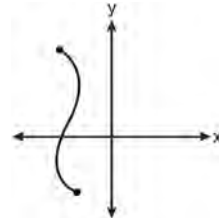
4)

104 What are the sum and product of the roots of the equation $6x^2 - 4x - 12 = 0$?

1) sum $= -\dfrac{2}{3}$; product $= -2$
2) sum $= \dfrac{2}{3}$; product $= -2$
3) sum $= -2$; product $= \dfrac{2}{3}$
4) sum $= -2$; product $= -\dfrac{2}{3}$

105 Which calculator output shows the strongest linear relationship between x and y?

1)
Lin Reg
$y = a + bx$
$a = 59.026$
$b = 6.767$
$r = .8643$

2)
Lin Reg
$y = a + bx$
$a = .7$
$b = 24.2$
$r = .8361$

3)
Lin Reg
$y = a + bx$
$a = 2.45$
$b = .95$
$r = .6022$

4)
Lin Reg
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

106 A blood bank needs twenty people to help with a blood drive. Twenty-five people have volunteered. Find how many different groups of twenty can be formed from the twenty-five volunteers.

107 What is the fifteenth term of the sequence $5, -10, 20, -40, 80, \ldots$?
1) $-163,840$
2) $-81,920$
3) $81,920$
4) $327,680$

108 An amateur bowler calculated his bowling average for the season. If the data are normally distributed, about how many of his 50 games were within one standard deviation of the mean?
1) 14
2) 17
3) 34
4) 48

109 Evaluate: $10 + \sum_{n=1}^{5} (n^3 - 1)$

110 What is the conjugate of $\frac{1}{2} + \frac{3}{2}i$?
1) $-\frac{1}{2} + \frac{3}{2}i$
2) $\frac{1}{2} - \frac{3}{2}i$
3) $\frac{3}{2} + \frac{1}{2}i$
4) $-\frac{1}{2} - \frac{3}{2}i$

111 Solve algebraically for x: $4 - \sqrt{2x - 5} = 1$

112 What is the conjugate of $-2 + 3i$?
1) $-3 + 2i$
2) $-2 - 3i$
3) $2 - 3i$
4) $3 + 2i$

113 A circle shown in the diagram below has a center of $(-5,3)$ and passes through point $(-1,7)$.
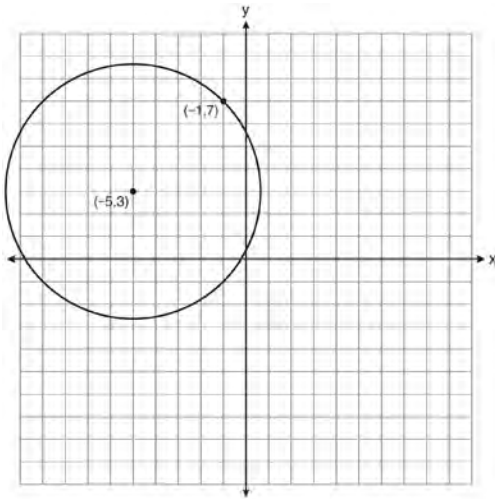
Write an equation that represents the circle.

114 The roots of the equation $9x^2 + 3x - 4 = 0$ are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

115 The sides of a parallelogram measure 10 cm and 18 cm. One angle of the parallelogram measures 46 degrees. What is the area of the parallelogram, to the *nearest square centimeter*?
1) 65
2) 125
3) 129
4) 162

116 What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?
1) $\dfrac{3}{4}$
2) $\dfrac{64}{81}$
3) $\dfrac{4}{3}$
4) $\dfrac{37}{3}$

117 What is the solution set of the equation $3x^5 - 48x = 0$?
1) $\{0, \pm 2\}$
2) $\{0, \pm 2, 3\}$
3) $\{0, \pm 2, \pm 2i\}$
4) $\{\pm 2, \pm 2i\}$

118 During a particular month, a local company surveyed all its employees to determine their travel times to work, in minutes. The data for all 15 employees are shown below.

$$25 \quad 55 \quad 40 \quad 65 \quad 29$$
$$45 \quad 59 \quad 35 \quad 25 \quad 37$$
$$52 \quad 30 \quad 8 \quad 40 \quad 55$$

Determine the number of employees whose travel time is within one standard deviation of the mean.

119 Express the product of $\left(\dfrac{1}{2}y^2 - \dfrac{1}{3}y\right)$ and $\left(12y + \dfrac{3}{5}\right)$ as a trinomial.

Algebra 2/Trigonometry Regents at Random

120 Find the third term in the recursive sequence $a_{k+1} = 2a_k - 1$, where $a_1 = 3$.

121 Which graph represents the solution set of $\left|\dfrac{4x-5}{3}\right| > 1?$

1)
−5 −4 −3 −2 −1 0 1 2 3 4 5

2)
−5 −4 −3 −2 −1 0 1 2 3 4 5

3)
−5 −4 −3 −2 −1 0 1 2 3 4 5

4)
−5 −4 −3 −2 −1 0 1 2 3 4 5
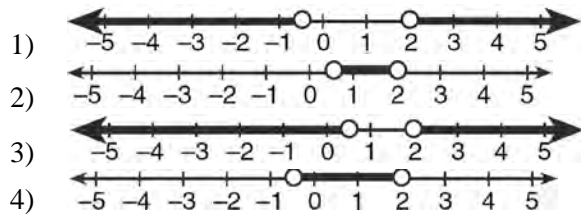
122 What is the domain of the function shown below?
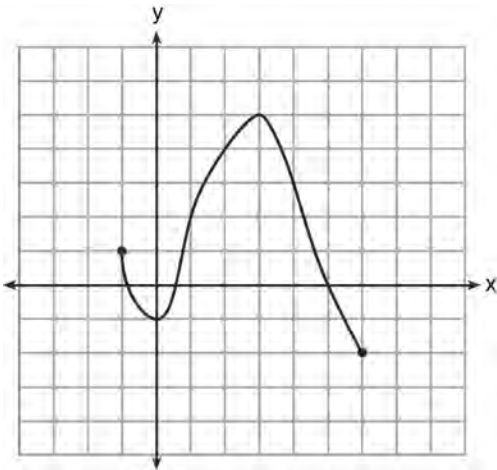
1) $-1 \le x \le 6$
2) $-1 \le y \le 6$
3) $-2 \le x \le 5$
4) $-2 \le y \le 5$

123 Mrs. Hill asked her students to express the sum $1+3+5+7+9+\ldots+39$ using sigma notation. Four different student answers were given. Which student answer is correct?

1) $\displaystyle\sum_{k=1}^{20}(2k-1)$

2) $\displaystyle\sum_{k=2}^{40}(k-1)$

3) $\displaystyle\sum_{k=-1}^{37}(k+2)$

4) $\displaystyle\sum_{k=1}^{39}(2k-1)$

124 If order does *not* matter, which selection of students would produce the most possible committees?
1) 5 out of 15
2) 5 out of 25
3) 20 out of 25
4) 15 out of 25

125 The formula for continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time in years. Using the formula, determine, to the *nearest dollar*, the amount in the account after 8 years if \$750 is invested at an annual rate of 3%.

126 Express as a single fraction the exact value of $\sin 75°$.

127 Which graph represents the function $\log_2 x = y$?

1)

2)

3)

4)
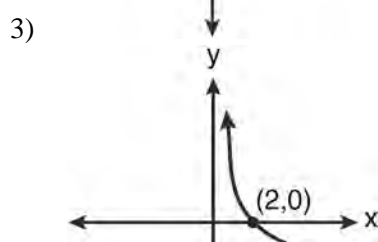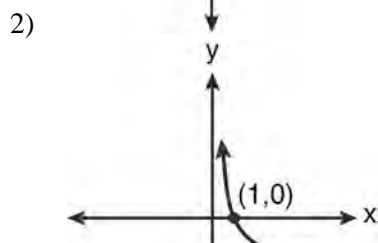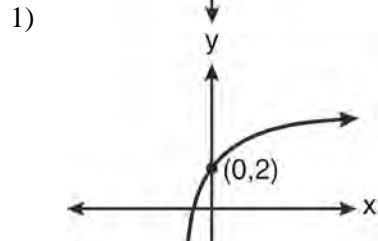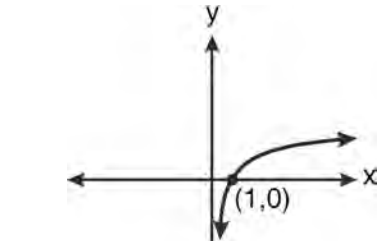
128 What is the period of the function $f(\theta) = -2\cos 3\theta$?

1) π

2) $\dfrac{2\pi}{3}$

3) $\dfrac{3\pi}{2}$

4) 2π

129 Matt places $1,200 in an investment account earning an annual rate of 6.5%, compounded continuously. Using the formula $V = Pe^{rt}$, where V is the value of the account in t years, P is the principal initially invested, e is the base of a natural logarithm, and r is the rate of interest, determine the amount of money, to the *nearest cent*, that Matt will have in the account after 10 years.

130 What is the fifteenth term of the geometric sequence $-\sqrt{5}, \sqrt{10}, -2\sqrt{5}, \ldots$?

1) $-128\sqrt{5}$

2) $128\sqrt{10}$

3) $-16384\sqrt{5}$

4) $16384\sqrt{10}$

131 If $a = 3$ and $b = -2$, what is the value of the expression $\dfrac{a^{-2}}{b^{-3}}$?

1) $-\dfrac{9}{8}$

2) -1

3) $-\dfrac{8}{9}$

4) $\dfrac{8}{9}$

132 What is the solution set for $2\cos\theta - 1 = 0$ in the interval $0° \le \theta < 360°$?
1) $\{30°, 150°\}$
2) $\{60°, 120°\}$
3) $\{30°, 330°\}$
4) $\{60°, 300°\}$

133 Solve algebraically for all values of x:

$$81^{x^3 + 2x^2} = 27^{\frac{5x}{3}}$$

134 The expression $\log_8 64$ is equivalent to
1) 8
2) 2
3) $\dfrac{1}{2}$
4) $\dfrac{1}{8}$

135 What is the range of $f(x) = (x+4)^2 + 7$?
1) $y \ge -4$
2) $y \ge 4$
3) $y = 7$
4) $y \ge 7$

136 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

137 Four points on the graph of the function $f(x)$ are shown below.

$$\{(0,1),(1,2),(2,4),(3,8)\}$$

Which equation represents $f(x)$?
1) $f(x) = 2^x$
2) $f(x) = 2x$
3) $f(x) = x + 1$
4) $f(x) = \log_2 x$

138 Which graph does *not* represent a function?

1)

2)

3)

4)
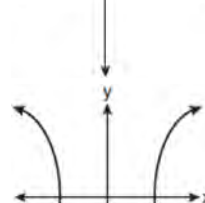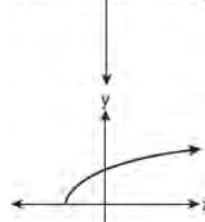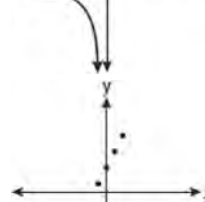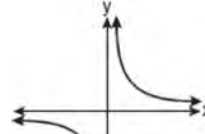
139 The scores of one class on the Unit 2 mathematics test are shown in the table below.

Unit 2 Mathematics Test

Test Score	Frequency
96	1
92	2
84	5
80	3
76	6
72	3
68	2

Find the population standard deviation of these scores, to the *nearest tenth*.

140 Graph the inequality $-3|6 - x| < -15$ for x. Graph the solution on the line below.

141 The letters of any word can be rearranged. Carol believes that the number of different 9-letter arrangements of the word "TENNESSEE" is greater than the number of different 7-letter arrangements of the word "VERMONT." Is she correct? Justify your answer.

142 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80°. Find, to the *nearest degree*, the measure of the smallest angle in the triangle.

143 In which interval of $f(x) = \cos(x)$ is the inverse also a function?

1) $-\dfrac{\pi}{2} < x < \dfrac{\pi}{2}$

2) $-\dfrac{\pi}{2} \leq x \leq \dfrac{\pi}{2}$

3) $0 \leq x \leq \pi$

4) $\dfrac{\pi}{2} \leq x \leq \dfrac{3\pi}{2}$

144 The members of a men's club have a choice of wearing black or red vests to their club meetings. A study done over a period of many years determined that the percentage of black vests worn is 60%. If there are 10 men at a club meeting on a given night, what is the probability, to the *nearest thousandth*, that *at least* 8 of the vests worn will be black?

145 If $f(x) = \dfrac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?

1) -13
2) 3.5
3) 3
4) 6

146 Which equation is represented by the graph below?
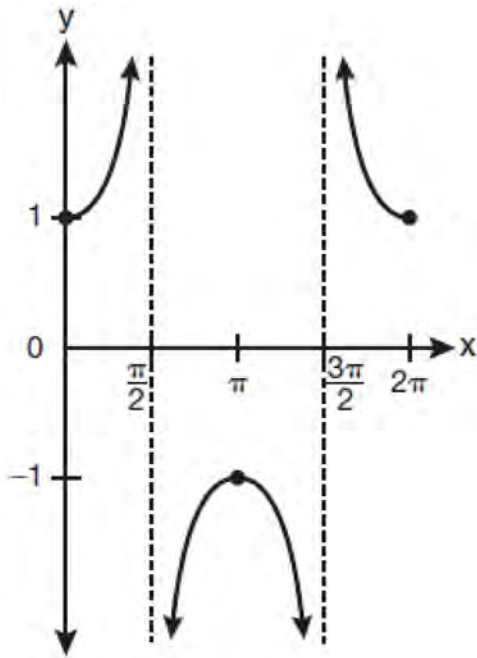
1) $y = \cot x$
2) $y = \csc x$
3) $y = \sec x$
4) $y = \tan x$

147 The conjugate of the complex expression $-5x + 4i$ is
1) $5x - 4i$
2) $5x + 4i$
3) $-5x - 4i$
4) $-5x + 4i$

148 Write a quadratic equation such that the sum of its roots is 6 and the product of its roots is -27.

149 The solution set of $4^{x^2 + 4x} = 2^{-6}$ is
1) $\{1,3\}$
2) $\{-1,3\}$
3) $\{-1,-3\}$
4) $\{1,-3\}$

150 Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?
1) $\dfrac{7}{2}$
2) $\dfrac{49}{4}$
3) $\dfrac{49}{2}$
4) 49

151 Solve the following systems of equations algebraically: $5 = y - x$
$$4x^2 = -17x + y + 4$$

152 If $\angle A$ is acute and $\tan A = \dfrac{2}{3}$, then
1) $\cot A = \dfrac{2}{3}$
2) $\cot A = \dfrac{1}{3}$
3) $\cot(90° - A) = \dfrac{2}{3}$
4) $\cot(90° - A) = \dfrac{1}{3}$

153 Which value of r represents data with a strong negative linear correlation between two variables?
1) -1.07
2) -0.89
3) -0.14
4) 0.92

154 Akeem invests $25,000 in an account that pays 4.75% annual interest compounded continuously. Using the formula $A = Pe^{rt}$, where A = the amount in the account after t years, P = principal invested, and r = the annual interest rate, how many years, to the *nearest tenth*, will it take for Akeem's investment to triple?
1) 10.0
2) 14.6
3) 23.1
4) 24.0

155 In simplest form, $\sqrt{-300}$ is equivalent to
1) $3i\sqrt{10}$
2) $5i\sqrt{12}$
3) $10i\sqrt{3}$
4) $12i\sqrt{5}$

156 Evaluate $e^{x\ln y}$ when $x = 3$ and $y = 2$.

157 In a study of 82 video game players, the researchers found that the ages of these players were normally distributed, with a mean age of 17 years and a standard deviation of 3 years. Determine if there were 15 video game players in this study over the age of 20. Justify your answer.

158 The expression $\sqrt[3]{64a^{16}}$ is equivalent to
1) $8a^4$
2) $8a^8$
3) $4a^5\sqrt[3]{a}$
4) $4a\sqrt[3]{a^5}$

159 If $f(x) = \dfrac{x}{x^2 - 16}$, what is the value of $f(-10)$?
1) $-\dfrac{5}{2}$
2) $-\dfrac{5}{42}$
3) $\dfrac{5}{58}$
4) $\dfrac{5}{18}$

160 Two sides of a parallelogram are 24 feet and 30 feet. The measure of the angle between these sides is 57°. Find the area of the parallelogram, to the *nearest square foot*.

161 A cup of soup is left on a countertop to cool. The table below gives the temperatures, in degrees Fahrenheit, of the soup recorded over a 10-minute period.

Time in Minutes (x)	0	2	4	6	8	10
Temperature in °F (y)	180.2	165.8	146.3	135.4	127.7	110.5

Write an exponential regression equation for the data, rounding all values to the *nearest thousandth*.

24

162 Which equation has roots with the sum equal to $\frac{9}{4}$

and the product equal to $\frac{3}{4}$?

1) $4x^2 + 9x + 3 = 0$
2) $4x^2 + 9x - 3 = 0$
3) $4x^2 - 9x + 3 = 0$
4) $4x^2 - 9x - 3 = 0$

163 What is the number of degrees in an angle whose

radian measure is $\frac{11\pi}{12}$?

1) 150
2) 165
3) 330
4) 518

164 Which summation represents
$5 + 7 + 9 + 11 + \ldots + 43$?

1) $\sum\limits_{n=5}^{43} n$

2) $\sum\limits_{n=1}^{20} (2n + 3)$

3) $\sum\limits_{n=4}^{24} (2n - 3)$

4) $\sum\limits_{n=3}^{23} (3n - 4)$

165 Find the first four terms of the recursive sequence defined below.

$$a_1 = -3$$

$$a_n = a_{(n-1)} - n$$

166 A doctor wants to test the effectiveness of a new drug on her patients. She separates her sample of patients into two groups and administers the drug to only one of these groups. She then compares the results. Which type of study *best* describes this situation?

1) census
2) survey
3) observation
4) controlled experiment

167 The expression $\dfrac{4}{5 - \sqrt{13}}$ is equivalent to

1) $\dfrac{4\sqrt{13}}{5\sqrt{13} - 13}$

2) $\dfrac{4(5 - \sqrt{13})}{38}$

3) $\dfrac{5 + \sqrt{13}}{3}$

4) $\dfrac{4(5 + \sqrt{13})}{38}$

168 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

1) $\dfrac{\pi}{2}$

2) $\dfrac{2\pi}{3}$

3) $\dfrac{5\pi}{6}$

4) $\dfrac{7\pi}{6}$

169 The solution set of $\sqrt{3x + 16} = x + 2$ is
1) $\{-3,4\}$
2) $\{-4,3\}$
3) $\{3\}$
4) $\{-4\}$

170 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to
1) $\sin x$
2) $\sin 7x$
3) $\cos x$
4) $\cos 7x$

171 Find all values of θ in the interval $0° \le \theta < 360°$ that satisfy the equation $\sin 2\theta = \sin \theta$.

172 Which function is *not* one-to-one?
1) $\{(0,1),(1,2),(2,3),(3,4)\}$
2) $\{(0,0),(1,1),(2,2),(3,3)\}$
3) $\{(0,1),(1,0),(2,3),(3,2)\}$
4) $\{(0,1),(1,0),(2,0),(3,2)\}$

173 Express $\cos \theta(\sec \theta - \cos \theta)$, in terms of $\sin \theta$.

174 The expression $\dfrac{\sin^2 \theta + \cos^2 \theta}{1 - \sin^2 \theta}$ is equivalent to
1) $\cos^2 \theta$
2) $\sin^2 \theta$
3) $\sec^2 \theta$
4) $\csc^2 \theta$

175 The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to
1) $\sqrt[3]{(x^2 - 1)^2}$
2) $\dfrac{1}{\sqrt[3]{(x^2 - 1)^2}}$
3) $\sqrt{(x^2 - 1)^3}$
4) $\dfrac{1}{\sqrt{(x^2 - 1)^3}}$

176 Write an equation for the graph of the trigonometric function shown below.
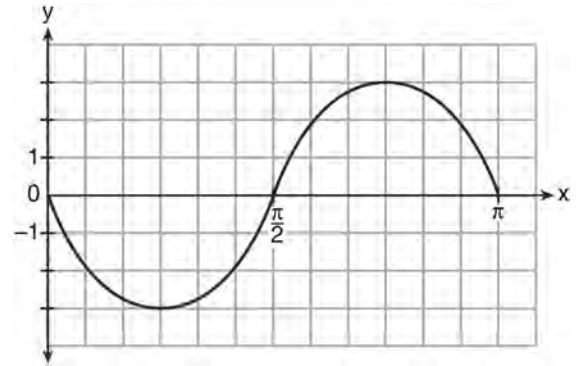
177 What is the solution of the equation $2\log_4(5x) = 3$?
1) 6.4
2) 2.56
3) $\dfrac{9}{5}$
4) $\dfrac{8}{5}$

26

178 As shown in the table below, a person's target heart rate during exercise changes as the person gets older.

Age (years)	Target Heart Rate (beats per minute)
20	135
25	132
30	129
35	125
40	122
45	119
50	115

Which value represents the linear correlation coefficient, rounded to the *nearest thousandth*, between a person's age, in years, and that person's target heart rate, in beats per minute?
1) -0.999
2) -0.664
3) 0.998
4) 1.503

179 Written in simplest form, the expression $\dfrac{\dfrac{x}{4} - \dfrac{1}{x}}{\dfrac{1}{2x} + \dfrac{1}{4}}$ is

equivalent to
1) $x - 1$
2) $x - 2$
3) $\dfrac{x-2}{2}$
4) $\dfrac{x^2 - 4}{x+2}$

180 If $f(x) = x^2 - 6$ and $g(x) = 2^x - 1$, determine the value of $(g \circ f)(-3)$.

181 If $r = \sqrt[3]{\dfrac{A^2 B}{C}}$, then $\log r$ can be represented by

1) $\dfrac{1}{6}\log A + \dfrac{1}{3}\log B - \log C$
2) $3(\log A^2 + \log B - \log C)$
3) $\dfrac{1}{3}\log(A^2 + B) - C$
4) $\dfrac{2}{3}\log A + \dfrac{1}{3}\log B - \dfrac{1}{3}\log C$

182 Find the sum and product of the roots of the equation $5x^2 + 11x - 3 = 0$.

183 Factor the expression $12t^8 - 75t^4$ completely.

184 What is the product of $\left(\dfrac{2}{5}x - \dfrac{3}{4}y^2\right)$ and $\left(\dfrac{2}{5}x + \dfrac{3}{4}y^2\right)$?

1) $\dfrac{4}{25}x^2 - \dfrac{9}{16}y^4$
2) $\dfrac{4}{25}x - \dfrac{9}{16}y^2$
3) $\dfrac{2}{5}x^2 - \dfrac{3}{4}y^4$
4) $\dfrac{4}{5}x$

185 Which expression is equivalent to $(n \circ m \circ p)(x)$, given $m(x) = \sin x$, $n(x) = 3x$, and $p(x) = x^2$?
1) $\sin(3x)^2$
2) $3\sin x^2$
3) $\sin^2(3x)$
4) $3\sin^2 x$

186 The table below displays the results of a survey regarding the number of pets each student in a class has. The average number of pets per student in this class is 2.

Number of Pets	0	1	2	3	4	5
Number of Students	4	6	10	0	k	2

What is the value of k for this table?
1) 9
2) 2
3) 8
4) 4

187 Which function is one-to-one?
1) $k(x) = x^2 + 2$
2) $g(x) = x^3 + 2$
3) $f(x) = |x| + 2$
4) $j(x) = x^4 + 2$

188 If θ is an angle in standard position and its terminal side passes through the point $(-3, 2)$, find the exact value of $\csc \theta$.

189 The equation $y - 2\sin\theta = 3$ may be rewritten as
1) $f(y) = 2\sin x + 3$
2) $f(y) = 2\sin\theta + 3$
3) $f(x) = 2\sin\theta + 3$
4) $f(\theta) = 2\sin\theta + 3$

190 The two sides and included angle of a parallelogram are 18, 22, and 60°. Find its exact area in simplest form.

191 The probability that a professional baseball player will get a hit is $\frac{1}{3}$. Calculate the exact probability that he will get *at least* 3 hits in 5 attempts.

192 Write an equation of the circle shown in the graph below.
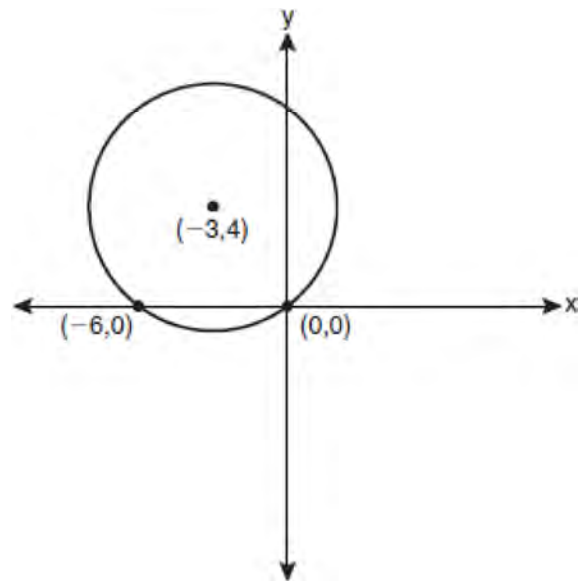
193 The measures of the angles between the resultant and two applied forces are 60° and 45°, and the magnitude of the resultant is 27 pounds. Find, to the *nearest pound*, the magnitude of each applied force.

194 In $\triangle MNP$, $m = 6$ and $n = 10$. Two distinct triangles can be constructed if the measure of angle M is
1) 35
2) 40
3) 45
4) 50

195 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to
1) $(x-1)^2 + (y+3)^2 = -3$
2) $(x-1)^2 + (y+3)^2 = 7$
3) $(x+1)^2 + (y+3)^2 = 7$
4) $(x+1)^2 + (y+3)^2 = 10$

196 The expression $\sqrt[4]{16x^2 y^7}$ is equivalent to
1) $2x^{\frac{1}{2}} y^{\frac{7}{4}}$
2) $2x^8 y^{28}$
3) $4x^{\frac{1}{2}} y^{\frac{7}{4}}$
4) $4x^8 y^{28}$

197 Find, to the *nearest tenth*, the radian measure of 216°.

198 The value of the expression $2\sum_{n=0}^{2}(n^2 + 2^n)$ is
1) 12
2) 22
3) 24
4) 26

199 Expressed as a function of a positive acute angle, $\cos(-305°)$ is equal to
1) $-\cos 55°$
2) $\cos 55°$
3) $-\sin 55°$
4) $\sin 55°$

200 The value of $\tan 126°43'$ to the *nearest ten-thousandth* is
1) -1.3407
2) -1.3408
3) -1.3548
4) -1.3549

201 The expression $\dfrac{a^2 b^{-3}}{a^{-4} b^2}$ is equivalent to
1) $\dfrac{a^6}{b^5}$
2) $\dfrac{b^5}{a^6}$
3) $\dfrac{a^2}{b}$
4) $a^{-2} b^{-1}$

202 Which graph represents a relation that is *not* a function?

1)

2)

3)

4)
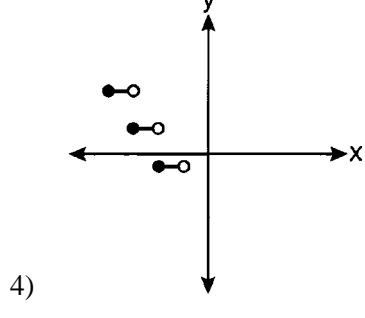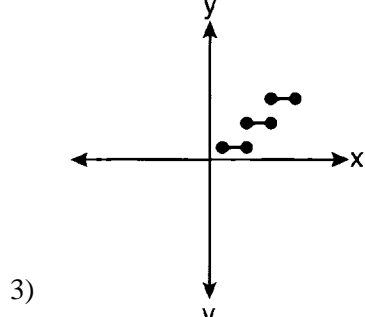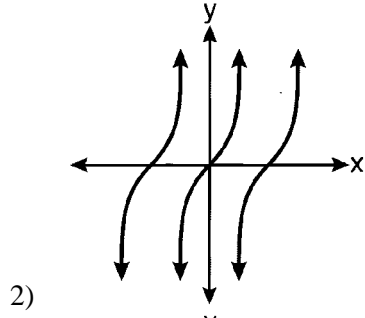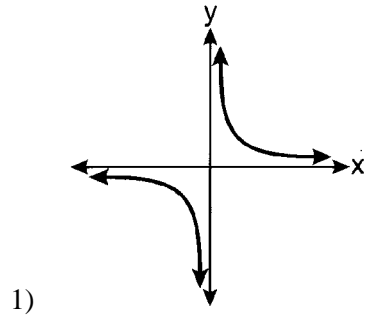
203 When factored completely, $x^3 + 3x^2 - 4x - 12$ equals

1) $(x+2)(x-2)(x-3)$

2) $(x+2)(x-2)(x+3)$

3) $(x^2-4)(x+3)$

4) $(x^2-4)(x-3)$

204 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to

1) $x^2(4x+6)(3x-2)$

2) $2(2x^2+3x)(3x^2-2x)$

3) $2x^2(2x-3)(3x+2)$

4) $2x^2(2x+3)(3x-2)$

205 Solve $2x^2 - 12x + 4 = 0$ by completing the square, expressing the result in simplest radical form.

206 Which graph represents the solution set of $|6x-7| \le 5$?

1)

2)

3)

4)
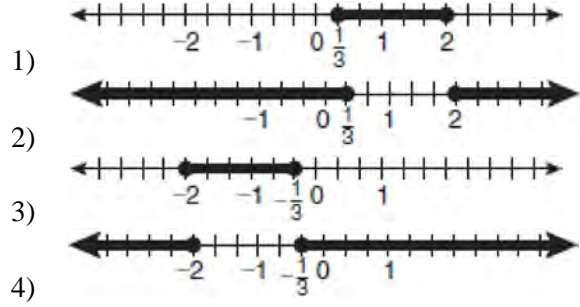
207 What is the solution set for the equation
$\sqrt{5x+29} = x+3$?
1) $\{4\}$
2) $\{-5\}$
3) $\{4,5\}$
4) $\{-5,4\}$

208 How many negative solutions to the equation
$2x^3 - 4x^2 + 3x - 1 = 0$ exist?
1) 1
2) 2
3) 3
4) 0

209 What is the middle term in the expansion of
$\left(\dfrac{x}{2} - 2y\right)^6$?
1) $20x^3y^3$
2) $-\dfrac{15}{4}x^4y^2$
3) $-20x^3y^3$
4) $\dfrac{15}{4}x^4y^2$

210 The value of the expression $\displaystyle\sum_{r=3}^{5}(-r^2+r)$ is
1) -38
2) -12
3) 26
4) 62

211 Which graph shows $y = \cos^{-1}x$?
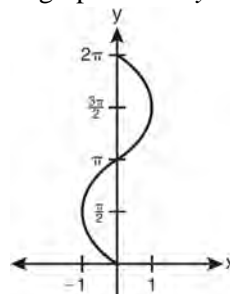
1)
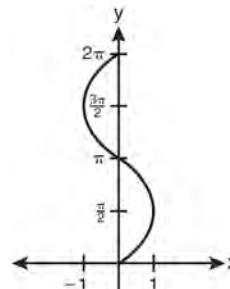
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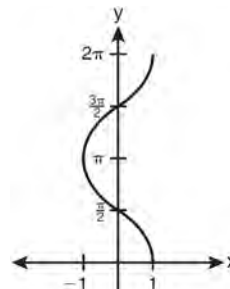
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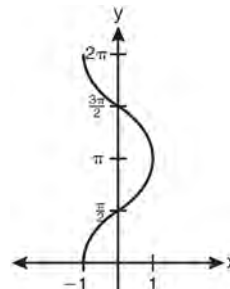
4)

212 The lengths of 100 pipes have a normal distribution with a mean of 102.4 inches and a standard deviation of 0.2 inch. If one of the pipes measures exactly 102.1 inches, its length lies
1) below the 16th percentile
2) between the 50th and 84th percentiles
3) between the 16th and 50th percentiles
4) above the 84th percentile

213 What is the coefficient of the fourth term in the expansion of $(a - 4b)^9$?
1) $-5,376$
2) -336
3) 336
4) $5,376$

214 Which relation is *not* a function?
1) $(x-2)^2 + y^2 = 4$
2) $x^2 + 4x + y = 4$
3) $x + y = 4$
4) $xy = 4$

215 For which equation does the sum of the roots equal $\frac{3}{4}$ and the product of the roots equal -2?
1) $4x^2 - 8x + 3 = 0$
2) $4x^2 + 8x + 3 = 0$
3) $4x^2 - 3x - 8 = 0$
4) $4x^2 + 3x - 2 = 0$

216 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?
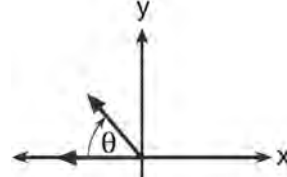
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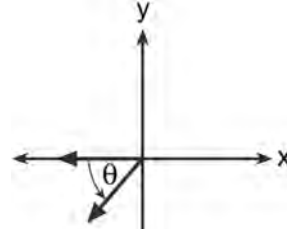
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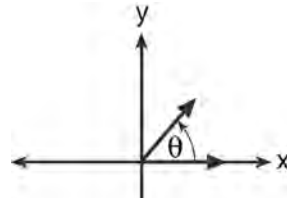
3)
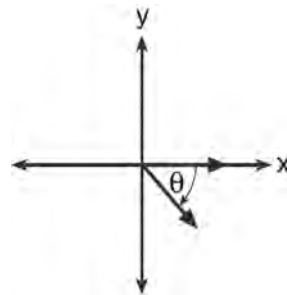
4)

217 If $\log_b x = 3\log_b p - \left(2\log_b t + \frac{1}{2}\log_b r\right)$, then the value of x is

1) $\dfrac{p^3}{\sqrt{t^2 r}}$

2) $p^3 t^2 r^{\frac{1}{2}}$

3) $\dfrac{p^3 t^2}{\sqrt{r}}$

4) $\dfrac{p^3}{t^2\sqrt{r}}$

218 Which expression is equivalent to $\dfrac{\sqrt{3}+5}{\sqrt{3}-5}$?

1) $-\dfrac{14+5\sqrt{3}}{11}$

2) $-\dfrac{17+5\sqrt{3}}{11}$

3) $\dfrac{14+5\sqrt{3}}{14}$

4) $\dfrac{17+5\sqrt{3}}{14}$

219 The product of i^7 and i^5 is equivalent to
1) 1
2) -1
3) i
4) $-i$

220 Simplify the expression $\dfrac{3x^{-4}y^5}{(2x^3 y^{-7})^{-2}}$ and write the answer using only positive exponents.

221 In $\triangle ABC$, $a = 15$, $b = 14$, and $c = 13$, as shown in the diagram below. What is the $m\angle C$, to the *nearest degree*?
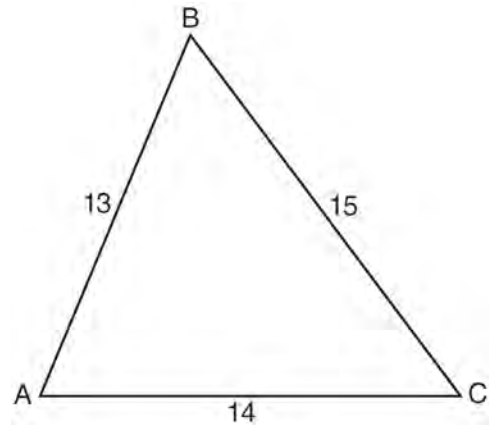
1) 53
2) 59
3) 67
4) 127

222 An auditorium has 21 rows of seats. The first row has 18 seats, and each succeeding row has two more seats than the previous row. How many seats are in the auditorium?
1) 540
2) 567
3) 760
4) 798

223　Express in simplest form: $\dfrac{\dfrac{4-x^2}{x^2+7x+12}}{\dfrac{2x-4}{x+3}}$

224　Samantha constructs the scatter plot below from a set of data.
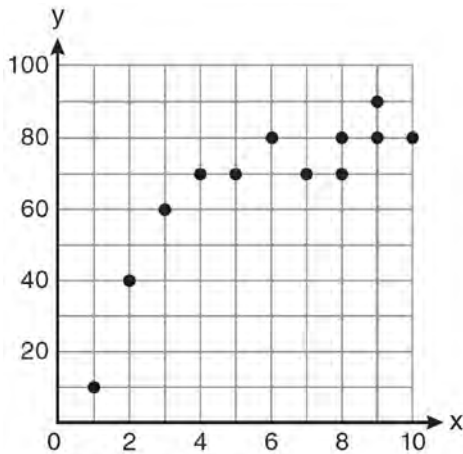
Based on her scatter plot, which regression model would be most appropriate?
1)　exponential
2)　linear
3)　logarithmic
4)　power

1)

2)

3)

4)

225　The graph below shows the function f(x).
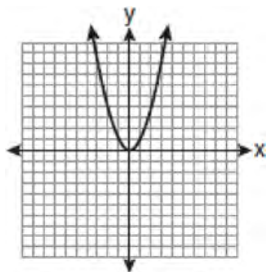
Which graph represents the function $f(x+2)$?
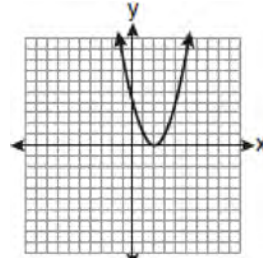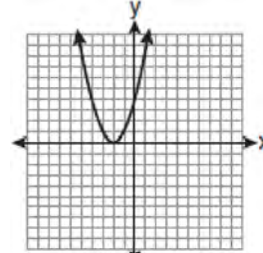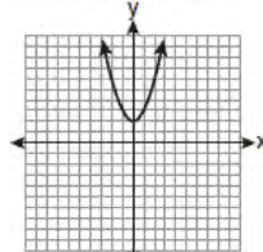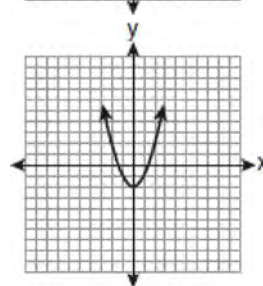
226　The expression $4ab\sqrt{2b}-3a\sqrt{18b^3}+7ab\sqrt{6b}$ is equivalent to
1)　$2ab\sqrt{6b}$
2)　$16ab\sqrt{2b}$
3)　$-5ab+7ab\sqrt{6b}$
4)　$-5ab\sqrt{2b}+7ab\sqrt{6b}$

227 Which graph represents the equation $y = \cos^{-1} x$?
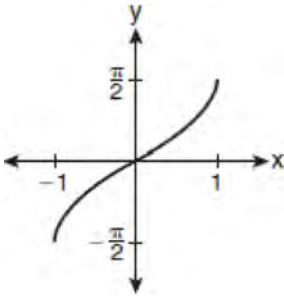
1)
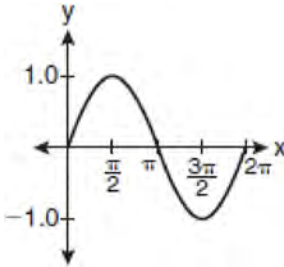
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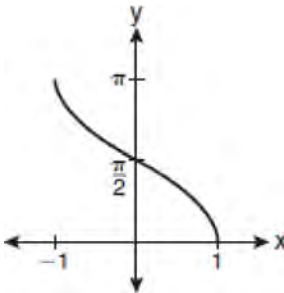
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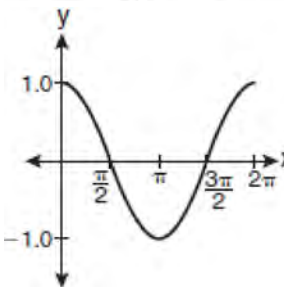
4)

228 Express in simplest form: $\dfrac{\dfrac{1}{2} - \dfrac{4}{d}}{\dfrac{1}{d} + \dfrac{3}{2d}}$

229 Ms. Bell's mathematics class consists of 4 sophomores, 10 juniors, and 5 seniors. How many different ways can Ms. Bell create a four-member committee of juniors if each junior has an equal chance of being selected?
1) 210
2) 3,876
3) 5,040
4) 93,024

230 What is the common difference of the arithmetic sequence $5, 8, 11, 14$?
1) $\dfrac{8}{5}$
2) -3
3) 3
4) 9

231 The solution set of the equation $\sqrt{x+3} = 3 - x$ is
1) $\{1\}$
2) $\{0\}$
3) $\{1,6\}$
4) $\{2,3\}$

232 Two forces of 25 newtons and 85 newtons acting on a body form an angle of 55°. Find the magnitude of the resultant force, to the *nearest hundredth of a newton*. Find the measure, to the *nearest degree*, of the angle formed between the resultant and the larger force.

233 Express $5\sqrt{3x^3} - 2\sqrt{27x^3}$ in simplest radical form.

234 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?
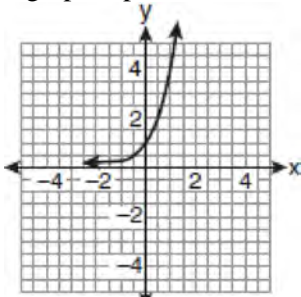
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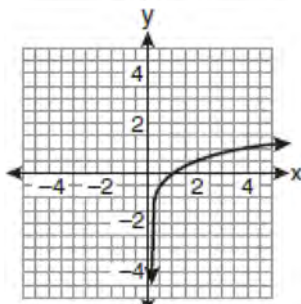
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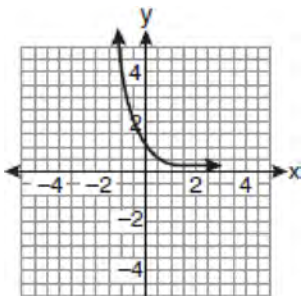
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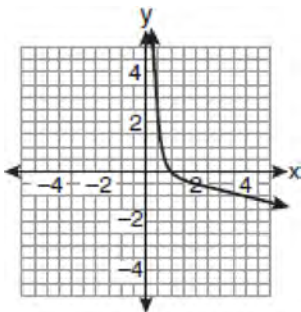
4)

235 Determine the value of n in simplest form:
$i^{13} + i^{18} + i^{31} + n = 0$

236 On the unit circle shown in the diagram below, sketch an angle, in standard position, whose degree measure is 240 and find the exact value of $\sin 240°$.
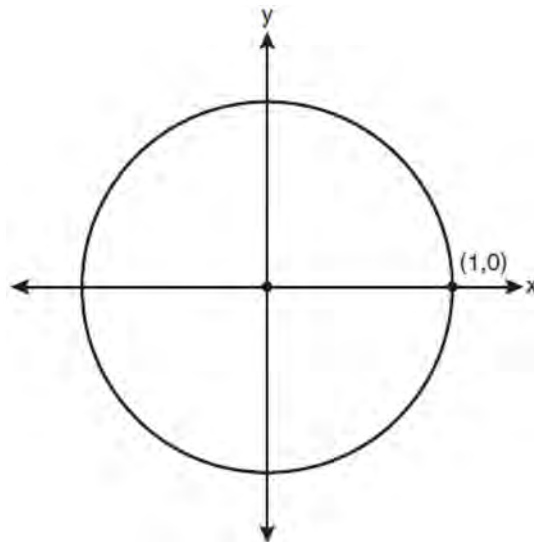
237 What are the values of θ in the interval $0° \le \theta < 360°$ that satisfy the equation $\tan \theta - \sqrt{3} = 0$?
1) 60°, 240°
2) 72°, 252°
3) 72°, 108°, 252°, 288°
4) 60°, 120°, 240°, 300°

238 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to
1) $x(x + 3)(x - 2)$
2) $x(x - 3)(x + 2)$
3) $-x(x - 3)(x + 2)$
4) $-x(x + 3)(x - 2)$

239 In $\triangle ABC$, m$\angle A = 120$, $b = 10$, and $c = 18$. What is the area of $\triangle ABC$ to the *nearest square inch*?
1) 52
2) 78
3) 90
4) 156

240 Find, to the *nearest minute*, the angle whose measure is 3.45 radians.

241 What is the domain of the function
$f(x) = \sqrt{x-2} + 3$?
1) $(-\infty, \infty)$
2) $(2, \infty)$
3) $[2, \infty)$
4) $[3, \infty)$

242 Use the discriminant to determine all values of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots.

243 The solutions of the equation $y^2 - 3y = 9$ are
1) $\dfrac{3 \pm 3i\sqrt{3}}{2}$
2) $\dfrac{3 \pm 3i\sqrt{5}}{2}$
3) $\dfrac{-3 \pm 3\sqrt{5}}{2}$
4) $\dfrac{3 \pm 3\sqrt{5}}{2}$

244 The function $f(x) = \tan x$ is defined in such a way that $f^{-1}(x)$ is a function. What can be the domain of $f(x)$?
1) $\{x \mid 0 \le x \le \pi\}$
2) $\{x \mid 0 \le x \le 2\pi\}$
3) $\left\{ x \mid -\dfrac{\pi}{2} < x < \dfrac{\pi}{2} \right\}$
4) $\left\{ x \mid -\dfrac{\pi}{2} < x < \dfrac{3\pi}{2} \right\}$

245 What is a positive value of $\tan \dfrac{1}{2} x$, when $\sin x = 0.8$?
1) 0.5
2) 0.4
3) 0.33
4) 0.25

246 Express $\dfrac{5}{3 - \sqrt{2}}$ with a rational denominator, in simplest radical form.

247 A committee of 5 members is to be randomly selected from a group of 9 teachers and 20 students. Determine how many different committees can be formed if 2 members must be teachers and 3 members must be students.

248 Solve for x: $\dfrac{4x}{x-3} = 2 + \dfrac{12}{x-3}$

249 The number of minutes students took to complete a quiz is summarized in the table below.

Minutes	14	15	16	17	18	19	20
Number of Students	5	3	x	5	2	10	1

If the mean number of minutes was 17, which equation could be used to calculate the value of x?

1) $17 = \dfrac{119 + x}{x}$

2) $17 = \dfrac{119 + 16x}{x}$

3) $17 = \dfrac{446 + x}{26 + x}$

4) $17 = \dfrac{446 + 16x}{26 + x}$

250 Twenty different cameras will be assigned to several boxes. Three cameras will be randomly selected and assigned to box A. Which expression can be used to calculate the number of ways that three cameras can be assigned to box A?

1) $20!$

2) $\dfrac{20!}{3!}$

3) $_{20}C_3$

4) $_{20}P_3$

251 The table below shows the results of an experiment involving the growth of bacteria.

Time (x) (in minutes)	1	3	5	7	9	11
Number of Bacteria (y)	2	25	81	175	310	497

Write a power regression equation for this set of data, rounding all values to *three decimal places*. Using this equation, predict the bacteria's growth, to the *nearest integer*, after 15 minutes.

252 The expression $2\log x - (3\log y + \log z)$ is equivalent to

1) $\log \dfrac{x^2}{y^3 z}$

2) $\log \dfrac{x^2 z}{y^3}$

3) $\log \dfrac{2x}{3yz}$

4) $\log \dfrac{2xz}{3y}$

253 A study finds that 80% of the local high school students text while doing homework. Ten students are selected at random from the local high school. Which expression would be part of the process used to determine the probability that, *at most*, 7 of the 10 students text while doing homework?

1) $_{10}C_6 \left(\dfrac{4}{5}\right)^6 \left(\dfrac{1}{5}\right)^4$

2) $_{10}C_7 \left(\dfrac{4}{5}\right)^{10} \left(\dfrac{1}{5}\right)^7$

3) $_{10}C_8 \left(\dfrac{7}{10}\right)^{10} \left(\dfrac{3}{10}\right)^2$

4) $_{10}C_9 \left(\dfrac{7}{10}\right)^9 \left(\dfrac{3}{10}\right)^1$

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

1) $-720x^2$

2) $-240x$

3) $720x^2$

4) $1,080x^3$

255 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.
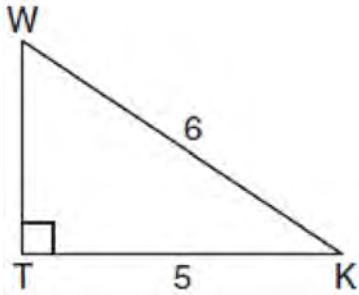
What is the measure of $\angle K$, to the *nearest minute*?
1) 33°33'
2) 33°34'
3) 33°55'
4) 33°56'

256 A survey completed at a large university asked 2,000 students to estimate the average number of hours they spend studying each week. Every tenth student entering the library was surveyed. The data showed that the mean number of hours that students spend studying was 15.7 per week. Which characteristic of the survey could create a bias in the results?
1) the size of the sample
2) the size of the population
3) the method of analyzing the data
4) the method of choosing the students who were surveyed

257 What is the value of x in the equation $\log_5 x = 4$?
1) 1.16
2) 20
3) 625
4) 1,024

258 Which graph best represents the inequality $y + 6 \geq x^2 - x$?
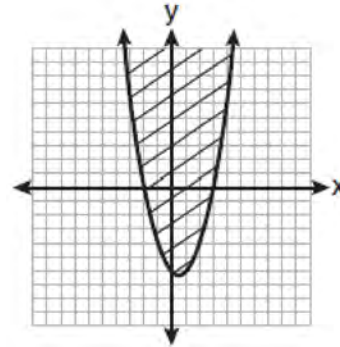
1)
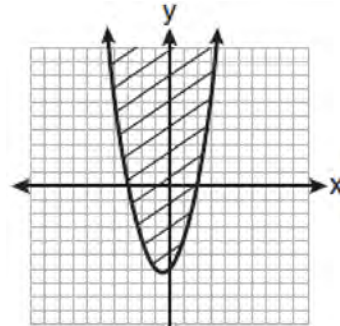
2)
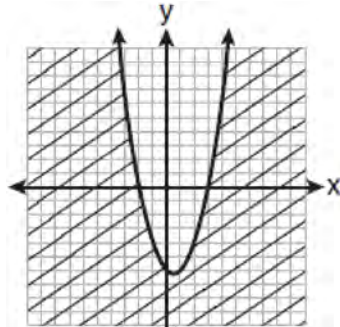
3)
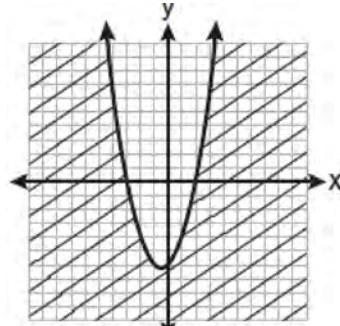
4)

259 A circle is drawn to represent a pizza with a 12 inch diameter. The circle is cut into eight congruent pieces. What is the length of the outer edge of any one piece of this circle?

1) $\dfrac{3\pi}{4}$

2) π

3) $\dfrac{3\pi}{2}$

4) 3π

260 The graph of the equation $y = \left(\dfrac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\dfrac{1}{2}\right)^x$ and write the equation of this asymptote.
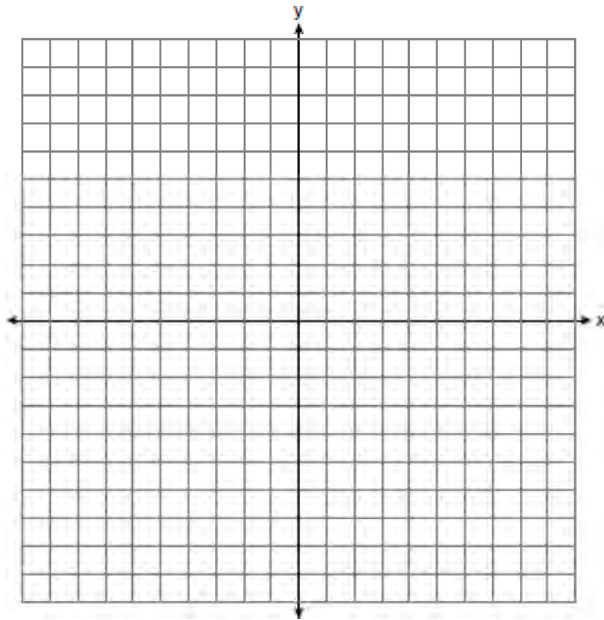
261 The table below shows the first-quarter averages for Mr. Harper's statistics class.

Statistics Class Averages

Quarter Averages	Frequency
99	1
97	5
95	4
92	4
90	7
87	2
84	6
81	2
75	1
70	2
65	1

What is the population variance for this set of data?

1) 8.2

2) 8.3

3) 67.3

4) 69.3

262 A circle has a radius of 4 inches. In inches, what is the length of the arc intercepted by a central angle of 2 radians?

1) 2π

2) 2

3) 8π

4) 8

40

263 The graph of $y = f(x)$ is shown below.
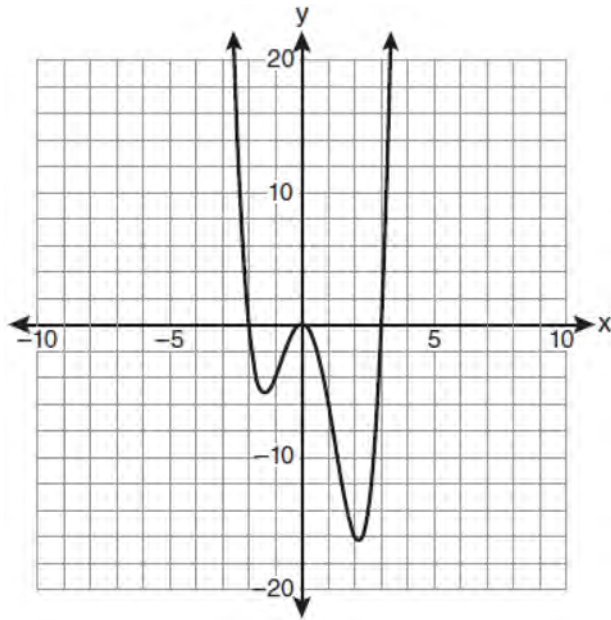
Which set lists all the real solutions of $f(x) = 0$?
1) $\{-3,2\}$
2) $\{-2,3\}$
3) $\{-3,0,2\}$
4) $\{-2,0,3\}$

264 The expression $\cos^2 \theta - \cos 2\theta$ is equivalent to
1) $\sin^2 \theta$
2) $-\sin^2 \theta$
3) $\cos^2 \theta + 1$
4) $-\cos^2 \theta - 1$

265 The value of x in the equation $4^{2x+5} = 8^{3x}$ is
1) 1
2) 2
3) 5
4) -10

266 What is the formula for the nth term of the sequence $54, 18, 6, \ldots$?
1) $a_n = 6\left(\dfrac{1}{3}\right)^n$
2) $a_n = 6\left(\dfrac{1}{3}\right)^{n-1}$
3) $a_n = 54\left(\dfrac{1}{3}\right)^n$
4) $a_n = 54\left(\dfrac{1}{3}\right)^{n-1}$

267 What is the period of the function
$y = \dfrac{1}{2} \sin\left(\dfrac{x}{3} - \pi\right)$?
1) $\dfrac{1}{2}$
2) $\dfrac{1}{3}$
3) $\dfrac{2}{3}\pi$
4) 6π

268 Which formula can be used to determine the total number of different eight-letter arrangements that can be formed using the letters in the word *DEADLINE*?
1) $8!$
2) $\dfrac{8!}{4!}$
3) $\dfrac{8!}{2!+2!}$
4) $\dfrac{8!}{2! \cdot 2!}$

41

269 Which equation is represented by the graph below?
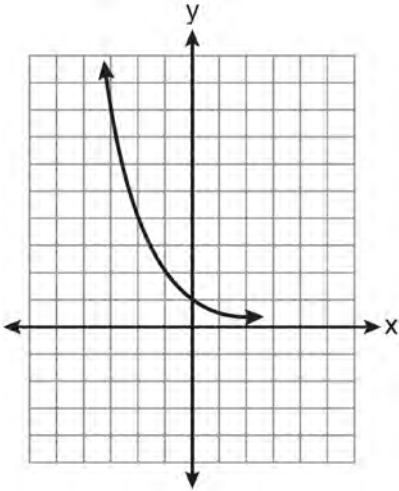
1) $y = 5^x$
2) $y = 0.5^x$
3) $y = 5^{-x}$
4) $y = 0.5^{-x}$

270 The value of csc $138°23'$ rounded to four decimal places is
1) -1.3376
2) -1.3408
3) 1.5012
4) 1.5057

271 The expression $(3 - 7i)^2$ is equivalent to
1) $-40 + 0i$
2) $-40 - 42i$
3) $58 + 0i$
4) $58 - 42i$

272 Solve the equation $8x^3 + 4x^2 - 18x - 9 = 0$ algebraically for all values of x.

273 Which expression is equivalent to $\dfrac{x^{-1}y^4}{3x^{-5}y^{-1}}$?
1) $\dfrac{x^4 y^5}{3}$
2) $\dfrac{x^5 y^4}{3}$
3) $3x^4 y^5$
4) $\dfrac{y^4}{3x^5}$

Algebra 2/Trigonometry Regents at Random
Answer Section

1 ANS: 1
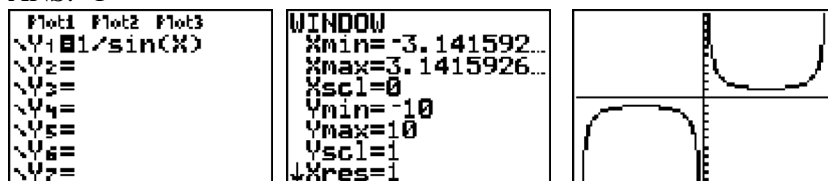
PTS: 2 REF: 011123a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

2 ANS:

800. $x = 4^{2.5} = 32.$ $y^{-\frac{3}{2}} = 125$. $\dfrac{x}{y} = \dfrac{32}{\dfrac{1}{25}} = 800$

$y = 125^{-\frac{2}{3}} = \dfrac{1}{25}$

PTS: 4 REF: 011237a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

3 ANS: 1

$8 \times 8 \times 7 \times 1 = 448.$ The first digit cannot be 0 or 5. The second digit cannot be 5 or the same as the first digit. The third digit cannot be 5 or the same as the first or second digit.

PTS: 2 REF: 011125a2 STA: A2.S.10 TOP: Permutations

4 ANS: 3

(1) and (4) fail the horizontal line test and are not one-to-one. Not every element of the range corresponds to only one element of the domain. (2) fails the vertical line test and is not a function. Not every element of the domain corresponds to only one element of the range.

PTS: 2 REF: 081020a2 STA: A2.A.43 TOP: Defining Functions

5 ANS: 3 PTS: 2 REF: 011110a2 STA: A2.A.30
TOP: Sequences

6 ANS: 3

$x^2 - 3x - 10 > 0$ or

$(x - 5)(x + 2) > 0$ $x - 5 < 0 \text{ and } x + 2 < 0$

$x - 5 > 0 \text{ and } x + 2 > 0$ $x < 5 \text{ and } x < -2$

$x > 5 \text{ and } x > -2$ $x < -2$

$x > 5$

PTS: 2 REF: 011115a2 STA: A2.A.4 TOP: Quadratic Inequalities
KEY: one variable

7 ANS: 1

$$-420\left(\frac{\pi}{180}\right) = -\frac{7\pi}{3}$$

PTS: 2   REF: 081002a2   STA: A2.M.2   TOP: Radian Measure
KEY: radians

8 ANS:

$x < -1$ or $x > 5$. $x^2 - 4x - 5 > 0$. $x - 5 > 0$ and $x + 1 > 0$ or $x - 5 < 0$ and $x + 1 < 0$

$\quad\quad\quad\quad\quad\quad\quad (x - 5)(x + 1) > 0\quad\quad x > 5$ and $x > -1\quad\quad\quad x < 5$ and $x < -1$

$\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad\quad x > 5\quad\quad\quad\quad\quad\quad\quad x < -1$

PTS: 2   REF: 011228a2   STA: A2.A.4   TOP: Quadratic Inequalities
KEY: one variable

9 ANS: 2

$$\frac{x^{-1} - 1}{x - 1} = \frac{\frac{1}{x} - 1}{x - 1} = \frac{\frac{1 - x}{x}}{x - 1} = \frac{\frac{-(x - 1)}{x}}{x - 1} = -\frac{1}{x}$$

PTS: 2   REF: 081018a2   STA: A2.A.9   TOP: Negative Exponents

10 ANS:

$$\frac{4}{9}x^2 - \frac{4}{3}x + 1.\quad \left(\frac{2}{3}x - 1\right)^2 = \left(\frac{2}{3}x - 1\right)\left(\frac{2}{3}x - 1\right) = \frac{4}{9}x^2 - \frac{2}{3}x - \frac{2}{3}x + 1 = \frac{4}{9}x^2 - \frac{4}{3}x + 1$$

PTS: 2   REF: 081034a2   STA: A2.N.3   TOP: Operations with Polynomials

11 ANS: 4   PTS: 2   REF: 011201a2   STA: A2.S.2
TOP: Analysis of Data

12 ANS:
D: $-5 \le x \le 8$. R: $-3 \le y \le 2$

PTS: 2   REF: 011132a2   STA: A2.A.51   TOP: Domain and Range

13 ANS:

$$\frac{12}{\sin 32} = \frac{10}{\sin B}\quad\quad\quad\quad . \ C \approx 180 - (32 + 26.2) \approx 121.8. \quad \frac{12}{\sin 32} = \frac{c}{\sin 121.8}$$

$$B = \sin^{-1}\frac{10\sin 32}{12} \approx 26.2\quad\quad\quad\quad\quad\quad\quad\quad c = \frac{12\sin 121.8}{\sin 32} \approx 19.2$$

PTS: 4   REF: 011137a2   STA: A2.A.73   TOP: Law of Sines
KEY: basic

14 ANS:

$$0.468. \ {}_8C_6\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^2 \approx 0.27313. \ {}_8C_7\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^1 \approx 0.15607. \ {}_8C_8\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^0 \approx 0.03902.$$

PTS: 4   REF: 011138a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

15 ANS:

$\ln(T - T_0) = -kt + 4.718$. $\ln(T - 68) = -0.104(10) + 4.718.$

$\ln(150 - 68) = -k(3) + 4.718$ $\ln(T - 68) = 3.678$

$\quad\quad 4.407 \approx -3k + 4.718$ $T - 68 \approx 39.6$

$\quad\quad\quad\quad k \approx 0.104$ $T \approx 108$

PTS: 6   REF: 011139a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: advanced

16 ANS:

$2.5 \cdot \dfrac{180}{\pi} \approx 143.2°$

PTS: 2   REF: 011129a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

17 ANS: 2

$\quad\quad 320 = 10(2)^{\frac{t}{60}}$

$\quad\quad 32 = (2)^{\frac{t}{60}}$

$\quad \log 32 = \log(2)^{\frac{t}{60}}$

$\quad \log 32 = \dfrac{t \log 2}{60}$

$\dfrac{60 \log 32}{\log 2} = t$

$\quad\quad 300 = t$

PTS: 2   REF: 011205a2   STA: A2.A.6   TOP: Exponential Growth

18 ANS:
$12 \cdot 6 = 9w$

$\quad\; 8 = w$

PTS: 2   REF: 011130a2   STA: A2.A.5   TOP: Inverse Variation

19 ANS: 2   PTS: 2   REF: 081003a2   STA: A2.A.51
TOP: Domain and Range

20 ANS:

$$\frac{-2(x^2+6)}{x^4} \cdot \frac{x^2(x-3)+6(x-3)}{x^2-4x} \cdot \frac{2x-4}{x^4-3x^3} \div \frac{x^2+2x-8}{16-x^2}$$

$$\frac{(x^2+6)(x-3)}{x(x-4)} \cdot \frac{2(x-2)}{x^3(x-3)} \cdot \frac{(4+x)(4-x)}{(x+4)(x-2)}$$

$$\frac{-2(x^2+6)}{x^4}$$

PTS: 6   REF: 011239a2   STA: A2.A.16   TOP: Multiplication and Division of Rationals
KEY: division

21 ANS:

$45, 225 \quad 2\tan C - 3 = 3\tan C - 4$

$$1 = \tan C$$

$$\tan^{-1}1 = C$$

$$C = 45, 225$$

PTS: 2   REF: 081032a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: basic

22 ANS:

$x = -\dfrac{1}{3}, -1 \quad \log_{x+3}\dfrac{x^3+x-2}{x} = 2$

$$\frac{x^3+x-2}{x} = (x+3)^2$$

$$\frac{x^3+x-2}{x} = x^2+6x+9$$

$$x^3+x-2 = x^3+6x^2+9x$$

$$0 = 6x^2+8x+2$$

$$0 = 3x^2+4x+1$$

$$0 = (3x+1)(x+1)$$

$$x = -\frac{1}{3}, -1$$

PTS: 6   REF: 081039a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: basic

23 ANS: 3

$_3C_2(2x^4)^1(-y)^2 = 6x^4y^2$

PTS: 2   REF: 011215a2   STA: A2.A.36   TOP: Binomial Expansions

24 ANS: 4   PTS: 2   REF: 011124a2   STA: A2.A.18
   TOP: Evaluating Logarithmic Expressions

25 ANS: 4

$$9^{3x+1} = 27^{x+2} \quad .$$

$$(3^2)^{3x+1} = (3^3)^{x+2}$$

$$3^{6x+2} = 3^{3x+6}$$

$$6x + 2 = 3x + 6$$

$$3x = 4$$

$$x = \frac{4}{3}$$

   PTS: 2   REF: 081008a2   STA: A2.A.27   TOP: Exponential Equations
   KEY: common base not shown

26 ANS:

$$\frac{2\sqrt{3}}{3}. \text{ If } \sin 60 = \frac{\sqrt{3}}{2}, \text{ then } \csc 60 = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

   PTS: 2   REF: 011235a2   STA: A2.A.59   TOP: Reciprocal Trigonometric Relationships

27 ANS: 2   PTS: 2   REF: 011222a2   STA: A2.A.39
   TOP: Domain and Range   KEY: real domain

28 ANS: 3

$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

   PTS: 2   REF: 081026a2   STA: A2.A.70   TOP: Graphing Trigonometric Functions
   KEY: recognize

29 ANS: 4

$$\frac{10}{4} = 2.5$$

   PTS: 2   REF: 011217a2   STA: A2.A.29   TOP: Sequences

30 ANS: 2   PTS: 2   REF: 011208a2   STA: A2.A.67
   TOP: Proving Trigonometric Identities

31 ANS: 3

$$\left(\frac{2}{3}\right)^2 + \cos^2 A = 1 \qquad\qquad \sin 2A = 2\sin A \cos A$$

$$\cos^2 A = \frac{5}{9} \qquad\qquad = 2\left(\frac{2}{3}\right)\left(\frac{\sqrt{5}}{3}\right)$$

$$\cos A = +\frac{\sqrt{5}}{3}, \sin A \text{ is acute.} \qquad = \frac{4\sqrt{5}}{9}$$

PTS: 2   REF: 011107a2   STA: A2.A.77   TOP: Double Angle Identities
KEY: evaluating

32 ANS:
68% of the students are within one standard deviation of the mean. 16% of the students are more than one standard deviation above the mean.

PTS: 2   REF: 011134a2   STA: A2.S.5   TOP: Normal Distributions
KEY: percent

33 ANS: 1

$$\frac{9}{\sin A} = \frac{10}{\sin 70}. \quad 58° + 70° \text{ is possible. } 122° + 70° \text{ is not possible.}$$

$$A = 58$$

PTS: 2   REF: 011210a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case

34 ANS: 2
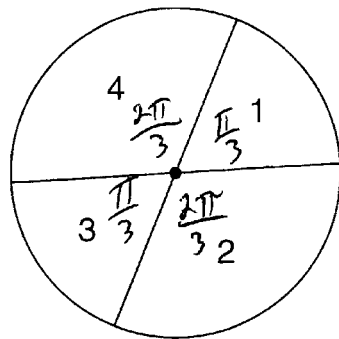
$$\frac{\frac{\pi}{3} + \frac{\pi}{3}}{2\pi} = \frac{\frac{2\pi}{3}}{2\pi} = \frac{1}{3}$$

PTS: 2   REF: 011108a2   STA: A2.S.13   TOP: Geometric Probability

35 ANS:

$$39{,}916{,}800. \quad \frac{{}_{12}P_{12}}{3! \cdot 2!} = \frac{479{,}001{,}600}{12} = 39{,}916{,}800$$

PTS: 2   REF: 081035a2   STA: A2.S.10   TOP: Permutations

36 ANS: 1

$\dfrac{1}{2}(7.4)(3.8)\sin 126 \approx 11.4$

PTS: 2 REF: 011218a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic

37 ANS: 1

$4a + 6 = 4a - 10.$ $4a + 6 = -4a + 10.$ $\left|4\left(\dfrac{1}{2}\right) + 6\right| - 4\left(\dfrac{1}{2}\right) = -10$

$6 \neq -10$ $8a = 4$

$8 - 2 \neq -10$

$a = \dfrac{4}{8} = \dfrac{1}{2}$

PTS: 2 REF: 011106a2 STA: A2.A.1 TOP: Absolute Value Equations

38 ANS: 4

$g\left(\dfrac{1}{2}\right) = \dfrac{1}{\frac{1}{2}} = 2.$ $f(2) = 4(2) - 2^2 = 4$

PTS: 2 REF: 011204a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

39 ANS: 4

$7^2 = 3^2 + 5^2 - 2(3)(5)\cos A$

$49 = 34 - 30\cos A$

$15 = -30\cos A$

$-\dfrac{1}{2} = \cos A$

$120 = \cos A$

PTS: 2 REF: 081017a2 STA: A2.A.73 TOP: Law of Cosines
KEY: angle, without calculator

40 ANS: 1

$\sqrt{12^2 - 6^2} = \sqrt{108} = \sqrt{36}\sqrt{3} = 6\sqrt{3}.$ $\cot J = \dfrac{A}{O} = \dfrac{6}{6\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{\sqrt{3}}{3}$

PTS: 2 REF: 011120a2 STA: A2.A.55 TOP: Trigonometric Ratios

41 ANS: 4 PTS: 2 REF: 011111a2 STA: A2.N.8
TOP: Conjugates of Complex Numbers

42 ANS: 1

$2i^2 + 3i^3 = 2(-1) + 3(-i) = -2 - 3i$

PTS: 2 REF: 081004a2 STA: A2.N.7 TOP: Imaginary Numbers

43 ANS:

$$\frac{23}{2}$$ $\cos^2 B + \sin^2 B = 1$ $\tan B = \dfrac{\sin B}{\cos B} = \dfrac{\dfrac{5}{\sqrt{41}}}{\dfrac{4}{\sqrt{41}}} = \dfrac{5}{4}$ $\tan(A+B) = \dfrac{\dfrac{2}{3} + \dfrac{5}{4}}{1 - \left(\dfrac{2}{3}\right)\left(\dfrac{5}{4}\right)} = \dfrac{\dfrac{8+15}{12}}{\dfrac{12}{12} - \dfrac{10}{12}} = \dfrac{\dfrac{23}{12}}{\dfrac{2}{12}} = \dfrac{23}{2}$

$$\cos^2 B + \left(\frac{5}{\sqrt{41}}\right)^2 = 1$$

$$\cos^2 B + \frac{25}{41} = \frac{41}{41}$$

$$\cos^2 B = \frac{16}{41}$$

$$\cos B = \frac{4}{\sqrt{41}}$$

PTS: 4   REF: 081037a2   STA: A2.A.76   TOP: Angle Sum and Difference Identities
KEY: evaluating

44 ANS:
$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1.$ $_5C_0(2x)^5(-1)^0 = 32x^5.$ $_5C_1(2x)^4(-1)^1 = -80x^4.$ $_5C_2(2x)^3(-1)^2 = 80x^3.$
$_5C_3(2x)^2(-1)^3 = -40x^2.$ $_5C_4(2x)^1(-1)^4 = 10x.$ $_5C_5(2x)^0(-1)^5 = -1$

PTS: 4   REF: 011136a2   STA: A2.A.36   TOP: Binomial Expansions

45 ANS: 4
$$_3C_2\left(\frac{5}{8}\right)^2\left(\frac{3}{8}\right)^1 = \frac{225}{512}$$

PTS: 2   REF: 011221a2   STA: A2.S.15   TOP: Binomial Probability
KEY: spinner

46 ANS: 2   PTS: 2   REF: 011225a2   STA: A2.A.43
TOP: Defining Functions

47 ANS:
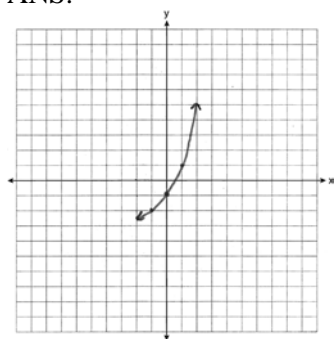
PTS: 2   REF: 011234a2   STA: A2.A.53   TOP: Graphing Exponential Functions
48 ANS: 1   PTS: 2   REF: 011117a2   STA: A2.S.9
TOP: Differentiating Permutations and Combinations

49 ANS: 1   PTS: 2   REF: 011112a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: advanced

50 ANS: 2

$$\frac{x^{-1} + 1}{x + 1} = \frac{\dfrac{1}{x} + 1}{x + 1} = \frac{\dfrac{1 + x}{x}}{x + 1} = \frac{1}{x}$$

PTS: 2   REF: 011211a2   STA: A2.A.9   TOP: Negative Exponents

51 ANS:

$$-\frac{a^2 b^3}{4}$$

PTS: 2   REF: 011231a2   STA: A2.A.13   TOP: Simplifying Radicals
KEY: index > 2

52 ANS: 2

$$x^2 + 2 = 6x$$

$$x^2 - 6x = -2$$

$$x^2 - 6x + 9 = -2 + 9$$

$$(x - 3)^2 = 7$$

PTS: 2   REF: 011116a2   STA: A2.A.24   TOP: Completing the Square

53 ANS:

88. $\dfrac{100}{\sin 33} = \dfrac{x}{\sin 32}$. $\sin 66 \approx \dfrac{T}{97.3}$

$x \approx 97.3$ $t \approx 88$

PTS: 4   REF: 011236a2   STA: A2.A.73   TOP: Law of Sines
KEY: advanced

54 ANS: 2
The binomials are conjugates, so use FL.

PTS: 2   REF: 011206a2   STA: A2.N.3   TOP: Operations with Polynomials

55 ANS: 3   PTS: 2   REF: 081007a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: basic

56 ANS: 2
$$x^2 - x - 6 = 3x - 6$$

$$x^2 - 4x = 0$$

$$x(x - 4) = 0$$

$$x = 0, 4$$

PTS: 2   REF: 081015a2   STA: A2.A.3   TOP: Quadratic-Linear Systems
KEY: equations

57 ANS: 3

$$\frac{-7 \pm \sqrt{7^2 - 4(2)(-3)}}{2(2)} = \frac{-7 \pm \sqrt{73}}{4}$$

PTS: 2   REF: 081009a2   STA: A2.A.25   TOP: Quadratic Formula

58 ANS: 3

$$S_n = \frac{n}{2}[2a + (n-1)d] = \frac{19}{2}[2(3) + (19-1)7] = 1254$$

PTS: 2   REF: 011202a2   STA: A2.A.35   TOP: Summations
KEY: arithmetic

59 ANS: 2

$$x^3 + x^2 - 2x = 0$$

$$x(x^2 + x - 2) = 0$$

$$x(x+2)(x-1) = 0$$

$$x = 0, -2, 1$$

PTS: 2   REF: 011103a2   STA: A2.A.26   TOP: Solving Polynomial Equations

60 ANS: 2
The roots are $-1, 2, 3$.

PTS: 2   REF: 081023a2   STA: A2.A.50   TOP: Solving Polynomial Equations

61 ANS: 2

$$\frac{10}{\sin 35} = \frac{13}{\sin B} \quad . \quad \begin{array}{l} 35 + 48 < 180 \\ B \approx 48, 132 \quad 35 + 132 < 180 \end{array}$$

PTS: 2   REF: 011113a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case

62 ANS: 3

$$\frac{-b}{a} = \frac{-6}{2} = -3. \quad \frac{c}{a} = \frac{4}{2} = 2$$

PTS: 2   REF: 011121a2   STA: A2.A.21   TOP: Roots of Quadratics
KEY: basic

63 ANS: 2   PTS: 2   REF: 011126a2   STA: A2.A.49
TOP: Equations of Circles

64 ANS: 4

$$\frac{2x+4}{\sqrt{x+2}} \cdot \frac{\sqrt{x+2}}{\sqrt{x+2}} = \frac{2(x+2)\sqrt{x+2}}{x+2} = 2\sqrt{x+2}$$

PTS: 2   REF: 011122a2   STA: A2.A.15   TOP: Rationalizing Denominators
KEY: index = 2

65 ANS:

$$\frac{\sin^2 A}{\cos^2 A} + \frac{\cos^2 A}{\cos^2 A} = \frac{1}{\cos^2 A}$$

$$\tan^2 A + 1 = \sec^2 A$$

PTS: 2   REF: 011135a2   STA: A2.A.67   TOP: Proving Trigonometric Identities

66 ANS: 4   PTS: 2   REF: 081005a2   STA: A2.A.60
TOP: Unit Circle

67 ANS: 1   PTS: 2   REF: 081022a2   STA: A2.A.46
TOP: Transformations with Functions and Relations
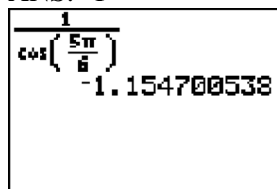
68 ANS: 2

$$\left(\frac{w^{-5}}{w^{-9}} \right)^{\frac{1}{2}} = (w^4)^{\frac{1}{2}} = w^2$$

PTS: 2   REF: 081011a2   STA: A2.A.8   TOP: Negative and Fractional Exponents

69 ANS: 1

PTS: 2   REF: 011203a2   STA: A2.A.66   TOP: Determining Trigonometric Functions

70 ANS: 1

$$2 \cdot \frac{180}{\pi} = \frac{360}{\pi}$$

PTS: 2   REF: 011220a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

71 ANS: 3

$$\frac{59.2}{\sin 74} = \frac{60.3}{\sin C} \quad 180 - 78.3 = 101.7$$

$$C \approx 78.3$$

PTS: 2   REF: 081006a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case

72 ANS: 4   PTS: 2   REF: 011127a2   STA: A2.S.1
TOP: Analysis of Data

73 ANS: 1

$$\cos(A - B) = \left(\frac{5}{13} \right)\left(-\frac{3}{5} \right) + \left(\frac{12}{13} \right)\left(\frac{4}{5} \right) = -\frac{15}{65} + \frac{48}{65} = \frac{33}{65}$$

PTS: 2   REF: 011214a2   STA: A2.A.76   TOP: Angle Sum and Difference Identities
KEY: evaluating

74 ANS:

26.2%. $_{10}C_8 \cdot 0.65^8 \cdot 0.35^2 + _{10}C_9 \cdot 0.65^9 \cdot 0.35^1 + _{10}C_{10} \cdot 0.65^{10} \cdot 0.35^0 \approx 0.262$

PTS: 4 REF: 081038a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

75 ANS:

$16^{2x+3} = 64^{x+2}$

$(4^2)^{2x+3} = (4^3)^{x+2}$

$4x + 6 = 3x + 6$

$x = 0$

PTS: 2 REF: 011128a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

76 ANS:

$y = 27.2025(1.1509)^x$. $y = 27.2025(1.1509)^{18} \approx 341$

PTS: 4 REF: 011238a2 STA: A2.S.7 TOP: Exponential Regression

77 ANS: 3
$34.1\% + 19.1\% = 53.2\%$

PTS: 2 REF: 011212a2 STA: A2.S.5 TOP: Normal Distributions
KEY: probability

78 ANS:

$\dfrac{1}{3}$ $\dfrac{1}{x+3} - \dfrac{2}{3-x} = \dfrac{4}{x^2-9}$

$\dfrac{1}{x+3} + \dfrac{2}{x-3} = \dfrac{4}{x^2-9}$

$\dfrac{x-3+2(x+3)}{(x+3)(x-3)} = \dfrac{4}{(x+3)(x-3)}$

$x - 3 + 2x + 6 = 4$

$3x = 1$

$x = \dfrac{1}{3}$

PTS: 4 REF: 081036a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

79 ANS: 2
$_{15}C_8 = 6,435$

PTS: 2 REF: 081012a2 STA: A2.S.11 TOP: Combinations

80 ANS: 1
common difference is 2. $b_n = x + 2n$

$$10 = x + 2(1)$$

$$8 = x$$

PTS: 2 REF: 081014a2 STA: A2.A.29 TOP: Sequences

81 ANS:

$$\frac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}} = \sqrt{18x^4y^3} = 3x^2y\sqrt{2y}$$

PTS: 2 REF: 011133a2 STA: A2.A.14 TOP: Operations with Radicals
KEY: with variables | index = 2

82 ANS:
Controlled experiment because Howard is comparing the results obtained from an experimental sample against a control sample.

PTS: 2 REF: 081030a2 STA: A2.S.1 TOP: Analysis of Data

83 ANS: 4
$$\frac{2\pi}{b} = 30$$

$$b = \frac{\pi}{15}$$

PTS: 2 REF: 011227a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

84 ANS: 4
$$(3 + \sqrt{5})(3 - \sqrt{5}) = 9 - \sqrt{25} = 4$$

PTS: 2 REF: 081001a2 STA: A2.N.2 TOP: Operations with Radicals

85 ANS: 1
$$10 \cdot \frac{3}{2} = \frac{3}{5}p$$

$$15 = \frac{3}{5}p$$

$$25 = p$$

PTS: 2 REF: 011226a2 STA: A2.A.5 TOP: Inverse Variation

86 ANS:
$$y = 10.596(1.586)^x$$

PTS: 2 REF: 081031a2 STA: A2.S.7 TOP: Exponential Regression

87 ANS: 3

$$\frac{3}{\sqrt{3a^2b}} = \frac{3}{a\sqrt{3b}} \cdot \frac{\sqrt{3b}}{\sqrt{3b}} = \frac{3\sqrt{3b}}{3ab} = \frac{\sqrt{3b}}{ab}$$

PTS: 2   REF: 081019a2   STA: A2.A.15   TOP: Rationalizing Denominators
KEY: index = 2

88 ANS:

$$\sum_{n=1}^{15} 7n$$

PTS: 2   REF: 081029a2   STA: A2.A.34   TOP: Sigma Notation

89 ANS: 3   PTS: 2   REF: 011119a2   STA: A2.A.52
TOP: Families of Functions

90 ANS: 2   PTS: 2   REF: 011114a2   STA: A2.N.3
TOP: Operations with Polynomials

91 ANS: 3   PTS: 2   REF: 081027a2   STA: A2.A.44
TOP: Inverse of Functions   KEY: equations

92 ANS: 2   PTS: 2   REF: 081010a2   STA: A2.A.55
TOP: Trigonometric Ratios

93 ANS: 3
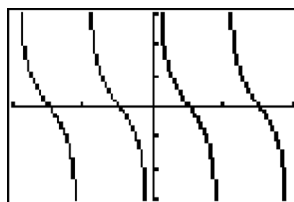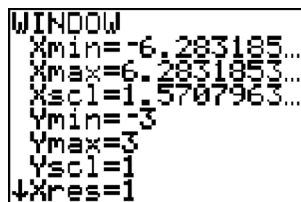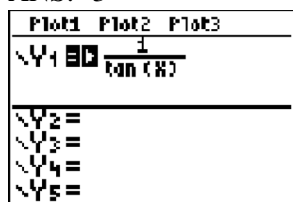
PTS: 2   REF: 011207a2   STA: A2.A.71   TOP: Graphing Trigonometric Functions

94 ANS: 4

$$x^{-\frac{2}{5}} = \frac{1}{x^{\frac{2}{5}}} = \frac{1}{\sqrt[5]{x^2}}$$

PTS: 2   REF: 011118a2   STA: A2.A.10   TOP: Fractional Exponents as Radicals

95 ANS: 3
$$b^2 - 4ac = (-10)^2 - 4(1)(25) = 100 - 100 = 0$$

PTS: 2   REF: 011102a2   STA: A2.A.2   TOP: Using the Discriminant
KEY: determine nature of roots given equation

96 ANS: 3   PTS: 2   REF: 011104a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: unit circle

97 ANS:

−104.

PTS: 2 REF: 011230a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic
98 ANS: 2

$6(x^2 − 5) = 6x^2 − 30$

PTS: 2 REF: 011109a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables
99 ANS: 4 PTS: 2 REF: 011219a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations
100 ANS:

$r = \sqrt{2^2 + 3^2} = \sqrt{13}$. $(x + 5)^2 + (y − 2)^2 = 13$

PTS: 2 REF: 011234a2 STA: A2.A.49 TOP: Writing Equations of Circles
101 ANS: 2

$\log x^2 = \log 3a + \log 2a$

$2 \log x = \log 6a^2$

$\log x = \dfrac{\log 6}{2} + \dfrac{\log a^2}{2}$

$\log x = \dfrac{1}{2} \log 6 + \dfrac{2 \log a}{2}$

$\log x = \dfrac{1}{2} \log 6 + \log a$

PTS: 2 REF: 011224a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs
102 ANS:

$10ax^2 − 23ax − 5a = a(10x^2 − 23x − 5) = a(5x + 1)(2x − 5)$

PTS: 2 REF: 081028a2 STA: A2.A.7 TOP: Factoring Polynomials
KEY: multiple variables
103 ANS: 4 PTS: 2 REF: 011101a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs
104 ANS: 2

sum: $\dfrac{−b}{a} = \dfrac{4}{6} = \dfrac{2}{3}$. product: $\dfrac{c}{a} = \dfrac{−12}{6} = −2$

PTS: 2 REF: 011209a2 STA: A2.A.20 TOP: Roots of Quadratics

105 ANS: 1
(4) shows the strongest linear relationship, but if $r < 0$, $b < 0$.

PTS: 2   REF: 011223a2   STA: A2.S.8   TOP: Correlation Coefficient

106 ANS:
$_{25}C_{20} = 53,130$

PTS: 2   REF: 011232a2   STA: A2.S.11   TOP: Combinations

107 ANS: 3
$a_n = 5(-2)^{n-1}$

$a_{15} = 5(-2)^{15-1} = 81,920$

PTS: 2   REF: 011105a2   STA: A2.A.32   TOP: Sequences

108 ANS: 3
$68\% \times 50 = 34$

PTS: 2   REF: 081013a2   STA: A2.S.5   TOP: Normal Distributions
KEY: predict

109 ANS:
230. $10 + (1^3 - 1) + (2^3 - 1) + (3^3 - 1) + (4^3 - 1) + (5^3 - 1) = 10 + 0 + 7 + 26 + 63 + 124 = 230$

PTS: 2   REF: 011131a2   STA: A2.N.10   TOP: Sigma Notation
KEY: basic

110 ANS: 2   PTS: 2   REF: 011213a2   STA: A2.N.8
TOP: Conjugates of Complex Numbers

111 ANS:
7. $4 - \sqrt{2x - 5} = 1$

$-\sqrt{2x - 5} = -3$

$2x - 5 = 9$

$2x = 14$

$x = 7$

PTS: 2   REF: 011229a2   STA: A2.A.22   TOP: Solving Radicals
KEY: basic

112 ANS: 2   PTS: 2   REF: 081024a2   STA: A2.N.8
TOP: Conjugates of Complex Numbers

113 ANS:
$(x + 5)^2 + (y - 3)^2 = 32$

PTS: 2   REF: 081033a2   STA: A2.A.49   TOP: Writing Equations of Circles

114 ANS: 4

$b^2 - 4ac = 3^2 - 4(9)(-4) = 9 + 144 = 153$

PTS: 2 REF: 081016a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

115 ANS: 3

$K = (10)(18)\sin 46 \approx 129$

PTS: 2 REF: 081021a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: parallelograms

116 ANS: 3

$27r^{4-1} = 64$

$$r^3 = \frac{64}{27}$$

$$r = \frac{4}{3}$$

PTS: 2 REF: 081025a2 STA: A2.A.31 TOP: Sequences

117 ANS: 3

$$3x^5 - 48x = 0$$

$$3x(x^4 - 16) = 0$$

$$3x(x^2 + 4)(x^2 - 4) = 0$$

$$3x(x^2 + 4)(x + 2)(x - 2) = 0$$

PTS: 2 REF: 011216a2 STA: A2.A.26 TOP: Solving Polynomial Equations

118 ANS:

$\sigma_x = 14.9.$ $\overline{x} = 40.$ There are 8 scores between 25.1 and 54.9.

PTS: 4 REF: 061237a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced

119 ANS:

$6y^3 - \frac{37}{10}y^2 - \frac{1}{5}y.$ $\left(\frac{1}{2}y^2 - \frac{1}{3}y\right)\left(12y + \frac{3}{5}\right) = 6y^3 + \frac{3}{10}y^2 - 4y^2 - \frac{1}{5}y = 6y^3 - \frac{37}{10}y^2 - \frac{1}{5}y$

PTS: 2 REF: 061128a2 STA: A2.N.3 TOP: Operations with Polynomials

Algebra 2/Trigonometry Regents at Random
Answer Section

120 ANS:
$a_1 = 3.$ $a_2 = 2(3) - 1 = 5.$ $a_3 = 2(5) - 1 = 9.$

PTS: 2   REF: 061233a2   STA: A2.A.33   TOP: Recursive Sequences

121 ANS: 3

$\dfrac{4x - 5}{3} > 1$ or $\dfrac{4x - 5}{3} < -1$

$4x - 5 > 3$ $4x - 5 < -3$

$4x > 8$ $4x < 2$

$x > 2$ $x < \dfrac{1}{2}$

PTS: 2   REF: 061209a2   STA: A2.A.1   TOP: Absolute Value Inequalities
KEY: graph

122 ANS: 1   PTS: 2   REF: 061202a2   STA: A2.A.51
TOP: Domain and Range

123 ANS: 1   PTS: 2   REF: 061025a2   STA: A2.A.34
TOP: Sigma Notation

124 ANS: 4
$_{15}C_5 = 3{,}003.$ $_{25}C_5 = {_{25}C_{20}} = 53{,}130.$ $_{25}C_{15} = 3{,}268{,}760.$

PTS: 2   REF: 061227a2   STA: A2.S.11   TOP: Combinations

125 ANS:
$A = 750e^{(0.03)(8)} \approx 953$

PTS: 2   REF: 061229a2   STA: A2.A.12   TOP: Evaluating Exponential Expressions

126 ANS:
$\sin(45 + 30) = \sin 45 \cos 30 + \cos 45 \sin 30$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{6} + \sqrt{2}}{4}$$

PTS: 4   REF: 061136a2   STA: A2.A.76   TOP: Angle Sum and Difference Identities
KEY: evaluating

127 ANS: 1   PTS: 2   REF: 061211a2   STA: A2.A.54
TOP: Graphing Logarithmic Functions

128 ANS: 2
$\dfrac{2\pi}{b} = \dfrac{2\pi}{3}$

PTS: 2   REF: 061111a2   STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions   KEY: period

129 ANS:

```
1200e^(.065*10)
       2298.648995
■
```
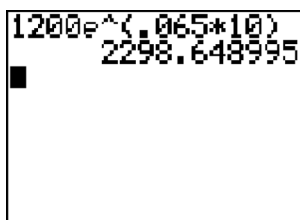
2,298.65.

PTS: 2   REF: fall0932a2   STA: A2.A.12   TOP: Evaluating Exponential Expressions

130 ANS: 1

$a_n = -\sqrt{5}(-\sqrt{2})^{n-1}$

$a_{15} = -\sqrt{5}(-\sqrt{2})^{15-1} = -\sqrt{5}(-\sqrt{2})^{14} = -\sqrt{5} \cdot 2^7 = -128\sqrt{5}$

PTS: 2   REF: 061109a2   STA: A2.A.32   TOP: Sequences

131 ANS: 3

$$\frac{3^{-2}}{(-2)^{-3}} = \frac{\frac{1}{9}}{-\frac{1}{8}} = -\frac{8}{9}$$

PTS: 2   REF: 061003a2   STA: A2.N.1   TOP: Negative and Fractional Exponents

132 ANS: 4

```
Plot1 Plot2 Plot3      WINDOW
\Y1■2cos(X)-1          Xmin=0
\Y2■0                  Xmax=360
\Y3=                   Xscl=30
\Y4=                   Ymin=-5
\Y5=                   Ymax=5
\Y6=                   Yscl=1
\Y7=                  ↓Xres=1
```

```
Intersection
X=60      Y=0
```
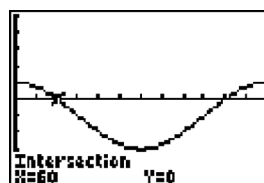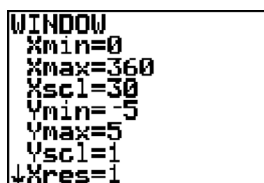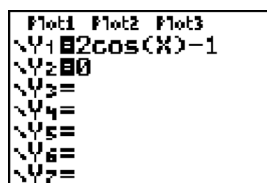
$2\cos\theta = 1$

$\cos\theta = \frac{1}{2}$

$\theta = \cos^{-1}\frac{1}{2} = 60, 300$

PTS: 2   REF: 061203a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: basic

133 ANS:

$$81^{x^3 + 2x^2} = 27^{\frac{5x}{3}}$$

$$\left(3^4\right)^{x^3 + 2x^2} = \left(3^3\right)^{\frac{5x}{3}}$$

$$3^{4x^3 + 8x^2} = 3^{5x}$$

$$4x^3 + 8x^2 - 5x = 0$$

$$x(4x^2 + 8x - 5) = 0$$

$$x(2x - 1)(2x + 5) = 0$$

$$x = 0, \frac{1}{2}, -\frac{5}{2}$$

PTS: 6   REF: 061239a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base not shown

134 ANS: 2

$$8^2 = 64$$

PTS: 2   REF: fall0909a2   STA: A2.A.18   TOP: Evaluating Logarithmic Expressions

135 ANS: 4   PTS: 2   REF: 061112a2   STA: A2.A.39
TOP: Domain and Range   KEY: real domain

136 ANS:

$$y = x^2 - 6. \ \ \mathrm{f}^{-1}(x) \text{ is not a function.}$$

$$x = y^2 - 6$$

$$x + 6 = y^2$$

$$\pm\sqrt{x + 6} = y$$

PTS: 2   REF: 061132a2   STA: A2.A.44   TOP: Inverse of Functions
KEY: equations

137 ANS: 1   PTS: 2   REF: 061004a2   STA: A2.A.52
TOP: Identifying the Equation of a Graph

138 ANS: 4   PTS: 2   REF: fall0908a2   STA: A2.A.38
TOP: Defining Functions   KEY: graphs

139 ANS:
7.4

PTS: 2   REF: 061029a2   STA: A2.S.4   TOP: Dispersion
KEY: basic, group frequency distributions

140 ANS:

$-3|6 - x| < -15$.

$|6 - x| > 5$

$6 - x > 5$ or $6 - x < -5$

$1 > x$ or $11 < x$
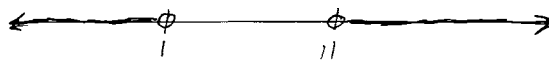
PTS: 2   REF: 061137a2   STA: A2.A.1   TOP: Absolute Value Inequalities
KEY: graph

141 ANS:

No. TENNESSEE: $\dfrac{{}_9P_9}{4! \cdot 2! \cdot 2!} = \dfrac{362,880}{96} = 3,780$. VERMONT: ${}_7P_7 = 5,040$

PTS: 4   REF: 061038a2   STA: A2.S.10   TOP: Permutations

142 ANS:

33. $a = \sqrt{10^2 + 6^2 - 2(10)(6)\cos 80} \approx 10.7$. $\angle C$ is opposite the shortest side. $\dfrac{6}{\sin C} = \dfrac{10.7}{\sin 80}$

$C \approx 33$

PTS: 6   REF: 061039a2   STA: A2.A.73   TOP: Law of Cosines
KEY: advanced

143 ANS: 3   PTS: 2   REF: 061224a2   STA: A2.A.63
TOP: Domain and Range

144 ANS:

0.167. ${}_{10}C_8 \cdot 0.6^8 \cdot 0.4^2 + {}_{10}C_9 \cdot 0.6^9 \cdot 0.4^1 + {}_{10}C_{10} \cdot 0.6^{10} \cdot 0.4^0 \approx 0.167$

PTS: 4   REF: 061036a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

145 ANS: 3

$f(4) = \dfrac{1}{2}(4) - 3 = -1$. $g(-1) = 2(-1) + 5 = 3$

PTS: 2   REF: fall0902a2   STA: A2.A.42   TOP: Compositions of Functions
KEY: numbers

146 ANS: 3
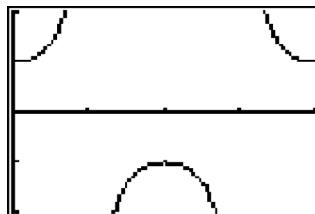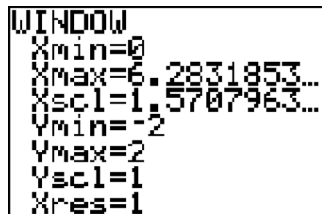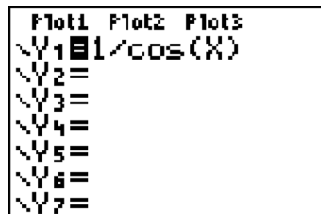
PTS: 2   REF: 061020a2   STA: A2.A.71   TOP: Graphing Trigonometric Functions

147 ANS: 3   PTS: 2   REF: 061219a2   STA: A2.N.8
TOP: Conjugates of Complex Numbers

148 ANS:

$x^2 - 6x - 27 = 0$, $\dfrac{-b}{a} = 6$. $\dfrac{c}{a} = -27$. If $a = 1$ then $b = -6$ and $c = -27$

PTS: 4   REF: 061130a2   STA: A2.A.21   TOP: Roots of Quadratics
KEY: basic

149 ANS: 3

$4^{x^2 + 4x} = 2^{-6}$. $2x^2 + 8x = -6$

$(2^2)^{x^2 + 4x} = 2^{-6}$ $2x^2 + 8x + 6 = 0$

$2^{2x^2 + 8x} = 2^{-6}$ $x^2 + 4x + 3 = 0$

$(x + 3)(x + 1) = 0$

$x = -3 \ x = -1$

PTS: 2   REF: 061015a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base shown

150 ANS: 2   PTS: 2   REF: 061122a2   STA: A2.A.24
TOP: Completing the Square

151 ANS:

$\left(-\dfrac{9}{2}, \dfrac{1}{2}\right)$ and $\left(\dfrac{1}{2}, \dfrac{11}{2}\right)$. $y = x + 5$. $4x^2 + 17x - 4 = x + 5$

$y = 4x^2 + 17x - 4$ $4x^2 + 16x - 9 = 0$

$(2x + 9)(2x - 1) = 0$

$x = -\dfrac{9}{2}$ and $x = \dfrac{1}{2}$

$y = -\dfrac{9}{2} + 5 = \dfrac{1}{2}$ and $y = \dfrac{1}{2} + 5 = \dfrac{11}{2}$

PTS: 6   REF: 061139a2   STA: A2.A.3   TOP: Quadratic-Linear Systems
KEY: equations

152 ANS: 3

Cofunctions tangent and cotangent are complementary

PTS: 2   REF: 061014a2   STA: A2.A.58   TOP: Cofunction Trigonometric Relationships

153 ANS: 2   PTS: 2   REF: 061021a2   STA: A2.S.8
TOP: Correlation Coefficient

154 ANS: 3

$$75000 = 25000e^{.0475t}$$

$$3 = e^{.0475t}$$

$$\ln 3 = \ln e^{.0475t}$$

$$\frac{\ln 3}{.0475} = \frac{.0475t \cdot \ln e}{.0475}$$

$$23.1 \approx t$$

PTS: 2   REF: 061117a2   STA: A2.A.6   TOP: Exponential Growth

155 ANS: 3

$$\sqrt{-300} = \sqrt{100}\,\sqrt{-1}\,\sqrt{3}$$

PTS: 2   REF: 061006a2   STA: A2.N.6   TOP: Square Roots of Negative Numbers

156 ANS:

$$e^{3\ln 2} = e^{\ln 2^3} = e^{\ln 8} = 8$$

PTS: 2   REF: 061131a2   STA: A2.A.12   TOP: Evaluating Exponential Expressions

157 ANS:

no. over 20 is more than 1 standard deviation above the mean. $0.159 \cdot 82 \approx 13.038$

PTS: 2   REF: 061129a2   STA: A2.S.5   TOP: Normal Distributions
KEY: predict

158 ANS: 3

$$\sqrt[3]{4^3 a^{15} a} = 4a^5 \sqrt[3]{a}$$

PTS: 2   REF: 061204a2   STA: A2.A.13   TOP: Simplifying Radicals
KEY: index > 2

159 ANS: 2

$$f(10) = \frac{-10}{(-10)^2 - 16} = \frac{-10}{84} = -\frac{5}{42}$$

PTS: 2   REF: 061102a2   STA: A2.A.41   TOP: Functional Notation

160 ANS:

$$K = ab\sin C = 24 \cdot 30 \sin 57 \approx 604$$

PTS: 2   REF: 061034a2   STA: A2.A.74   TOP: Using Trigonometry to Find Area
KEY: parallelograms

161 ANS:

$$y = 180.377(0.954)^x$$

PTS: 2   REF: 061231a2   STA: A2.S.7   TOP: Exponential Regression

162 ANS: 3

sum of the roots, $\dfrac{-b}{a} = \dfrac{-(-9)}{4} = \dfrac{9}{4}$. product of the roots, $\dfrac{c}{a} = \dfrac{3}{4}$

PTS: 2   REF: 061208a2   STA: A2.A.21   TOP: Roots of Quadratics
KEY: basic

163 ANS: 2

$\dfrac{11\pi}{12} \cdot \dfrac{180}{\pi} = 165$

PTS: 2   REF: 061002a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

164 ANS: 2   PTS: 2   REF: 061205a2   STA: A2.A.34
TOP: Sigma Notation

165 ANS:
$-3, -5, -8, -12$

PTS: 2   REF: fall0934a2   STA: A2.A.33   TOP: Recursive Sequences

166 ANS: 4   PTS: 2   REF: 061101a2   STA: A2.S.1
TOP: Analysis of Data

167 ANS: 3

$\dfrac{4}{5 - \sqrt{13}} \cdot \dfrac{5 + \sqrt{13}}{5 + \sqrt{13}} = \dfrac{4(5 + \sqrt{13})}{25 - 13} = \dfrac{5 + \sqrt{13}}{3}$

PTS: 2   REF: 061116a2   STA: A2.N.5   TOP: Rationalizing Denominators

168 ANS: 3

$2\pi \cdot \dfrac{5}{12} = \dfrac{10\pi}{12} = \dfrac{5\pi}{6}$

PTS: 2   REF: 061125a2   STA: A2.M.1   TOP: Radian Measure

169 ANS: 3

$3x + 16 = (x + 2)^2$. -4 is an extraneous solution.

$3x + 16 = x^2 + 4x + 4$

$\quad 0 = x^2 + x - 12$

$\quad 0 = (x + 4)(x - 3)$

$\quad x = -4 \ \ x = 3$

PTS: 2   REF: 061121a2   STA: A2.A.22   TOP: Solving Radicals
KEY: extraneous solutions

170 ANS: 3   PTS: 2   REF: fall0910a2   STA: A2.A.76
TOP: Angle Sum and Difference Identities   KEY: simplifying

171 ANS:

0, 60, 180, 300.
$$\sin 2\theta = \sin \theta$$
$$\sin 2\theta - \sin \theta = 0$$
$$2\sin \theta \cos \theta - \sin \theta = 0$$
$$\sin \theta(2\cos \theta - 1) = 0$$
$$\sin \theta = 0 \quad 2\cos \theta - 1 = 0$$
$$\theta = 0,180 \quad \cos \theta = \frac{1}{2}$$
$$\theta = 60,300$$

PTS: 4　　　　REF: 061037a2　　STA: A2.A.68　　TOP: Trigonometric Equations
KEY: double angle identities

172 ANS: 4

(4) fails the horizontal line test. Not every element of the range corresponds to only one element of the domain.

PTS: 2　　　　REF: fall0906a2　　STA: A2.A.43　　TOP: Defining Functions

173 ANS:

$$\cos \theta \cdot \frac{1}{\cos \theta} - \cos^2 \theta = 1 - \cos^2 \theta = \sin^2 \theta$$

PTS: 2　　　　REF: 061230a2　　STA: A2.A.58　　TOP: Reciprocal Trigonometric Relationships

174 ANS: 3

$$\frac{\sin^2 \theta + \cos^2 \theta}{1 - \sin^2 \theta} = \frac{1}{\cos^2 \theta} = \sec^2 \theta$$

PTS: 2　　　　REF: 061123a2　　STA: A2.A.58　　TOP: Reciprocal Trigonometric Relationships

175 ANS: 2　　　PTS: 2　　　REF: 061011a2　　STA: A2.A.10
TOP: Fractional Exponents as Radicals

176 ANS:

$y = -3\sin 2x$. The period of the function is π, the amplitude is 3 and it is reflected over the x-axis.

PTS: 2　　　　REF: 061235a2　　STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

177 ANS: 4

$$2\log_4(5x) = 3$$

$$\log_4(5x) = \frac{3}{2}$$

$$5x = 4^{\frac{3}{2}}$$

$$5x = 8$$

$$x = \frac{8}{5}$$

PTS: 2   REF: fall0921a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: advanced

178 ANS: 1

PTS: 2   REF: 061225a2   STA: A2.S.8   TOP: Correlation Coefficient

179 ANS: 2

$$\frac{\dfrac{x}{4} - \dfrac{1}{x}}{\dfrac{1}{2x} + \dfrac{1}{4}} = \frac{\dfrac{x^2 - 4}{4x}}{\dfrac{2x + 4}{8x}} = \frac{(x + 2)(x - 2)}{4x} \times \frac{8x}{2(x + 2)} = x - 2$$

PTS: 2   REF: fall0920a2   STA: A2.A.17   TOP: Complex Fractions

180 ANS:

7. $f(-3) = (-3)^2 - 6 = 3$. $g(x) = 2^3 - 1 = 7$.

PTS: 2   REF: 061135a2   STA: A2.A.42   TOP: Compositions of Functions
KEY: numbers

181 ANS: 4   PTS: 2   REF: 061120a2   STA: A2.A.19
TOP: Properties of Logarithms   KEY: splitting logs

182 ANS:

Sum $\dfrac{-b}{a} = -\dfrac{11}{5}$. Product $\dfrac{c}{a} = -\dfrac{3}{5}$

PTS: 2   REF: 061030a2   STA: A2.A.20   TOP: Roots of Quadratics

183 ANS:

$$12t^8 - 75t^4 = 3t^4(4t^4 - 25) = 3t^4(2t^2 + 5)(2t^2 - 5)$$

PTS: 2   REF: 061133a2   STA: A2.A.7
TOP: Factoring the Difference of Perfect Squares   KEY: binomial

184 ANS: 1
The binomials are conjugates, so use FL.

PTS: 2   REF: 061201a2   STA: A2.N.3   TOP: Operations with Polynomials
185 ANS: 2   PTS: 2   REF: 061216a2   STA: A2.A.42
TOP: Compositions of Functions   KEY: variables
186 ANS: 4

$$\frac{4 \cdot 0 + 6 \cdot 1 + 10 \cdot 2 + 0 \cdot 3 + 4k + 2 \cdot 5}{4 + 6 + 10 + 0 + k + 2} = 2$$

$$\frac{4k + 36}{k + 22} = 2$$

$$4k + 36 = 2k + 44$$

$$2k = 8$$

$$k = 4$$

PTS: 2   REF: 061221a2   STA: A2.S.3   TOP: Average Known with Missing Data
187 ANS: 2   PTS: 2   REF: 061218a2   STA: A2.A.43
TOP: Defining Functions
188 ANS:

$$\frac{\sqrt{13}}{2}. \quad \sin \theta = \frac{y}{\sqrt{x^2 + y^2}} = \frac{2}{\sqrt{(-3)^2 + 2^2}} = \frac{2}{\sqrt{13}}. \quad \csc \theta = \frac{\sqrt{13}}{2}.$$

PTS: 2   REF: fall0933a2   STA: A2.A.62   TOP: Determining Trigonometric Functions
189 ANS: 4
$$y - 2\sin \theta = 3$$

$$y = 2\sin \theta + 3$$

$$f(\theta) = 2\sin \theta + 3$$

PTS: 2   REF: fall0927a2   STA: A2.A.40   TOP: Functional Notation
190 ANS:

$$K = ab\sin C = 18 \cdot 22\sin 60 = 396\frac{\sqrt{3}}{2} = 198\sqrt{3}$$

PTS: 2   REF: 061234a2   STA: A2.A.74   TOP: Using Trigonometry to Find Area
KEY: Parallelograms

191 ANS:

$$\frac{51}{243}. \quad {}_5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2 = \frac{40}{243}$$

$$_5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1 = \frac{10}{243}$$

$$_5C_3\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0 = \frac{1}{243}$$

PTS: 4   REF: 061138a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

192 ANS:
$$(x+3)^2 + (y-4)^2 = 25$$

PTS: 2   REF: fall0929a2   STA: A2.A.49   TOP: Writing Equations of Circles

193 ANS:
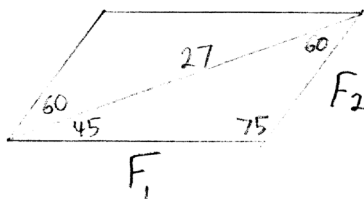
$$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}. \quad \frac{27}{\sin 75} = \frac{F_2}{\sin 45}.$$

$$F_1 \approx 24 \qquad F_1 \approx 20$$

PTS: 4   REF: 061238a2   STA: A2.A.73   TOP: Vectors

194 ANS: 1

$$\frac{6}{\sin 35} = \frac{10}{\sin N}$$

$$N \approx 73$$

$$73 + 35 < 180$$

$$(180 - 73) + 35 < 180$$

PTS: 2   REF: 061226a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case

195 ANS: 2
$$x^2 - 2x + y^2 + 6y = -3$$

$$x^2 - 2x + 1 + y^2 + 6y + 9 = -3 + 1 + 9$$

$$(x-1)^2 + (y+3)^2 = 7$$

PTS: 2   REF: 061016a2   STA: A2.A.47   TOP: Equations of Circles

196 ANS: 1

$$\sqrt[4]{16x^2y^7} = 16^{\frac{1}{4}} x^{\frac{2}{4}} y^{\frac{7}{4}} = 2x^{\frac{1}{2}} y^{\frac{7}{4}}$$

PTS: 2　　　　REF: 061107a2　　STA: A2.A.11　　TOP: Radicals as Fractional Exponents

197 ANS:

$$216\left(\frac{\pi}{180}\right) \approx 3.8$$

PTS: 2　　　　REF: 061232a2　　STA: A2.M.2　　TOP: Radian Measure
KEY: radians

198 ANS: 3

n	0	1	2	Σ
$n^2 + 2^n$	$0^2 + 2^0 = 1$	$1^2 + 2^2 = 3$	$2^2 + 2^2 = 8$	12

$2 \times 12 = 24$
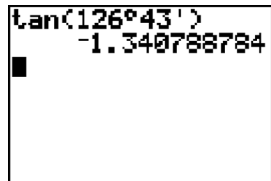
PTS: 2　　　　REF: fall0911a2　　STA: A2.N.10　　TOP: Sigma Notation
KEY: basic

199 ANS: 2
$\cos(-305° + 360°) = \cos(55°)$

PTS: 2　　　　REF: 061104a2　　STA: A2.A.57　　TOP: Reference Angles

200 ANS: 2

```
tan(126°43')
    -1.340788784
■
```

PTS: 2　　　　REF: 061115a2　　STA: A2.A.66　　TOP: Determining Trigonometric Functions

201 ANS: 1　　　　PTS: 2　　　　REF: fall0914a2　　STA: A2.A.9
TOP: Negative and Fractional Exponents

202 ANS: 3　　　　PTS: 2　　　　REF: 061114a2　　STA: A2.A.38
TOP: Defining Functions　　　KEY: graphs

203 ANS: 2

$x^3 + 3x^2 - 4x - 12$

$x^2(x+3) - 4(x+3)$

$(x^2 - 4)(x+3)$

$(x+2)(x-2)(x+3)$

PTS: 2　　　　REF: 061214a2　　STA: A2.A.7　　TOP: Factoring by Grouping

204 ANS: 4

$12x^4 + 10x^3 - 12x^2 = 2x^2(6x^2 + 5x - 6) = 2x^2(2x + 3)(3x - 2)$

PTS: 2   REF: 061008a2   STA: A2.A.7   TOP: Factoring Polynomials
KEY: single variable

205 ANS:

$3 \pm \sqrt{7}$. $2x^2 - 12x + 4 = 0$

$$x^2 - 6x + 2 = 0$$

$$x^2 - 6x = -2$$

$$x^2 - 6x + 9 = -2 + 9$$

$$(x - 3)^2 = 7$$

$$x - 3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

PTS: 4   REF: fall0936a2   STA: A2.A.24   TOP: Completing the Square

206 ANS: 1

$6x - 7 \le 5$ $6x - 7 \ge -5$

$6x \le 12$ $6x \ge 2$

$x \le 2$

$x \ge \dfrac{1}{3}$

PTS: 2   REF: fall0905a2   STA: A2.A.1   TOP: Absolute Value Inequalities
KEY: graph

207 ANS: 1

$5x + 29 = (x + 3)^2$. $(-5) + 3$ shows an extraneous solution.

$5x + 29 = x^2 + 6x + 9$

$0 = x^2 + x - 20$

$0 = (x + 5)(x - 4)$

$x = -5, 4$

PTS: 2   REF: 061213a2   STA: A2.A.22   TOP: Solving Radicals
KEY: extraneous solutions

208 ANS: 4

PTS: 2   REF: 061222a2   STA: A2.A.50   TOP: Solving Polynomial Equations

13

209 ANS: 3

$$_6C_3\left(\frac{x}{2}\right)^3(-2y)^3 = 20 \cdot \frac{x^3}{8} \cdot -8y^3 = -20x^3y^3$$

PTS: 2 REF: 061215a2 STA: A2.A.36 TOP: Binomial Expansions

210 ANS: 1

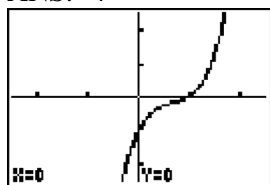| n	3	4	5	Σ
$-r^2 + r$	$-3^2 + 3 = -6$	$-4^2 + 4 = -12$	$-5^2 + 5 = -20$	-38

PTS: 2 REF: 061118a2 STA: A2.N.10 TOP: Sigma Notation
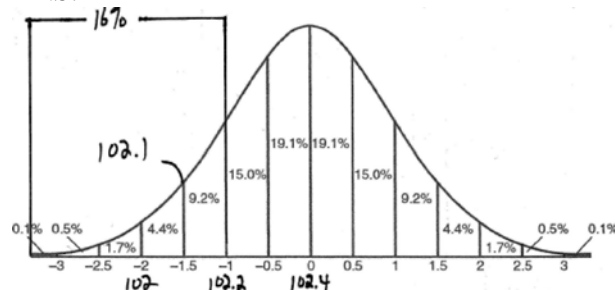KEY: basic

211 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

212 ANS: 1

PTS: 2 REF: fall0915a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

213 ANS: 1

$$_9C_3a^6(-4b)^3 = -5376a^6b^3$$

PTS: 2 REF: 061126a2 STA: A2.A.36 TOP: Binomial Expansions

214 ANS: 1 PTS: 2 REF: 061013a2 STA: A2.A.38
TOP: Defining Functions

215 ANS: 3

$$S = \frac{-b}{a} = \frac{-(-3)}{4} = \frac{3}{4}. \ P = \frac{c}{a} = \frac{-8}{4} = -2$$

PTS: 2 REF: fall0912a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: basic

216 ANS: 4 PTS: 2 REF: 061206a2 STA: A2.A.60
TOP: Unit Circle

217 ANS: 4 PTS: 2 REF: 061207a2 STA: A2.A.19
TOP: Properties of Logarithms KEY: antilogarithms

218 ANS: 1

$$\frac{\sqrt{3}+5}{\sqrt{3}-5} \cdot \frac{\sqrt{3}+5}{\sqrt{3}+5} = \frac{3+5\sqrt{3}+5\sqrt{3}+25}{3-25} = \frac{28+10\sqrt{3}}{-22} = -\frac{14+5\sqrt{3}}{11}$$

PTS: 2   REF: 061012a2   STA: A2.N.5   TOP: Rationalizing Denominators

219 ANS: 1   PTS: 2   REF: 061019a2   STA: A2.N.7
TOP: Imaginary Numbers

220 ANS:

$$\frac{12x^2}{y^9} \cdot \frac{3x^{-4}y^5}{(2x^3y^{-7})^{-2}} = \frac{3y^5(2x^3y^{-7})^2}{x^4} = \frac{3y^5(4x^6y^{-14})}{x^4} = \frac{12x^6y^{-9}}{x^4} = \frac{12x^2}{y^9}$$

PTS: 2   REF: 061134a2   STA: A2.A.9   TOP: Negative Exponents

221 ANS: 1

$$13^2 = 15^2 + 14^2 - 2(15)(14)\cos C$$

$$169 = 421 - 420\cos C$$

$$-252 = -420\cos C$$

$$\frac{252}{420} = \cos C$$

$$53 \approx C$$

PTS: 2   REF: 061110a2   STA: A2.A.73   TOP: Law of Cosines
KEY: find angle

222 ANS: 4

$$S_n = \frac{n}{2}[2a+(n-1)d] = \frac{21}{2}[2(18)+(21-1)2] = 798$$

PTS: 2   REF: 061103a2   STA: A2.A.35   TOP: Series
KEY: arithmetic

223 ANS:

$$\frac{-(x^2-4)}{(x+4)(x+3)} \times \frac{x+3}{2(x-2)} = \frac{-(x+2)(x-2)}{x+4} \times \frac{1}{2(x-2)} = \frac{-(x+2)}{2(x+4)}$$

PTS: 4   REF: 061236a2   STA: A2.A.16   TOP: Multiplication and Division of Rationals
KEY: division

224 ANS: 3   PTS: 2   REF: 061127a2   STA: A2.S.6
TOP: Regression

225 ANS: 2   PTS: 2   REF: fall0926a2   STA: A2.A.46
TOP: Transformations with Functions and Relations

226 ANS: 4

$$4ab\sqrt{2b} - 3a\sqrt{9b^2}\sqrt{2b} + 7ab\sqrt{6b} = 4ab\sqrt{2b} - 9ab\sqrt{2b} + 7ab\sqrt{6b} = -5ab\sqrt{2b} + 7ab\sqrt{6b}$$

PTS: 2   REF: fall0918a2   STA: A2.A.14   TOP: Operations with Radicals
KEY: with variables | index = 2

227 ANS: 3 PTS: 2 REF: fall0913a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

228 ANS:
$$\frac{\frac{1}{2}-\frac{4}{d}}{\frac{1}{d}+\frac{3}{2d}}=\frac{\frac{d-8}{2d}}{\frac{2d+3d}{2d^2}}=\frac{d-8}{2d}\times\frac{2d^2}{5d}=\frac{d-8}{5}$$

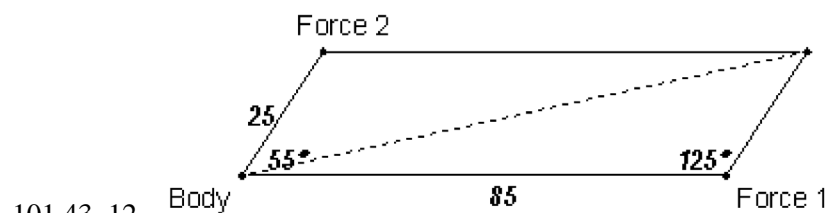PTS: 2 REF: 061035a2 STA: A2.A.17 TOP: Complex Fractions

229 ANS: 1
$$_{10}C_4 = 210$$

PTS: 2 REF: 061113a2 STA: A2.S.11 TOP: Combinations

230 ANS: 3 PTS: 2 REF: 061001a2 STA: A2.A.30
TOP: Sequences

231 ANS: 1 PTS: 2 REF: 061018a2 STA: A2.A.22
TOP: Solving Radicals KEY: extraneous solutions

232 ANS:

101.43, 12.

$$r^2 = 25^2 + 85^2 - 2(25)(85)\cos 125.$$
$$r^2 \approx 10287.7$$
$$r \approx 101.43$$

$$\frac{2.5}{\sin x}=\frac{101.43}{\sin 125}$$
$$x \approx 12$$

PTS: 6 REF: fall0939a2 STA: A2.A.73 TOP: Vectors

233 ANS:
$$5\sqrt{3x^3}-2\sqrt{27x^3}=5\sqrt{x^2}\sqrt{3x}-2\sqrt{9x^2}\sqrt{3x}=5x\sqrt{3x}-6x\sqrt{3x}=-x\sqrt{3x}$$

PTS: 2 REF: 061032a2 STA: A2.N.2 TOP: Operations with Radicals

234 ANS: 2
$$f^{-1}(x)=\log_4 x$$

PTS: 2 REF: fall0916a2 STA: A2.A.54 TOP: Graphing Logarithmic Functions

235 ANS:

$$i^{13} + i^{18} + i^{31} + n = 0$$

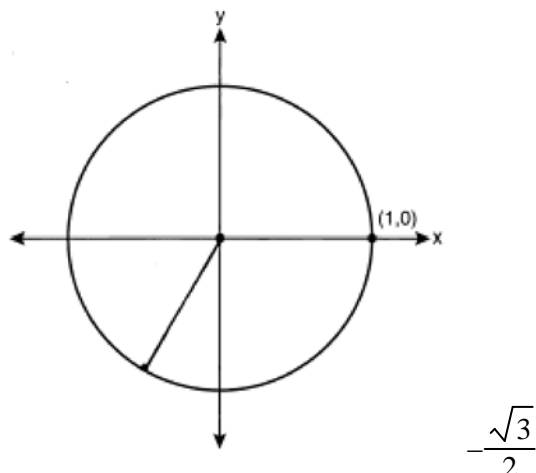$$i + (-1) - i + n = 0$$

$$-1 + n = 0$$

$$n = 1$$

PTS: 2   REF: 061228a2   STA: A2.N.7   TOP: Imaginary Numbers

236 ANS:

$$-\frac{\sqrt{3}}{2}$$

PTS: 2   REF: 061033a2   STA: A2.A.60   TOP: Unit Circle
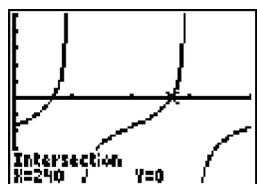
237 ANS: 1

$$\tan\theta - \sqrt{3} = 0$$

$$\tan\theta = \sqrt{3}$$

$$\theta = \tan^{-1}\sqrt{3}$$

$$\theta = 60, 240$$

PTS: 2   REF: fall0903a2   STA: A2.A.68   TOP: Trigonometric Equations
KEY: basic

238 ANS: 4

$$6x - x^3 - x^2 = -x(x^2 + x - 6) = -x(x + 3)(x - 2)$$

PTS: 2   REF: fall0917a2   STA: A2.A.7   TOP: Factoring Polynomials
KEY: single variable

239 ANS: 2

$$K = \frac{1}{2}(10)(18)\sin 120 = 45\sqrt{3} \approx 78$$

PTS: 2   REF: fall0907a2   STA: A2.A.74   TOP: Using Trigonometry to Find Area
KEY: basic

240 ANS:

197°40'. $3.45 \times \dfrac{180}{\pi} \approx 197°40'$.

PTS: 2   REF: fall0931a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

241 ANS: 3   PTS: 2   REF: fall0923a2   STA: A2.A.39
TOP: Domain and Range   KEY: real domain

242 ANS:

$$b^2 - 4ac = 0$$

$$k^2 - 4(1)(4) = 0$$

$$k^2 - 16 = 0$$

$$(k+4)(k-4) = 0$$

$$k = \pm 4$$

PTS: 2   REF: 061028a2   STA: A2.A.2   TOP: Using the Discriminant
KEY: determine equation given nature of roots

243 ANS: 4

$$\frac{3 \pm \sqrt{(-3)^2 - 4(1)(-9)}}{2(1)} = \frac{3 \pm \sqrt{45}}{2} = \frac{3 \pm 3\sqrt{5}}{2}$$

PTS: 2   REF: 061009a2   STA: A2.A.25   TOP: Quadratic Formula

244 ANS: 3   PTS: 2   REF: 061022a2   STA: A2.A.63
TOP: Domain and Range

245 ANS: 1

If $\sin x = 0.8$, then $\cos x = 0.6$. $\tan \frac{1}{2}x = \sqrt{\dfrac{1-0.6}{1+0.6}} = \sqrt{\dfrac{0.4}{1.6}} = 0.5$.

PTS: 2   REF: 061220a2   STA: A2.A.77   TOP: Half Angle Identities

246 ANS:

$$\frac{5(3+\sqrt{2})}{7}. \quad \frac{5}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{5(3+\sqrt{2})}{9-2} = \frac{5(3+\sqrt{2})}{7}$$
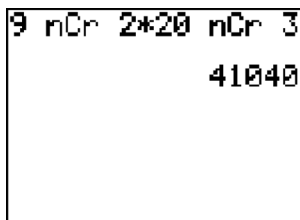
PTS: 2   REF: fall0928a2   STA: A2.N.5   TOP: Rationalizing Denominators

247 ANS:

```
9 nCr 2*20 nCr 3
            41040
```

41,040.

PTS: 2   REF: fall0935a2   STA: A2.S.12   TOP: Sample Space

248 ANS:

no solution. $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

$$\frac{4x-12}{x-3} = 2$$

$$\frac{4(x-3)}{x-3} = 2$$

$$4 \neq 2$$

PTS: 2   REF: fall0930a2   STA: A2.A.23   TOP: Solving Rationals
KEY: rational solutions

249 ANS: 4   PTS: 2   REF: 061124a2   STA: A2.S.3
TOP: Average Known with Missing Data

250 ANS: 3   PTS: 2   REF: 061007a2   STA: A2.S.9
TOP: Differentiating Permutations and Combinations

251 ANS:

$y = 2.001x^{2.298}$, 1,009. $y = 2.001(15)^{2.298} \approx 1009$

PTS: 4   REF: fall0938a2   STA: A2.S.7   TOP: Power Regression

252 ANS: 1

$$2\log x - (3\log y + \log z) = \log x^2 - \log y^3 - \log z = \log \frac{x^2}{y^3 z}$$

PTS: 2   REF: 061010a2   STA: A2.A.19   TOP: Properties of Logarithms

253 ANS: 1   PTS: 2   REF: 061223a2   STA: A2.S.15
TOP: Binomial Probability   KEY: modeling

254 ANS: 1

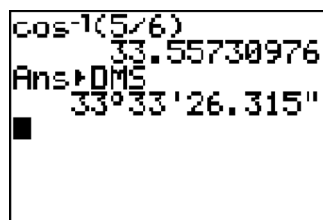$${}_5C_3(3x)^2(-2)^3 = 10 \cdot 9x^2 \cdot -8 = -720x^2$$

PTS: 2   REF: fall0919a2   STA: A2.A.36   TOP: Binomial Expansions

255 ANS: 1

$$\cos K = \frac{5}{6}$$

$$K = \cos^{-1}\frac{5}{6}$$

$$K \approx 33°33'$$

PTS: 2   REF: 061023a2   STA: A2.A.55   TOP: Trigonometric Ratios

256 ANS: 4
Students entering the library are more likely to spend more time studying, creating bias.

PTS: 2   REF: fall0904a2   STA: A2.S.2   TOP: Analysis of Data

257 ANS: 3
$$x = 5^4 = 625$$

PTS: 2   REF: 061106a2   STA: A2.A.28   TOP: Logarithmic Equations
KEY: basic

258 ANS: 1
$$y \geq x^2 - x - 6$$

$$y \geq (x - 3)(x + 2)$$

PTS: 2   REF: 061017a2   STA: A2.A.4   TOP: Quadratic Inequalities
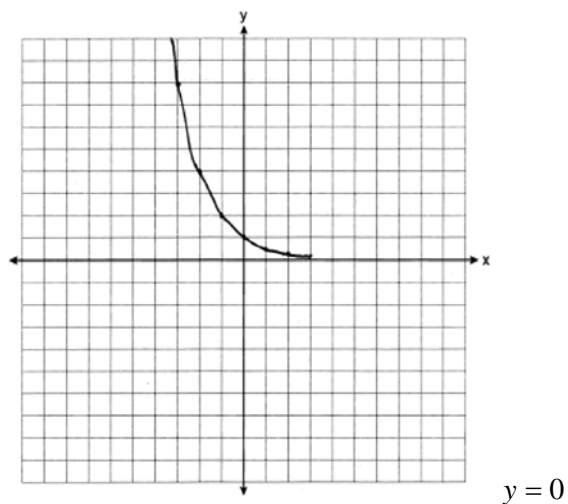KEY: two variables

259 ANS: 3
$$s = \theta\, r = \frac{2\pi}{8} \cdot 6 = \frac{3\pi}{2}$$

PTS: 2   REF: 061212a2   STA: A2.A.61   TOP: Arc Length
KEY: arc length

260 ANS:

$y = 0$

PTS: 2　　　REF: 061031a2　　STA: A2.A.53　　TOP: Graphing Exponential Functions

261 ANS: 3

PTS: 2　　　REF: fall0924a2　　STA: A2.S.4　　TOP: Dispersion
KEY: variance

262 ANS: 4
$s = \theta\, r = 2 \cdot 4 = 8$

PTS: 2　　　REF: fall0922a2　　STA: A2.A.61　　TOP: Arc Length
KEY: arc length

263 ANS: 4　　　PTS: 2　　　REF: 061005a2　　STA: A2.A.50
TOP: Solving Polynomial Equations

264 ANS: 1
$\cos^2\theta - \cos 2\theta = \cos^2\theta - (\cos^2\theta - \sin^2\theta) = \sin^2\theta$

PTS: 2　　　REF: 061024a2　　STA: A2.A.77　　TOP: Double Angle Identities
KEY: simplifying

265 ANS: 2

$$4^{2x+5} = 8^{3x} \quad .$$

$$\left(2^2\right)^{2x+5} = \left(2^3\right)^{3x}$$

$$2^{4x+10} = 2^{9x}$$

$$4x + 10 = 9x$$

$$10 = 5x$$

$$2 = x$$

PTS: 2   REF: 061105a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base not shown

266 ANS: 4   PTS: 2   REF: 061026a2   STA: A2.A.29
TOP: Sequences

267 ANS: 4

$$\frac{2\pi}{b} = \frac{2\pi}{\dfrac{1}{3}} = 6\pi$$

PTS: 2   REF: 061027a2   STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions   KEY: period

268 ANS: 4   PTS: 2   REF: fall0925a2   STA: A2.S.10
TOP: Permutations

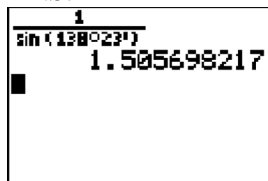269 ANS: 2   PTS: 2   REF: 061108a2   STA: A2.A.52
TOP: Identifying the Equation of a Graph

270 ANS: 4

PTS: 2   REF: 061217a2   STA: A2.A.66   TOP: Determining Trigonometric Functions

271 ANS: 2

$$(3 - 7i)(3 - 7i) = 9 - 21i - 21i + 49i^2 = 9 - 42i - 49 = -40 - 42i$$

PTS: 2   REF: fall0901a2   STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

272 ANS:

$\pm\dfrac{3}{2}, -\dfrac{1}{2}.$ $8x^3 + 4x^2 - 18x - 9 = 0$

$$4x^2(2x+1) - 9(2x+1) = 0$$

$$(4x^2 - 9)(2x+1) = 0$$

$$4x^2 - 9 = 0 \text{ or } 2x + 1 = 0$$

$$(2x+3)(2x-3) = 0 \quad x = -\dfrac{1}{2}$$

$$x = \pm\dfrac{3}{2}$$

PTS: 4   REF: fall0937a2   STA: A2.A.26   TOP: Solving Polynomial Equations

273 ANS: 1   PTS: 2   REF: 061210a2   STA: A2.A.9
TOP: Negative Exponents