JMAP
REGENTS AT RANDOM

The NY Algebra 2/Trigonometry Regents Exams
Fall 2009-June 2014

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Algebra 2/Trigonometry Regents at Random

1 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

2 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

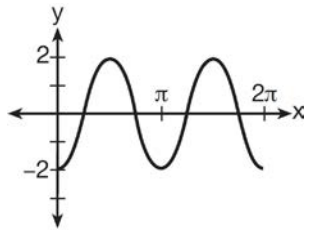
1) every third student sent to the office
2) every third student to enter the library
3) every third student to enter the gym for the basketball game
4) every third student arriving at school in the morning

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

1) $-\frac{\pi}{2} < x < \frac{\pi}{2}$
2) $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$
3) $0 \leq x \leq \pi$
4) $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$

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

5 Which equation represents the graph below?



1) $y = -2\sin 2x$
2) $y = -2\sin\frac{1}{2}x$
3) $y = -2\cos 2x$
4) $y = -2\cos\frac{1}{2}x$

6 The relationship between t, a student's test scores, and d, the student's success in college, is modeled by the equation $d = 0.48t + 75.2$. Based on this linear regression model, the correlation coefficient could be

1) between –1 and 0
2) between 0 and 1
3) equal to –1
4) equal to 0

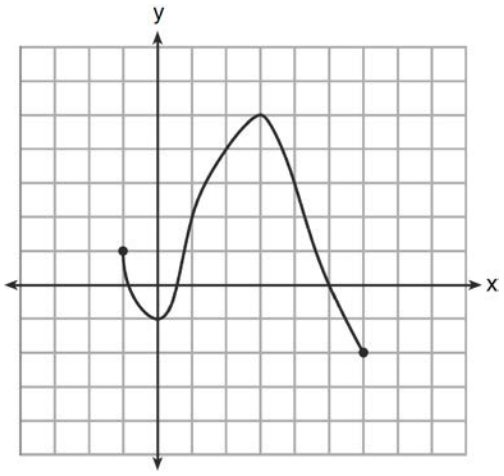
7 What is the range of $f(x) = |x - 3| + 2$?

1) $\{x | x \geq 3\}$
2) $\{y | y \geq 2\}$
3) $\{x | x \in \text{real numbers}\}$
4) $\{y | y \in \text{real numbers}\}$

8 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) $\cos x + \sin x$

9 What is the domain of the function shown below?



1) $-1 \leq x \leq 6$
2) $-1 \leq y \leq 6$
3) $-2 \leq x \leq 5$
4) $-2 \leq y \leq 5$

10 What is the solution set of the equation $\frac{30}{x^2 - 9} + 1 = \frac{5}{x - 3}$?

1) $\{2, 3\}$
2) $\{2\}$
3) $\{3\}$
4) $\{\ \}$

11 A math club has 30 boys and 20 girls. Which expression represents the total number of different 5-member teams, consisting of 3 boys and 2 girls, that can be formed?

1) ${}_{30}P_3 \cdot {}_{20}P_2$
2) ${}_{30}C_3 \cdot {}_{20}C_2$
3) ${}_{30}P_3 + {}_{20}P_2$
4) ${}_{30}C_3 + {}_{20}C_2$

12 What is the middle term in the expansion of $\left(\frac{x}{2} - 2y\right)^6$?

1) $20x^3y^3$
2) $-\frac{15}{4}x^4y^2$
3) $-20x^3y^3$
4) $\frac{15}{4}x^4y^2$

13 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) $3\sin^2 x$

14 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
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

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

16 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) $a_n = 4(2.5)^{n-1}$

17 The expression $\log 4m^2$ is equivalent to

1) $2(\log 4 + \log m)$
2) $2\log 4 + \log m$
3) $\log 4 + 2\log m$
4) $\log 16 + 2\log m$

18 Expressed with a rational denominator and in simplest form, $\frac{x}{x - \sqrt{x}}$ is

1) $\frac{x^2 + x\sqrt{x}}{x^2 - x}$
2) $-\sqrt{x}$
3) $\frac{x + \sqrt{x}}{1 - x}$
4) $\frac{x + \sqrt{x}}{x - 1}$

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

20 Expressed in simplest form, $\sqrt{-18} - \sqrt{-32}$ is

1) $-\sqrt{2}$
2) $-7\sqrt{2}$
3) $-i\sqrt{2}$
4) $7i\sqrt{2}$

21 Because Sam's backyard gets very little sunlight, the probability that a geranium planted there will flower is 0.28. Sam planted five geraniums. Determine the probability, to the *nearest thousandth*, that *at least* four geraniums will flower.

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

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

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

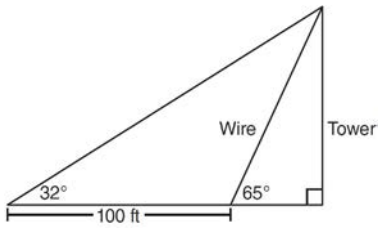
4) $_{10}C_9\left(\frac{7}{10}\right)^9\left(\frac{3}{10}\right)^1$

23 Find, to the *nearest tenth of a square foot*, the area of a rhombus that has a side of 6 feet and an angle of 50°.

24 If $\log 2 = a$ and $\log 3 = b$, the expression $\log\frac{9}{20}$ is equivalent to

1) $2b - a + 1$
2) $2b - a - 1$
3) $b^2 - a + 10$
4) $\frac{2b}{a+1}$

25 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*.



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

27 Two forces of 40 pounds and 28 pounds act on an object. The angle between the two forces is 65°. Find the magnitude of the resultant force, to the *nearest pound*. Using this answer, find the measure of the angle formed between the resultant and the *smaller* force, to the *nearest degree*.

28 Which step can be used when solving $x^2 - 6x - 25 = 0$ by completing the square?

1) $x^2 - 6x + 9 = 25 + 9$
2) $x^2 - 6x - 9 = 25 - 9$
3) $x^2 - 6x + 36 = 25 + 36$
4) $x^2 - 6x - 36 = 25 - 36$

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

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

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

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

30 If $\sin\theta < 0$ and $\cot\theta > 0$, in which quadrant does the terminal side of angle θ lie?

1) I
2) II
3) III
4) IV

31 Which function is one-to-one?

1) $f(x) = |x|$
2) $f(x) = 2^x$
3) $f(x) = x^2$
4) $f(x) = \sin x$

32 Which expression, when rounded to three decimal places, is equal to −1.155?

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

33 Given ΔABC 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 If $g(x) = \frac{1}{2}x + 8$ and $h(x) = \frac{1}{2}x - 2$, what is the value of $g(h(-8))$?

1) 0
2) 9
3) 5
4) 4

35 If $\sin A = \frac{1}{3}$, what is the value of $\cos 2A$?

1) $-\frac{2}{3}$
2) $\frac{2}{3}$
3) $-\frac{7}{9}$
4) $\frac{7}{9}$

36 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

37 The value of $\sin(180 + x)$ is equivalent to
1) $-\sin x$
2) $-\sin(90 - x)$
3) $\sin x$
4) $\sin(90 - x)$

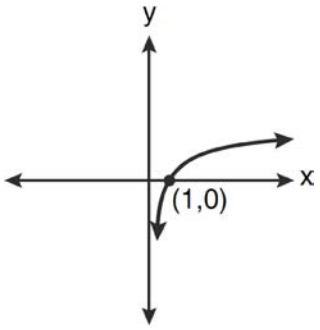
38 Which value of r represents data with a strong positive linear correlation between two variables?
1) 0.89
2) 0.34
3) 1.04
4) 0.01

39 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.

40 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) $\{\pm 2, \pm 2i\}$

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

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

1)


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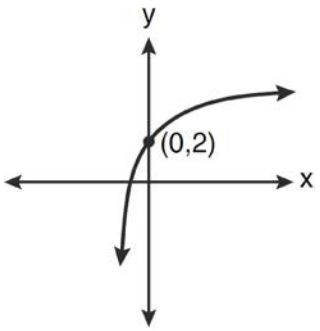

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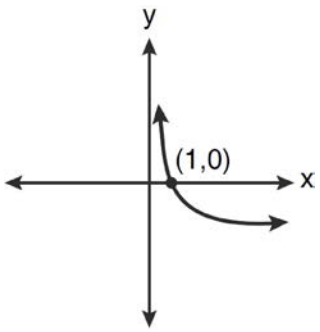
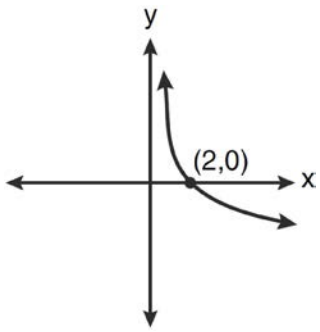


4)


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

44 Which expression is equivalent to $\left(9x^2y^6\right)^{-\frac{1}{2}}$?

1) $\frac{1}{3xy^3}$

2) $3xy^3$

3) $\frac{3}{xy^3}$

4) $\frac{xy^3}{3}$

45 In an arithmetic sequence, $a_4 = 19$ and $a_7 = 31$. Determine a formula for a_n, the n^{th} term of this sequence.

46 Express $4xi + 5yi^8 + 6xi^3 + 2yi^4$ in simplest $a + bi$ form.

47 What is the common ratio of the sequence $\frac{1}{64}a^5b^3, -\frac{3}{32}a^3b^4, \frac{9}{16}ab^5, \ldots$?

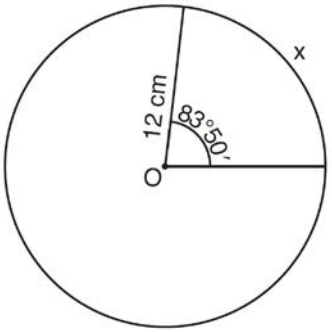
1) $-\frac{3b}{2a^2}$

2) $-\frac{6b}{a^2}$

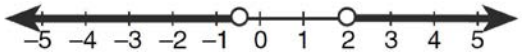
3) $-\frac{3a^2}{b}$

4) $-\frac{6a^2}{b}$

48 Circle *O* shown below has a radius of 12 centimeters. To the *nearest tenth of a centimeter*, determine the length of the arc, *x*, subtended by an angle of 83°50'.



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

1)


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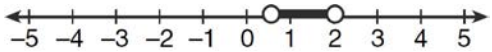


3)


4)


50 Given the relation $\{(8,2),(3,6),(7,5),(k,4)\}$, which value of *k* will result in the relation *not* being a function?

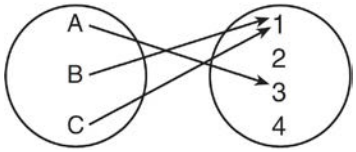
1) 1

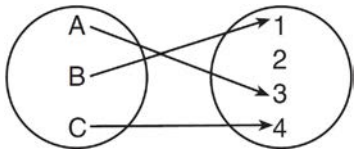
2) 2

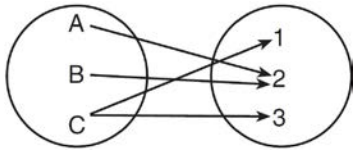
3) 3

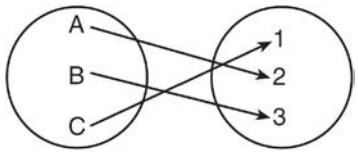
4) 4

51 Which diagram represents a relation that is both one-to-one and onto?

1) 

2) 

3) 

4) 

52 The expression $\sqrt[3]{64a^{16}}$ is equivalent to

1) $8a^4$
2) $8a^8$
3) $4a^5\sqrt[3]{a}$
4) $4a\sqrt[3]{a^5}$

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

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

54 Solve algebraically for all values of x:

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

55 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)	**Temperature in ^{0}F** (y)
0	180.2
2	165.8
4	146.3
6	135.4
8	127.7
10	110.5

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

56 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	55	40	65	29
45	59	35	25	37
52	30	8	40	55

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

57 In ΔDEF, $d = 5$, $e = 8$, and $m\angle D = 32$. How many distinct triangles can be drawn given these measurements?
1) 1
2) 2
3) 3
4) 0

58 Approximately how many degrees does five radians equal?
1) 286
2) 900
3) $\frac{\pi}{36}$
4) 5π

59 What is the product of the roots of $x^2 - 4x + k = 0$ if one of the roots is 7?
1) 21
2) −11
3) −21
4) −77

60 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) $\frac{25}{64}$
2) $\frac{45}{512}$
3) $\frac{75}{512}$
4) $\frac{225}{512}$

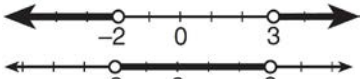
61 If p varies inversely as q, and $p = 10$ when $q = \frac{3}{2}$, what is the value of p when $q = \frac{3}{5}$?
1) 25
2) 15
3) 9
4) 4

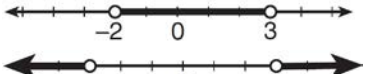
62 A population of rabbits doubles every 60 days according to the formula $P = 10(2)^{\frac{t}{60}}$, where P is the population of rabbits on day t. What is the value of t when the population is 320?
1) 240
2) 300
3) 660
4) 960

63 If n is a negative integer, then which statement is always true?
1) $6n^{-2} < 4n^{-1}$
2) $\frac{n}{4} > -6n^{-1}$
3) $6n^{-1} < 4n^{-1}$
4) $4n^{-1} > (6n)^{-1}$

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

65 What is the graph of the solution set of $|2x - 1| > 5$?

1) 

2) 

3) 

4) 

66 What is the number of degrees in an angle whose radian measure is $\frac{8\pi}{5}$?

1) 576
2) 288
3) 225
4) 113

67 A school cafeteria has five different lunch periods. The cafeteria staff wants to find out which items on the menu are most popular, so they give every student in the first lunch period a list of questions to answer in order to collect data to represent the school. Which type of study does this represent?

1) observation
2) controlled experiment
3) population survey
4) sample survey

68 How many different six-letter arrangements can be made using the letters of the word "TATTOO"?

1) 60
2) 90
3) 120
4) 720

69 Which expression is equivalent to $\left(3x^2\right)^{-1}$?

1) $\frac{1}{3x^2}$
2) $-3x^2$
3) $\frac{1}{9x^2}$
4) $-9x^2$

70 What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?

1) $(-8, -3)$
2) $(-8, 3)$
3) $(8, -3)$
4) $(8, 3)$

71 If $\sin x = \sin y = a$ and $\cos x = \cos y = b$, then $\cos(x - y)$ is

1) $b^2 - a^2$
2) $b^2 + a^2$
3) $2b - 2a$
4) $2b + 2a$

72 If $\log_4 x = 2.5$ and $\log_y 125 = -\frac{3}{2}$, find the numerical value of $\frac{x}{y}$, in simplest form.

73 Find, algebraically, the measure of the obtuse angle, to the *nearest degree*, that satisfies the equation $5\csc\theta = 8$.

74 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

75 Solve algebraically for all values of x: $\log_{(x+4)}(17x - 4) = 2$

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

77 Express $\frac{\cot x \sin x}{\sec x}$ as a single trigonometric function, in simplest form, for all values of x for which it is defined.

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

79 In a certain school, the heights of the population of girls are normally distributed, with a mean of 63 inches and a standard deviation of 2 inches. If there are 450 girls in the school, determine how many of the girls are *shorter than* 60 inches. Round the answer to the *nearest integer*.

80 In ΔKLM, $KL = 20$, $LM = 13$, and $m\angle K = 40$. The measure of $\angle M$?
1) must be between 0° and 90°
2) must equal 90°
3) must be between 90° and 180°
4) is ambiguous

81 Liz has applied to a college that requires students to score in the top 6.7% on the mathematics portion of an aptitude test. The scores on the test are approximately normally distributed with a mean score of 576 and a standard deviation of 104. What is the minimum score Liz must earn to meet this requirement?
1) 680
2) 732
3) 740
4) 784

82 If $g(x) = \left(ax\sqrt{1-x} \right)^2$, express g(10) in simplest form.

83 Which ordered pair is a solution of the system of equations shown below? $x + y = 5$

$$(x+3)^2 + (y-3)^2 = 53$$

1) $(2, 3)$
2) $(5, 0)$
3) $(-5, 10)$
4) $(-4, 9)$

84 Solve $x^3 + 5x^2 = 4x + 20$ algebraically.

85 The area of triangle ABC is 42. If $AB = 8$ and $m\angle B = 61$, the length of $\overline{BC}$ is approximately
1) 5.1
2) 9.2
3) 12.0
4) 21.7

86 The quantities p and q vary inversely. If $p = 20$ when $q = -2$, and $p = x$ when $q = -2x + 2$, then x equals
1) -4 and 5
2) $\frac{20}{19}$
3) -5 and 4
4) $-\frac{1}{4}$

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

88 Whenever Sara rents a movie, the probability that it is a horror movie is 0.57. Of the next five movies she rents, determine the probability, to the *nearest hundredth*, that *no more than* two of these rentals are horror movies.

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

90 The expression $\dfrac{a + \frac{b}{c}}{d - \frac{b}{c}}$ is equivalent to
1) $\frac{c+1}{d-1}$
2) $\frac{a+b}{d-b}$
3) $\frac{ac+b}{cd-b}$
4) $\frac{ac+1}{cd-1}$

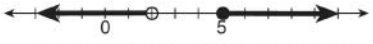
91 When $x^{-1} + 1$ is divided by $x + 1$, the quotient equals

1) 1
2) $\frac{1}{x}$
3) x
4) $-\frac{1}{x}$

92 Which graph represents the solution set of $\frac{x+16}{x-2} \leq 7$?

1) 

2) 

3) 

4) 

93 Which statement regarding the inverse function is true?

1) A domain of $y = \sin^{-1}x$ is $[0, 2\pi]$.
2) The range of $y = \sin^{-1}x$ is $[-1, 1]$.
3) A domain of $y = \cos^{-1}x$ is $(-\infty, \infty)$.
4) The range of $y = \cos^{-1}x$ is $[0, \pi]$.

94 Which expression represents the total number of different 11-letter arrangements that can be made using the letters in the word "MATHEMATICS"?

1) $\frac{11!}{3!}$
2) $\frac{11!}{2! + 2! + 2!}$
3) $\frac{11!}{8!}$
4) $\frac{11!}{2! \cdot 2! \cdot 2!}$

95 If $\tan\left(\text{Arc}\cos\frac{\sqrt{3}}{k}\right) = \frac{\sqrt{3}}{3}$, then k is

1) 1
2) 2
3) $\sqrt{2}$
4) $3\sqrt{2}$

96 Which equation represents a graph that has a period of 4π?

1) $y = 3\sin\frac{1}{2}x$
2) $y = 3\sin 2x$
3) $y = 3\sin\frac{1}{4}x$
4) $y = 3\sin 4x$

97 What is the common difference in the sequence $2a + 1, 4a + 4, 6a + 7, 8a + 10, \ldots$?

1) $2a + 3$
2) $-2a - 3$
3) $2a + 5$
4) $-2a + 5$

98 Which survey is *least* likely to contain bias?

1) surveying a sample of people leaving a movie theater to determine which flavor of ice cream is the most popular
2) surveying the members of a football team to determine the most watched TV sport
3) surveying a sample of people leaving a library to determine the average number of books a person reads in a year
4) surveying a sample of people leaving a gym to determine the average number of hours a person exercises per week

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

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

100 The simplest form of $\frac{1 - \frac{4}{x}}{1 - \frac{2}{x} - \frac{8}{x^2}}$ is

1) $\frac{1}{2}$
2) $\frac{x}{x+2}$
3) $\frac{x}{3}$
4) $-\frac{x}{x-2}$

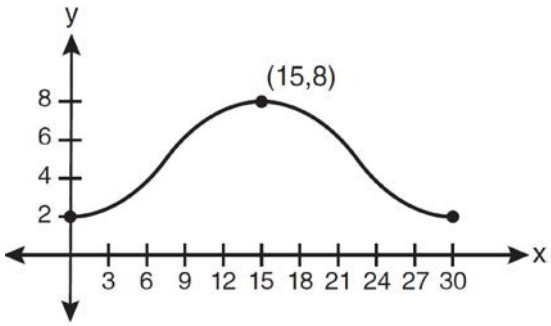
101 The expression $(x+i)^2 - (x-i)^2$ is equivalent to

1) 0
2) -2
3) $-2 + 4xi$
4) $4xi$

102 A school math team consists of three juniors and five seniors. How many different groups can be formed that consist of one junior and two seniors?

1) 13
2) 15
3) 30
4) 60

103 Which equation is graphed in the diagram below?

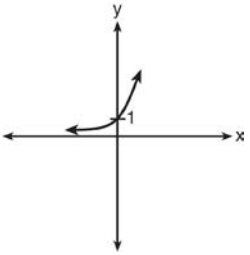


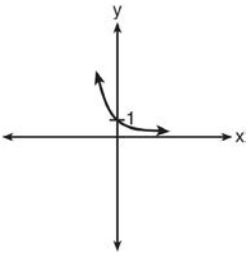
1) $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$
2) $y = 3\cos\left(\frac{\pi}{15}x\right) + 5$
3) $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$
4) $y = -3\cos\left(\frac{\pi}{15}x\right) + 5$

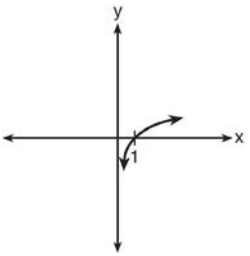
104 The points $(2, 3)$, $\left(4, \frac{3}{4}\right)$, and $(6, d)$ lie on the graph of a function. If y is inversely proportional to the square of x, what is the value of d?

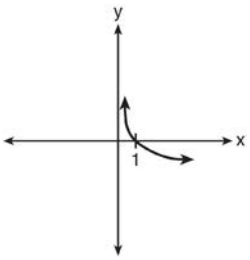
1) 1
2) $\frac{1}{3}$
3) 3
4) 27

105 Which sketch shows the inverse of $y = a^x$, where $a > 1$?

1) 

2) 

3) 

4) 

106 The number of bacteria present in a Petri dish can be modeled by the function $N = 50e^{3t}$, where N is the number of bacteria present in the Petri dish after t hours. Using this model, determine, to the *nearest hundredth*, the number of hours it will take for N to reach 30,700.

107 The number of possible different 12-letter arrangements of the letters in the word "TRIGONOMETRY" is represented by

1) $\frac{12!}{3!}$

2) $\frac{12!}{6!}$

3) $\frac{{}_{12}P_{12}}{8}$

4) $\frac{{}_{12}P_{12}}{6!}$

108 The expression $\frac{1}{7-\sqrt{11}}$ is equivalent to

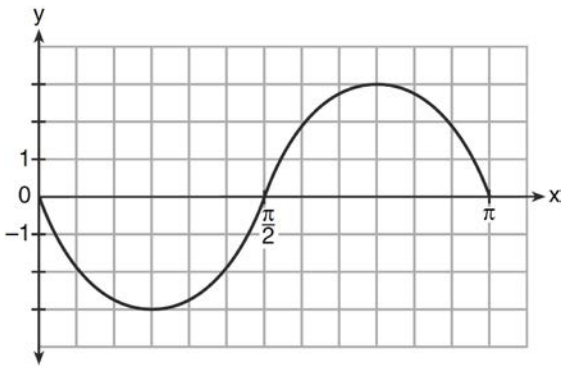
1) $\frac{7+\sqrt{11}}{38}$

2) $\frac{7-\sqrt{11}}{38}$

3) $\frac{7+\sqrt{11}}{60}$

4) $\frac{7-\sqrt{11}}{60}$

109 Write an equation for the graph of the trigonometric function shown below.



110 Solve algebraically for all values of x:
$\log_{(x+3)}(2x+3) + \log_{(x+3)}(x+5) = 2$

111 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

112 The formula to determine 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. Which equation could be used to determine the value of an account with an \$18,000 initial investment, at an interest rate of 1.25% for 24 months?
1) $A = 18,000e^{1.25 \cdot 2}$
2) $A = 18,000e^{1.25 \cdot 24}$
3) $A = 18,000e^{0.0125 \cdot 2}$
4) $A = 18,000e^{0.0125 \cdot 24}$

113 There are eight people in a tennis club. Which expression can be used to find the number of different ways they can place first, second, and third in a tournament?
1) ${}_8P_3$
2) ${}_8C_3$
3) ${}_8P_5$
4) ${}_8C_5$

114 If d varies inversely as t, and $d = 20$ when $t = 2$, what is the value of t when $d = -5$?
1) 8
2) 2
3) –8
4) –2

115 Solve the equation below algebraically, and express the result in simplest radical form:
$$\frac{13}{x} = 10 - x$$

116 If $f(x) = 2x^2 - 3x + 1$ and $g(x) = x + 5$, what is $f(g(x))$?
1) $2x^2 + 17x + 36$
2) $2x^2 + 17x + 66$
3) $2x^2 - 3x + 6$
4) $2x^2 - 3x + 36$

117 The expression $\left(2 - 3\sqrt{x}\right)^2$ is equivalent to
1) $4 - 9x$
2) $4 - 3x$
3) $4 - 12\sqrt{x} + 9x$
4) $4 - 12\sqrt{x} + 6x$

118 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%.

119 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.

120 What is the product of $\left(\frac{x}{4} - \frac{1}{3}\right)$ and $\left(\frac{x}{4} + \frac{1}{3}\right)$?

1) $\frac{x^2}{8} - \frac{1}{9}$
2) $\frac{x^2}{16} - \frac{1}{9}$
3) $\frac{x^2}{8} - \frac{x}{6} - \frac{1}{9}$
4) $\frac{x^2}{16} - \frac{x}{6} - \frac{1}{9}$

121 Solve the equation $6x^2 - 2x - 3 = 0$ and express the answer in simplest radical form.

122 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) $4x^2 - 9x - 3 = 0$

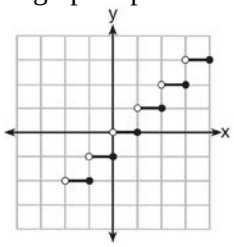
123 The conjugate of the complex expression $-5x + 4i$ is

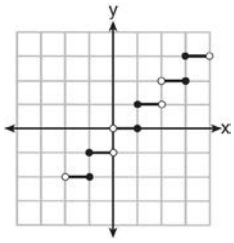
1) $5x - 4i$
2) $5x + 4i$
3) $-5x - 4i$
4) $-5x + 4i$

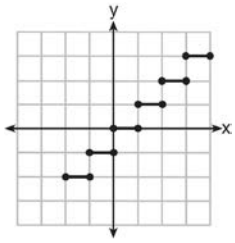
124 Which summation represents $5 + 7 + 9 + 11 + \ldots + 43$?

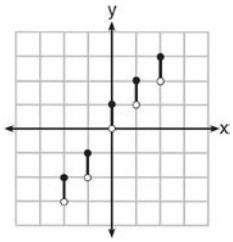
1) $\sum_{n=5}^{43} n$
2) $\sum_{n=1}^{20} (2n + 3)$
3) $\sum_{n=4}^{24} (2n - 3)$
4) $\sum_{n=3}^{23} (3n - 4)$

125 Which graph represents a function?

1) 

2) 

3) 

4) 

126 If $2x^3 = y$, then $\log y$ equals

1) $\log(2x) + \log 3$
2) $3\log(2x)$
3) $3\log 2 + 3\log x$
4) $\log 2 + 3\log x$

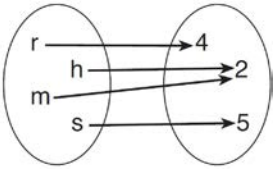
127 The expression $\frac{\cot x}{\csc x}$ is equivalent to

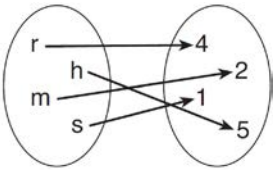
1) $\sin x$
2) $\cos x$
3) $\tan x$
4) $\sec x$

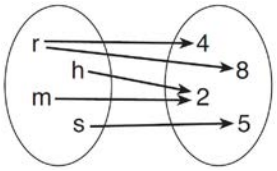
128 When factored completely, $x^3 + 3x^2 - 4x - 12$ equals

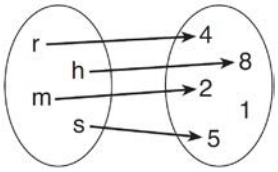
1) $(x + 2)(x - 2)(x - 3)$
2) $(x + 2)(x - 2)(x + 3)$
3) $(x^2 - 4)(x + 3)$
4) $(x^2 - 4)(x - 3)$

129 Which relation is both one-to-one and onto?

1) 

2) 

3) 

4) 

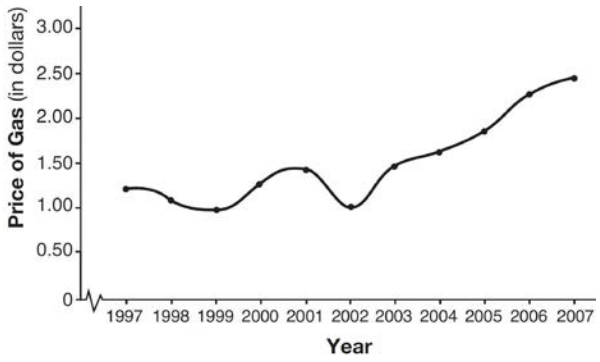
130 If $x = 3i$, $y = 2i$, and $z = m + i$, the expression xy^2z equals

1) $-12 - 12mi$
2) $-6 - 6mi$
3) $12 - 12mi$
4) $6 - 6mi$

131 Theresa is comparing the graphs of $y = 2^x$ and $y = 5^x$. Which statement is true?

1) The y-intercept of $y = 2^x$ is $(0, 2)$, and the y-intercept of $y = 5^x$ is $(0, 5)$.
2) Both graphs have a y-intercept of $(0, 1)$, and $y = 2^x$ is steeper for $x > 0$.
3) Both graphs have a y-intercept of $(0, 1)$, and $y = 5^x$ is steeper for $x > 0$.
4) Neither graph has a y-intercept.

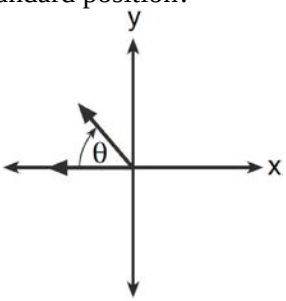
132 The graph below shows the average price of gasoline, in dollars, for the years 1997 to 2007.

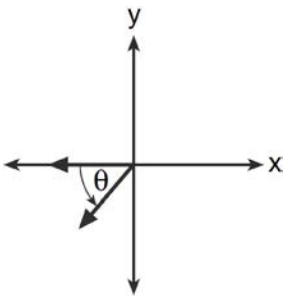


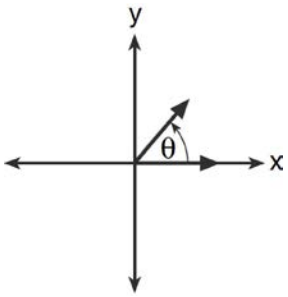
What is the approximate range of this graph?

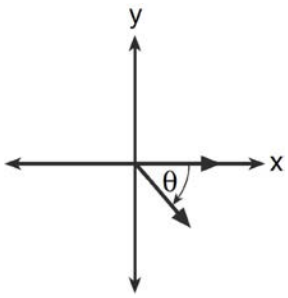
1) $1997 \le x \le 2007$
2) $1999 \le x \le 2007$
3) $0.97 \le y \le 2.38$
4) $1.27 \le y \le 2.38$

133 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?

1)


2)


3)


4)


134 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.

135 In a certain high school, a survey revealed the mean amount of bottled water consumed by students each day was 153 bottles with a standard deviation of 22 bottles. Assuming the survey represented a normal distribution, what is the range of the number of bottled waters that approximately 68.2% of the students drink?

1) 131 – 164
2) 131 – 175
3) 142 – 164
4) 142 – 175

136 The sum of $\sqrt[3]{6a^4b^2}$ and $\sqrt[3]{162a^4b^2}$, expressed in simplest radical form, is

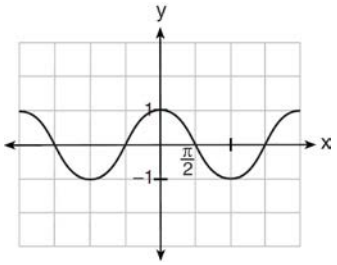
1) $\sqrt[6]{168a^8b^4}$
2) $2a^2b\sqrt[3]{21a^2b}$
3) $4a\sqrt[3]{6ab^2}$
4) $10a^2b\sqrt[3]{8}$

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

138 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%

139 Which is a graph of $y = \cot x$?

1)


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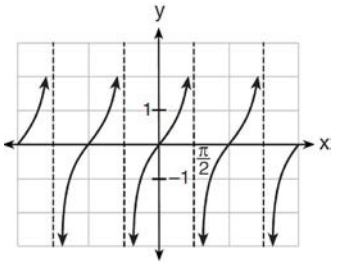

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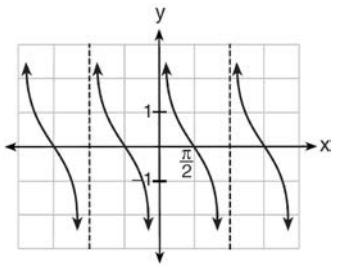
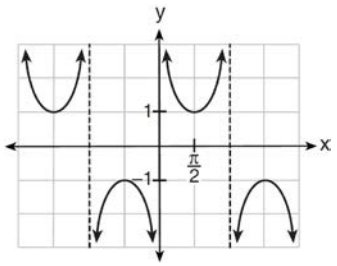


4)


140 On a multiple-choice test, Abby randomly guesses on all seven questions. Each question has four choices. Find the probability, to the *nearest thousandth*, that Abby gets *exactly* three questions correct.

141 The expression $\frac{x^2+9x-22}{x^2-121} \div (2-x)$ is equivalent to

1) $x-11$
2) $\frac{1}{x-11}$
3) $11-x$
4) $\frac{1}{11-x}$

142 Susie invests $500 in an account that is compounded continuously at an annual interest rate of 5%, according to the formula $A = Pe^{rt}$, where A is the amount accrued, P is the principal, r is the rate of interest, and t is the time, in years. Approximately how many years will it take for Susie's money to double?

1) 1.4
2) 6.0
3) 13.9
4) 14.7

143 Which expression is equivalent to $\frac{x^{-1}y^4}{3x^{-5}y^{-1}}$?

1) $\frac{x^4y^5}{3}$
2) $\frac{x^5y^4}{3}$
3) $3x^4y^5$
4) $\frac{y^4}{3x^5}$

144 Show that $\sec\theta \sin\theta \cot\theta = 1$ is an identity.

145 When x^2+3x-4 is subtracted from x^3+3x^2-2x, the difference is

1) x^3+2x^2-5x+4
2) x^3+2x^2+x-4
3) $-x^3+4x^2+x-4$
4) $-x^3-2x^2+5x+4$

146 In $\triangle PQR$, p equals

1) $\frac{r\sin P}{\sin Q}$
2) $\frac{r\sin P}{\sin R}$
3) $\frac{r\sin R}{\sin P}$
4) $\frac{q\sin R}{\sin Q}$

147 In parallelogram $BFLO$, $\overline{OL} = 3.8$, $LF = 7.4$, 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

148 Solve $|2x-3| > 5$ algebraically.

149 Multiply $x+yi$ by its conjugate, and express the product in simplest form.

150 If $\sec(a + 15)° = \csc(2a)°$, find the smallest positive value of a, in degrees.

151 An angle, P, drawn in standard position, terminates in Quadrant II if
1) $\cos P < 0$ and $\csc P < 0$
2) $\sin P > 0$ and $\cos P > 0$
3) $\csc P > 0$ and $\cot P < 0$
4) $\tan P < 0$ and $\sec P > 0$

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

153 Determine algebraically the x-coordinate of all points where the graphs of $xy = 10$ and $y = x + 3$ intersect.

154 In the interval $0° \le x < 360°$, $\tan x$ is undefined when x equals
1) 0º and 90º
2) 90º and 180º
3) 180º and 270º
4) 90º and 270º

155 The expression $\sin(\theta + 90)°$ is equivalent to
1) $-\sin\theta$
2) $-\cos\theta$
3) $\sin\theta$
4) $\cos\theta$

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

157 Max solves a quadratic equation by completing the square. He shows a correct step:

$$(x + 2)^2 = -9$$

What are the solutions to his equation?
1) $2 \pm 3i$
2) $-2 \pm 3i$
3) $3 \pm 2i$
4) $-3 \pm 2i$

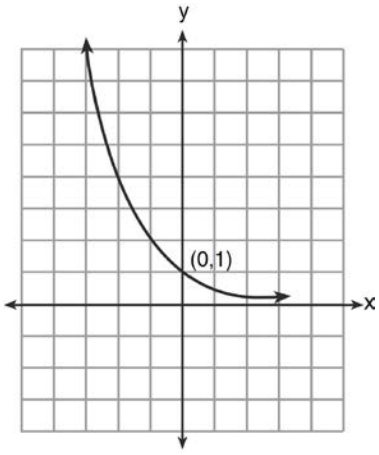
158 Convert 3 radians to degrees and express the answer to the *nearest minute*.

159 Which value of k satisfies the equation $8^{3k+4} = 4^{2k-1}$?
1) -1
2) $-\frac{9}{4}$
3) -2
4) $-\frac{14}{5}$

160 What is the product of the roots of the quadratic equation $2x^2 - 7x = 5$?

1) 5
2) $\frac{5}{2}$
3) -5
4) $-\frac{5}{2}$

161 What is the equation of the graph shown below?



1) $y = 2^x$
2) $y = 2^{-x}$
3) $x = 2^y$
4) $x = 2^{-y}$

162 The heights, in inches, of 10 high school varsity basketball players are 78, 79, 79, 72, 75, 71, 74, 74, 83, and 71. Find the interquartile range of this data set.

163 Two sides of a triangular-shaped sandbox measure 22 feet and 13 feet. If the angle between these two sides measures 55°, what is the area of the sandbox, to the *nearest square foot*?

1) 82
2) 117
3) 143
4) 234

164 Determine the sum and the product of the roots of $3x^2 = 11x - 6$.

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

166 A market research firm needs to collect data on viewer preferences for local news programming in Buffalo. Which method of data collection is most appropriate?

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

167 What is the common ratio of the geometric sequence shown below?

$$-2, 4, -8, 16, \ldots$$

1) $-\frac{1}{2}$
2) 2
3) -2
4) -6

168 If $f(x) = \sqrt{9 - x^2}$, what are its domain and range?

1) domain: $\{x \mid -3 \le x \le 3\}$; range: $\{y \mid 0 \le y \le 3\}$
2) domain: $\{x \mid x \ne \pm 3\}$; range: $\{y \mid 0 \le y \le 3\}$
3) domain: $\{x \mid x \le -3 \text{ or } x \ge 3\}$; range: $\{y \mid y \ne 0\}$
4) domain: $\{x \mid x \ne 3\}$; range: $\{y \mid y \ge 0\}$

169 Which ordered pair is in the solution set of the system of equations shown below?

$$y^2 - x^2 + 32 = 0$$
$$3y - x = 0$$

1) $(2, 6)$
2) $(3, 1)$
3) $(-1, -3)$
4) $(-6, -2)$

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

1) $\frac{4}{7}$
2) -2
3) $\frac{7}{2}$
4) 4

171 Solve algebraically for x:

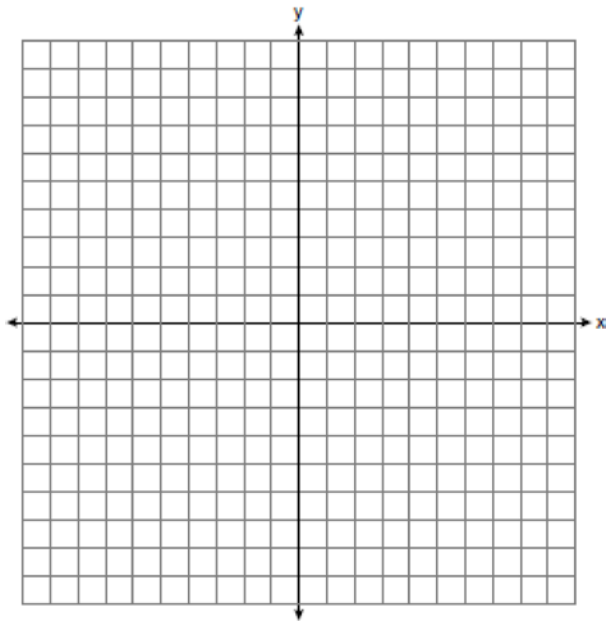
$$\sqrt{x^2 + x - 1} + 11x = 7x + 3$$

172 Express in simplest terms: $\dfrac{1 + \frac{3}{x}}{1 - \frac{5}{x} - \frac{24}{x^2}}$

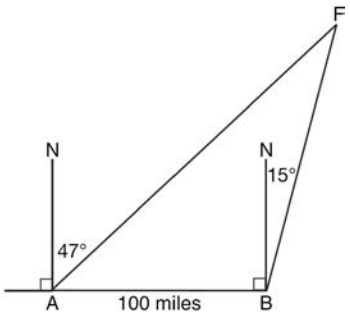
173 A jogger ran $\frac{1}{3}$ mile on day 1, and $\frac{2}{3}$ mile on day 2, and $1\frac{1}{3}$ miles on day 3, and $2\frac{2}{3}$ miles on day 4, and this pattern continued for 3 more days. Which expression represents the total distance the jogger ran?

1) $\sum_{d=1}^{7} \frac{1}{3}(2)^{d-1}$
2) $\sum_{d=1}^{7} \frac{1}{3}(2)^{d}$
3) $\sum_{d=1}^{7} 2\left(\frac{1}{3}\right)^{d-1}$
4) $\sum_{d=1}^{7} 2\left(\frac{1}{3}\right)^{d}$

174 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.



175 As shown in the diagram below, fire-tracking station *A* is 100 miles due west of fire-tracking station *B*. A forest fire is spotted at *F*, on a bearing 47° northeast of station *A* and 15° northeast of station *B*. Determine, to the *nearest tenth of a mile*, the distance the fire is from *both* station *A* and station *B*. [N represents due north.]



176 Solve algebraically for x: $\log_{27}(2x-1) = \frac{4}{3}$

177 Express the product of cos 30° and sin 45° in simplest radical form.

178 When factored completely, the expression $3x^3 - 5x^2 - 48x + 80$ is equivalent to

1) $(x^2 - 16)(3x - 5)$
2) $(x^2 + 16)(3x - 5)(3x + 5)$
3) $(x + 4)(x - 4)(3x - 5)$
4) $(x + 4)(x - 4)(3x - 5)(3x - 5)$

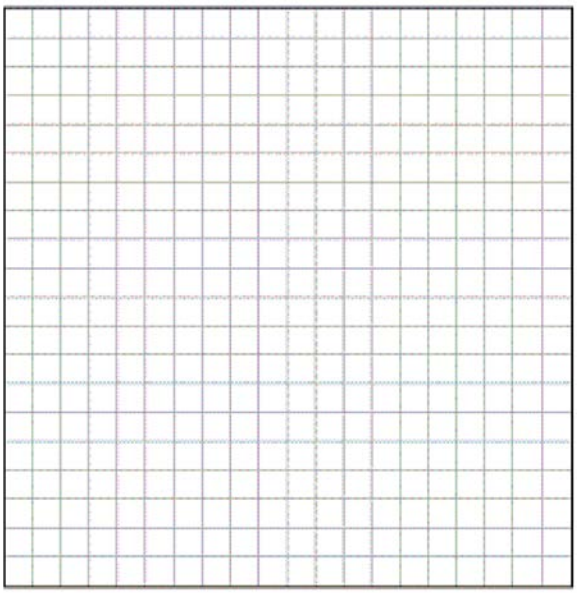
179 Determine the sum and the product of the roots of the equation $12x^2 + x - 6 = 0$.

180 The data collected by a biologist showing the growth of a colony of bacteria at the end of each hour are displayed in the table below.

Time, hour, (x)	**Population** (y)
0	250
1	330
2	580
3	800
4	1650
5	3000

Write an exponential regression equation to model these data. Round all values to the *nearest thousandth*. Assuming this trend continues, use this equation to estimate, to the nearest *ten*, the number of bacteria in the colony at the end of 7 hours.

181 Determine the solution of the inequality $|3 - 2x| \geq 7$. [The use of the grid below is optional.]



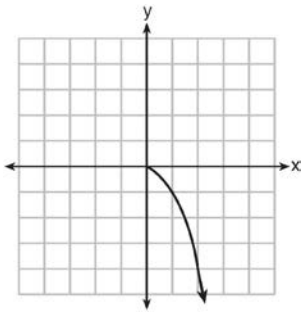
182 The discriminant of a quadratic equation is 24. The roots are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

183 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

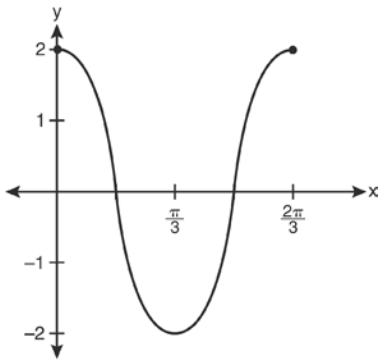
Altitude (x)	Ozone Units (y)
0	0.7
5	0.6
10	1.1
15	3.0
20	4.9

184 What is the range of the function shown below?



1) $x \le 0$
2) $x \ge 0$
3) $y \le 0$
4) $y \ge 0$

185 Which equation is represented by the graph below?



1) $y = 2\cos 3x$
2) $y = 2\sin 3x$
3) $y = 2\cos\frac{2\pi}{3}x$
4) $y = 2\sin\frac{2\pi}{3}x$

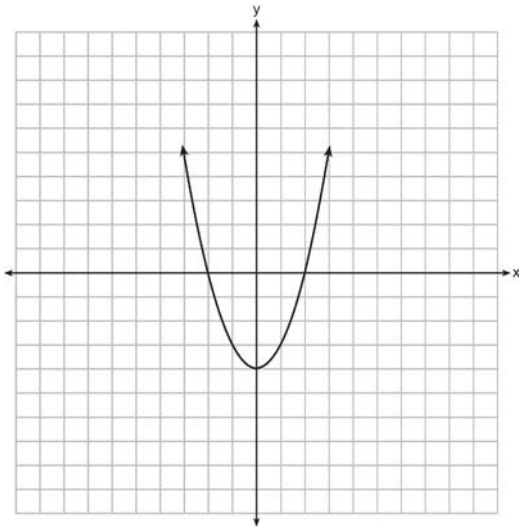
186 The expression $4 + \sum_{k=2}^{5} 3(k - x)$ is equal to
1) $58 - 4x$
2) $46 - 4x$
3) $58 - 12x$
4) $46 - 12x$

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

188 A ranch in the Australian Outback is shaped like triangle ACE, with $m\angle A = 42$, $m\angle E = 103$, and $AC = 15$ miles. Find the area of the ranch, to the *nearest square mile*.

189 Determine the sum of the first twenty terms of the sequence whose first five terms are 5, 14, 23, 32, 41.

190 The function f(x) is graphed on the set of axes below. On the same set of axes, graph f($x + 1$) + 2.



191 Which problem involves evaluating ${}_6P_4$?

1) How many different four-digit ID numbers can be formed using 1, 2, 3, 4, 5, and 6 without repetition?
2) How many different subcommittees of four can be chosen from a committee having six members?
3) How many different outfits can be made using six shirts and four pairs of pants?
4) How many different ways can one boy and one girl be selected from a group of four boys and six girls?

192 Solve algebraically for all exact values of x in the interval $0 \le x < 2\pi$: $2\sin^2 x + 5\sin x = 3$

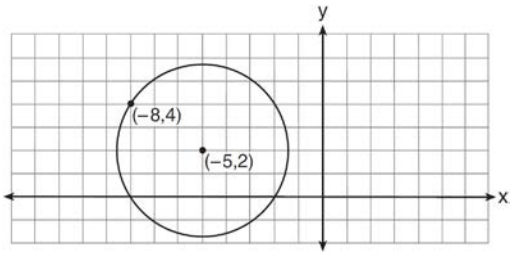
193 What is the period of the graph $y = \frac{1}{2}\sin 6x$?

1) $\frac{\pi}{6}$
2) $\frac{\pi}{3}$
3) $\frac{\pi}{2}$
4) 6π

194 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) $\{60°, 300°\}$

195 Write an equation of the circle shown in the diagram below.



196 Which expression is equivalent to $\sum_{n=1}^{4}(a-n)^2$?

1) $2a^2+17$
2) $4a^2+30$
3) $2a^2-10a+17$
4) $4a^2-20a+30$

197 For $y=\frac{3}{\sqrt{x-4}}$, what are the domain and range?

1) $\{x|x>4\}$ and $\{y|y>0\}$
2) $\{x|x\geq 4\}$ and $\{y|y>0\}$
3) $\{x|x>4\}$ and $\{y|y\geq 0\}$
4) $\{x|x\geq 4\}$ and $\{y|y\geq 0\}$

198 What is the conjugate of $\frac{1}{2}+\frac{3}{2}i$?

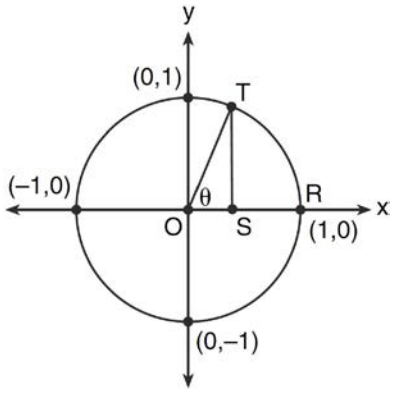
1) $-\frac{1}{2}+\frac{3}{2}i$
2) $\frac{1}{2}-\frac{3}{2}i$
3) $\frac{3}{2}+\frac{1}{2}i$
4) $-\frac{1}{2}-\frac{3}{2}i$

199 If $\sin A=-\frac{7}{25}$ and $\angle A$ terminates in Quadrant IV, $\tan A$ equals

1) $-\frac{7}{25}$
2) $-\frac{7}{24}$
3) $-\frac{24}{7}$
4) $-\frac{24}{25}$

200 Solve $\sec x-\sqrt{2}=0$ algebraically for all values of x in $0°\leq x<360°$.

201 In the diagram below, the length of which line segment is equal to the exact value of $\sin\theta$?



1) $\overline{TO}$
2) $\overline{TS}$
3) $\overline{OR}$
4) $\overline{OS}$

202 Solve $|-4x+5|<13$ algebraically for x.

203 Which function is one-to-one?

1) $k(x)=x^2+2$
2) $g(x)=x^3+2$
3) $f(x)=|x|+2$
4) $j(x)=x^4+2$

204 Convert 2.5 radians to degrees, and express the answer to the *nearest minute*.

205 What is the solution set of the equation $-\sqrt{2}\sec x = 2$ when $0° \le x < 360°$?
1) $\{45°, 135°, 225°, 315°\}$
2) $\{45°, 315°\}$
3) $\{135°, 225°\}$
4) $\{225°, 315°\}$

206 Given angle A in Quadrant I with $\sin A = \frac{12}{13}$ and angle B in Quadrant II with $\cos B = -\frac{3}{5}$, what is the value of $\cos(A - B)$?
1) $\frac{33}{65}$
2) $-\frac{33}{65}$
3) $\frac{63}{65}$
4) $-\frac{63}{65}$

207 The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \ldots$ is
1) $-13,107$
2) $-21,845$
3) $-39,321$
4) $-65,535$

208 Ten teams competed in a cheerleading competition at a local high school. Their scores were 29, 28, 39, 37, 45, 40, 41, 38, 37, and 48. How many scores are within one population standard deviation from the mean? For these data, what is the interquartile range?

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

210 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) $\frac{3\pi}{4}$
2) π
3) $\frac{3\pi}{2}$
4) 3π

211 If \$5000 is invested at a rate of 3% interest compounded quarterly, what is the value of the investment in 5 years? (Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A is the amount accrued, P is the principal, r is the interest rate, n is the number of times per year the money is compounded, and t is the length of time, in years.)
1) \$5190.33
2) \$5796.37
3) \$5805.92
4) \$5808.08

212 Solve algebraically for all values of x:
$x^4 + 4x^3 + 4x^2 = -16x$

213 What is the common difference of the arithmetic sequence below?

$$-7x, -4x, -x, 2x, 5x, \ldots$$

1) -3
2) $-3x$
3) 3
4) $3x$

214 Solve algebraically for x: $\log_{5x-1} 4 = \frac{1}{3}$

215 A cliff diver on a Caribbean island jumps from a height of 105 feet, with an initial upward velocity of 5 feet per second. An equation that models the height, h(t), above the water, in feet, of the diver in time elapsed, t, in seconds, is $h(t) = -16t^2 + 5t + 105$. How many seconds, to the *nearest hundredth*, does it take the diver to fall 45 feet below his starting point?

1) 1.45
2) 1.84
3) 2.10
4) 2.72

216 The expression $x^2(x+2) - (x+2)$ is equivalent to

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

217 Two sides of a parallelogram measure 27 cm and 32 cm. The included angle measures 48°. Find the length of the longer diagonal of the parallelogram, to the *nearest centimeter*.

218 What is a positive value of $\tan \frac{1}{2}x$, when $\sin x = 0.8$?

1) 0.5
2) 0.4
3) 0.33
4) 0.25

219 If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to

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

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

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

221 The expression $\left(\sqrt[3]{27x^2}\right)\left(\sqrt[3]{16x^4}\right)$ is equivalent to

1) $12x^2\sqrt[3]{2}$
2) $12x\sqrt[3]{2x}$
3) $6x\sqrt[3]{2x^2}$
4) $6x^2\sqrt[3]{2}$

222 Expressed in simplest form, $\frac{3y}{2y-6} + \frac{9}{6-2y}$ is equivalent to

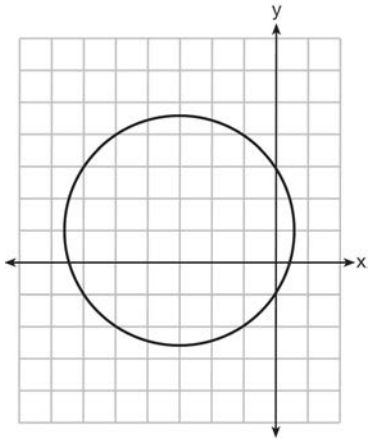
1) $\frac{-6y^2 + 36y - 54}{(2y-6)(6-2y)}$

2) $\frac{3y-9}{2y-6}$

3) $\frac{3}{2}$

4) $-\frac{3}{2}$

223 Which equation is represented by the graph below?



1) $(x-3)^2 + (y+1)^2 = 5$

2) $(x+3)^2 + (y-1)^2 = 5$

3) $(x-1)^2 + (y+3)^2 = 13$

4) $(x+3)^2 + (y-1)^2 = 13$

224 Perform the indicated operations and simplify completely:

$$\frac{x^3 - 3x^2 + 6x - 18}{x^2 - 4x} \cdot \frac{2x-4}{x^4 - 3x^3} \div \frac{x^2 + 2x - 8}{16 - x^2}$$

225 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 $(e, 1)$.

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

227 What is the equation of the circle passing through the point $(6, 5)$ and centered at $(3, -4)$?

1) $(x-6)^2 + (y-5)^2 = 82$

2) $(x-6)^2 + (y-5)^2 = 90$

3) $(x-3)^2 + (y+4)^2 = 82$

4) $(x-3)^2 + (y+4)^2 = 90$

228 The expression $(2a)^{-4}$ is equivalent to

1) $-8a^4$

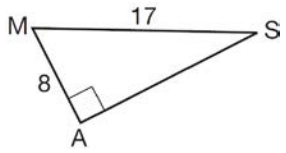
2) $\frac{16}{a^4}$

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

4) $\frac{1}{16a^4}$

229 Find the number of possible different 10-letter arrangements using the letters of the word "STATISTICS."

230 In the right triangle shown below, what is the measure of angle *S*, to the *nearest minute*?



1) 28°1'
2) 28°4'
3) 61°56'
4) 61°93'

231 What is the fourth term in the binomial expansion $(x-2)^8$?

1) $448x^5$
2) $448x^4$
3) $-448x^5$
4) $-448x^4$

232 For which value of k will the roots of the equation $2x^2 - 5x + k = 0$ be real and rational numbers?

1) 1
2) –5
3) 0
4) 4

233 The solution set of the equation $\sqrt{2x-4} = x-2$ is

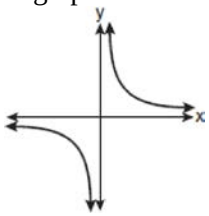
1) $\{-2, -4\}$
2) $\{2, 4\}$
3) $\{4\}$
4) $\{\ \}$

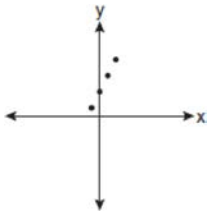
234 The following is a list of the individual points scored by all twelve members of the Webster High School basketball team at a recent game:

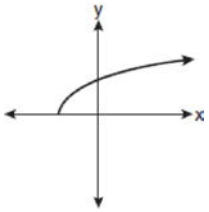
2 2 3 4 6 7 9 10 10 11 12 14

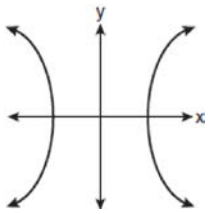
Find the interquartile range for this set of data.

235 Which graph does *not* represent a function?

1)


2)


3)


4)


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

Algebra 2/Trigonometry Regents at Random

237 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.

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

239 The expression $\frac{4}{5 - \sqrt{13}}$ is equivalent to
1) $\frac{4\sqrt{13}}{5\sqrt{13} - 13}$
2) $\frac{4(5 - \sqrt{13})}{38}$
3) $\frac{5 + \sqrt{13}}{3}$
4) $\frac{4(5 + \sqrt{13})}{38}$

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

$$a_1 = -3$$
$$a_n = a_{(n-1)} - n$$

241 Solve for x: $\frac{4x}{x-3} = 2 + \frac{12}{x-3}$

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

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

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

245 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) $16384\sqrt{10}$

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

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

248 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

249 Written in simplest form, the expression $\dfrac{\frac{x}{4}-\frac{1}{x}}{\frac{1}{2x}+\frac{1}{4}}$ is equivalent to
1) $x-1$
2) $x-2$
3) $\dfrac{x-2}{2}$
4) $\dfrac{x^2-4}{x+2}$

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

252 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*.

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

254 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) $f(\theta) = 2\sin\theta + 3$

255 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

256 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*.

257 What are the values of θ in the interval $0° \le \theta < 360°$ that satisfy the equation $\tan\theta - \sqrt{3} = 0$?

1) 60º, 240º
2) 72º, 252º
3) 72º, 108º, 252º, 288º
4) 60º, 120º, 240º, 300º

258 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

259 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.]

260 What is the formula for the nth term of the sequence $54, 18, 6, \ldots$?

1) $a_n = 6\left(\frac{1}{3}\right)^n$
2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$
3) $a_n = 54\left(\frac{1}{3}\right)^n$
4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

261 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

262 Solve the following systems of equations algebraically: $5 = y - x$

$$4x^2 = -17x + y + 4$$

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

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

264 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.

265 If $\angle A$ is acute and $\tan A = \frac{2}{3}$, then

1) $\cot A = \frac{2}{3}$
2) $\cot A = \frac{1}{3}$
3) $\cot(90° - A) = \frac{2}{3}$
4) $\cot(90° - A) = \frac{1}{3}$

266 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) $\{(0,1),(1,0),(2,0),(3,2)\}$

267 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

268 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

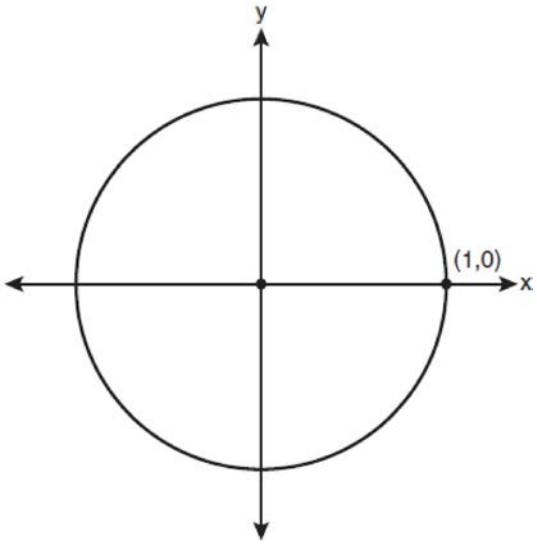
If the mean number of minutes was 17, which equation could be used to calculate the value of x?

1) $17 = \frac{119 + x}{x}$
2) $17 = \frac{119 + 16x}{x}$
3) $17 = \frac{446 + x}{26 + x}$
4) $17 = \frac{446 + 16x}{26 + x}$

269 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) $2x^2 - 6x + 4 = 0$

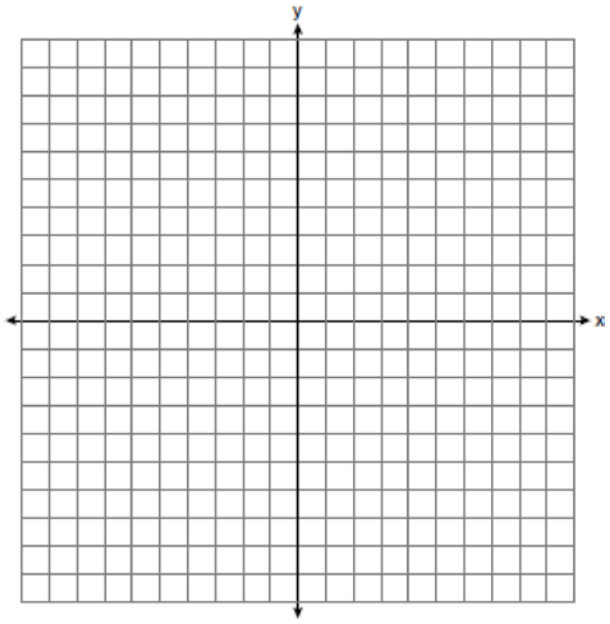
270 On the unit circle shown in the diagram below, sketch an angle, in standard position, whose degree measure is 240 and find the exact value of $\sin 240°$.



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

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

272 The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\frac{1}{2}\right)^x$ and write the equation of this asymptote.



273 The expression $\sqrt[4]{16x^2y^7}$ is equivalent to

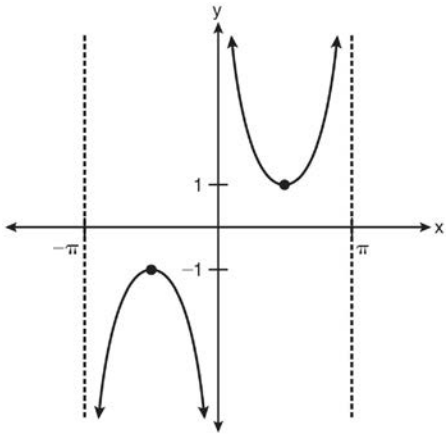
1) $2x^{\frac{1}{2}}y^{\frac{7}{4}}$
2) $2x^8y^{28}$
3) $4x^{\frac{1}{2}}y^{\frac{7}{4}}$
4) $4x^8y^{28}$

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

275 The solution set of the equation $\sqrt{x+3} = 3 - x$ is

1) $\{1\}$
2) $\{0\}$
3) $\{1, 6\}$
4) $\{2, 3\}$

276 Which equation is sketched in the diagram below?



1) $y = \csc x$
2) $y = \sec x$
3) $y = \cot x$
4) $y = \tan x$

277 The expression $\frac{2x+4}{\sqrt{x+2}}$ is equivalent to

1) $\frac{(2x+4)\sqrt{x-2}}{x-2}$
2) $\frac{(2x+4)\sqrt{x-2}}{x-4}$
3) $2\sqrt{x-2}$
4) $2\sqrt{x+2}$

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

279 The expression $\log_8 64$ is equivalent to

1) 8
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{8}$

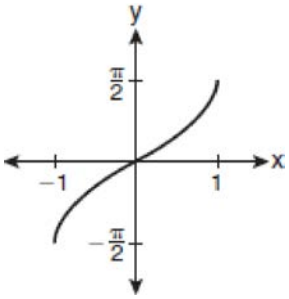
280 Which expression is equivalent to $\frac{\sqrt{3}+5}{\sqrt{3}-5}$?

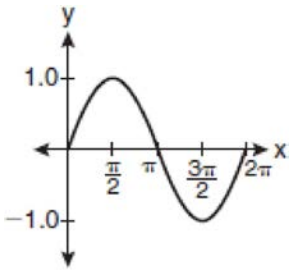
1) $-\frac{14+5\sqrt{3}}{11}$
2) $-\frac{17+5\sqrt{3}}{11}$
3) $\frac{14+5\sqrt{3}}{14}$
4) $\frac{17+5\sqrt{3}}{14}$

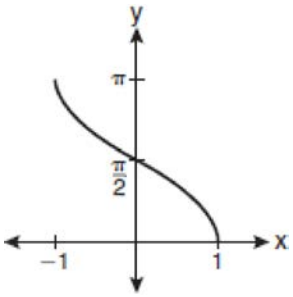
281 What is the value of x in the equation $9^{3x+1} = 27^{x+2}$?

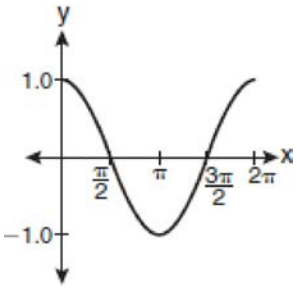
1) 1
2) $\frac{1}{3}$
3) $\frac{1}{2}$
4) $\frac{4}{3}$

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

1) 

2) 

3) 

4) 

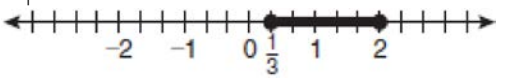
283 The minimum point on the graph of the equation $y = f(x)$ is $(-1, -3)$. What is the minimum point on the graph of the equation $y = f(x) + 5$?

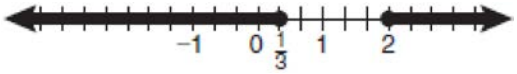
1) $(-1, 2)$
2) $(-1, -8)$
3) $(4, -3)$
4) $(-6, -3)$

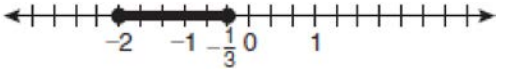
284 Which relation is *not* a function?

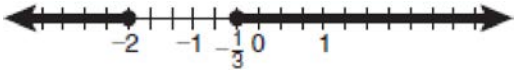
1) $(x-2)^2 + y^2 = 4$
2) $x^2 + 4x + y = 4$
3) $x + y = 4$
4) $xy = 4$

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

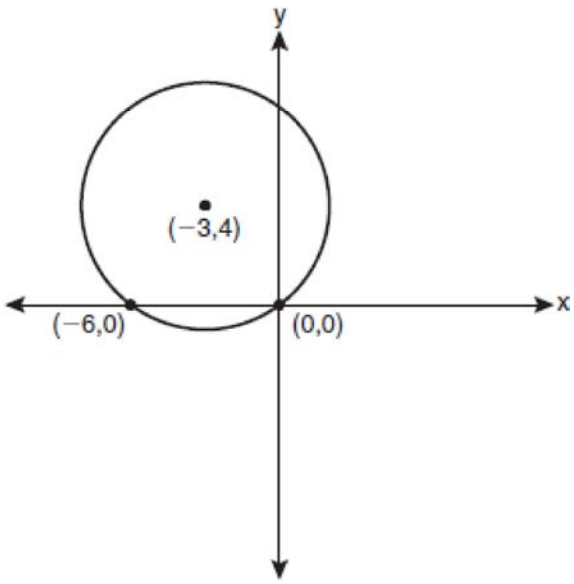
1) 

2) 

3) 

4) 

286 Write an equation of the circle shown in the graph below.



287 What is the range of $f(x) = (x + 4)^2 + 7$?

1) $y \geq -4$
2) $y \geq 4$
3) $y = 7$
4) $y \geq 7$

288 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.

289 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) $\frac{{}_{15}C_2 \cdot {}_5C_1}{{}_{30}C_3}$
2) $\frac{{}_{15}P_2 \cdot {}_5P_1}{{}_{30}C_3}$
3) $\frac{{}_{15}C_2 \cdot {}_5C_1}{{}_{30}P_3}$
4) $\frac{{}_{15}P_2 \cdot {}_5P_1}{{}_{30}P_3}$

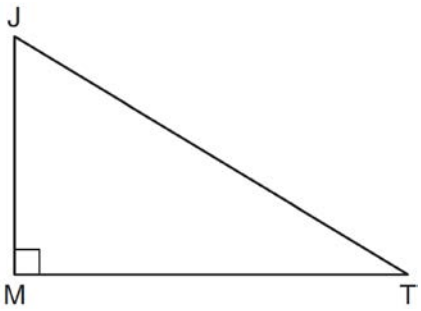
290 When simplified, the expression $\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to

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

291 The expression $\frac{\sin^2\theta + \cos^2\theta}{1 - \sin^2\theta}$ is equivalent to

1) $\cos^2\theta$
2) $\sin^2\theta$
3) $\sec^2\theta$
4) $\csc^2\theta$

292 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) $\frac{\sqrt{3}}{3}$
2) 2
3) $\sqrt{3}$
4) $\frac{2\sqrt{3}}{3}$

293 The solution set of $\sqrt{3x+16} = x+2$ is

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

294 The fraction $\frac{3}{\sqrt{3a^2b}}$ is equivalent to

1) $\frac{1}{a\sqrt{b}}$
2) $\frac{\sqrt{b}}{ab}$
3) $\frac{\sqrt{3b}}{ab}$
4) $\frac{\sqrt{3}}{a}$

295 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?

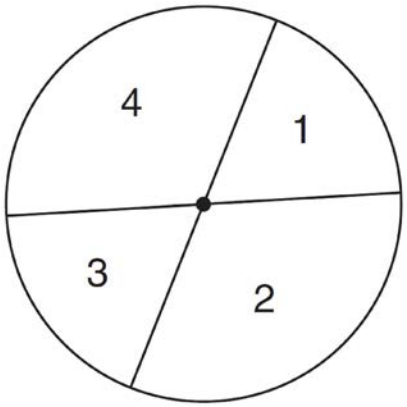
1) 210
2) 3,876
3) 5,040
4) 93,024

296 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 $g(x) = -\frac{1}{2}x + 4$

297 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.

298 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 $\frac{2\pi}{3}$.



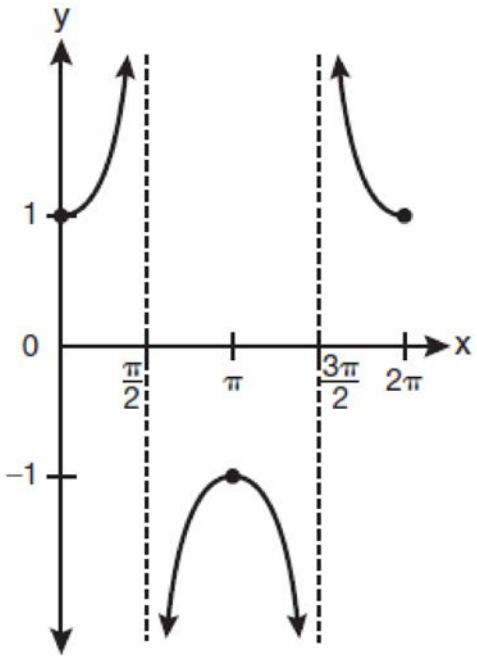
If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

1) $\frac{1}{6}$
2) $\frac{1}{3}$
3) $\frac{1}{2}$
4) $\frac{2}{3}$

299 What is the value of x in the equation $\log_5 x = 4$?

1) 1.16
2) 20
3) 625
4) 1,024

300 Which equation is represented by the graph below?

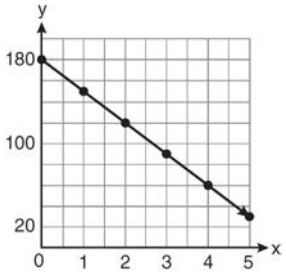


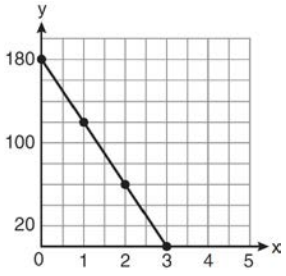
1) $y = \cot x$
2) $y = \csc x$
3) $y = \sec x$
4) $y = \tan x$

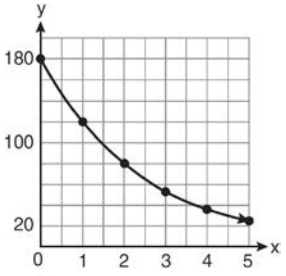
301 If $f(x) = x^2 - 5$ and $g(x) = 6x$, then $g(f(x))$ is equal to

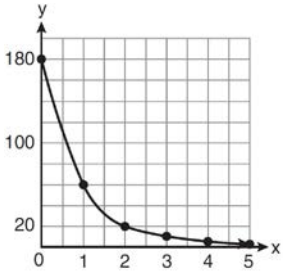
1) $6x^3 - 30x$
2) $6x^2 - 30$
3) $36x^2 - 5$
4) $x^2 + 6x - 5$

302 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) 

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

1) π
2) $\frac{2\pi}{3}$
3) $\frac{3\pi}{2}$
4) 2π

304 What is the solution set of the equation $|4a + 6| - 4a = -10$?

1) $\varnothing$
2) $\{0\}$
3) $\left\{\frac{1}{2}\right\}$
4) $\left\{0, \frac{1}{2}\right\}$

305 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

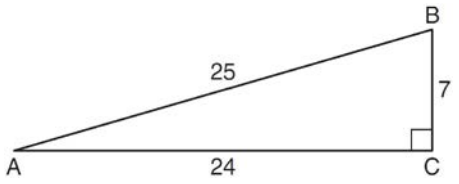
306 The solutions of the equation $y^2 - 3y = 9$ are

1) $\frac{3 \pm 3i\sqrt{3}}{2}$
2) $\frac{3 \pm 3i\sqrt{5}}{2}$
3) $\frac{-3 \pm 3\sqrt{5}}{2}$
4) $\frac{3 \pm 3\sqrt{5}}{2}$

307 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) $\frac{7}{2}$
2) $\frac{49}{4}$
3) $\frac{49}{2}$
4) 49

308 Which ratio represents $\csc A$ in the diagram below?



1) $\frac{25}{24}$
2) $\frac{25}{7}$
3) $\frac{24}{7}$
4) $\frac{7}{24}$

309 The expression $2i^2 + 3i^3$ is equivalent to

1) $-2 - 3i$
2) $2 - 3i$
3) $-2 + 3i$
4) $2 + 3i$

310 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.

311 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.

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

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

314 If $f(x) = \frac{x}{x^2 - 16}$, what is the value of $f(-10)$?

1) $-\frac{5}{2}$
2) $-\frac{5}{42}$
3) $\frac{5}{58}$
4) $\frac{5}{18}$

315 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.

316 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.

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

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

1) –30°
2) 60°
3) 150°
4) 240°

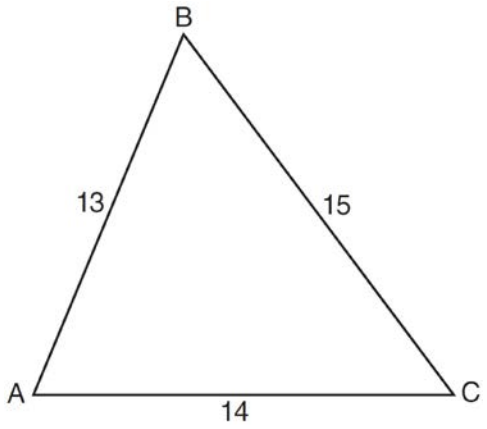
319 The sides of a parallelogram measure 10 cm and 18 cm. One angle of the parallelogram measures 46 degrees. What is the area of the parallelogram, to the *nearest square centimeter*?

1) 65
2) 125
3) 129
4) 162

320 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

321 In ΔABC, $a = 15$, $b = 14$, 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

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

1) $\frac{\pi}{2}$
2) $\frac{2\pi}{3}$
3) $\frac{5\pi}{6}$
4) $\frac{7\pi}{6}$

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

324 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.

325 What is the radian measure of an angle whose measure is –420°?

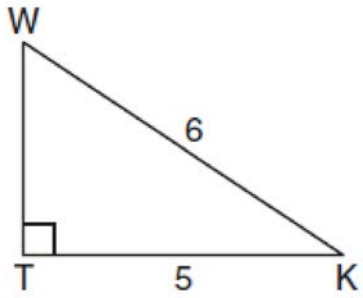
1) $-\frac{7\pi}{3}$
2) $-\frac{7\pi}{6}$
3) $\frac{7\pi}{6}$
4) $\frac{7\pi}{3}$

326 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.*

327 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'

328 The roots of the equation $2x^2 + 7x - 3 = 0$ are

1) $-\frac{1}{2}$ and -3
2) $\frac{1}{2}$ and 3
3) $\frac{-7 \pm \sqrt{73}}{4}$
4) $\frac{7 \pm \sqrt{73}}{4}$

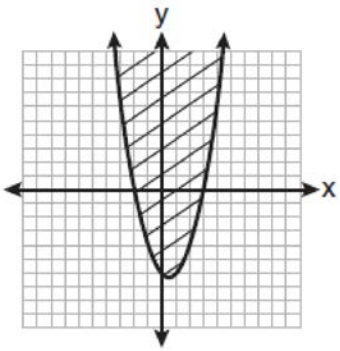
329 Which value of r represents data with a strong negative linear correlation between two variables?

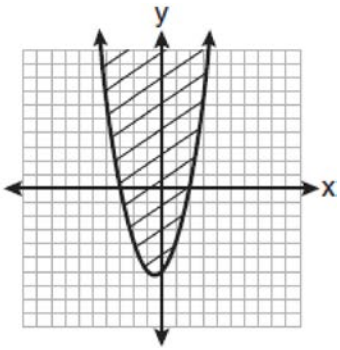
1) –1.07
2) –0.89
3) –0.14
4) 0.92

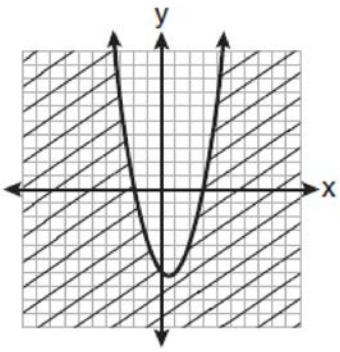
330 Find the total number of different twelve-letter arrangements that can be formed using the letters in the word *PENNSYLVANIA.*

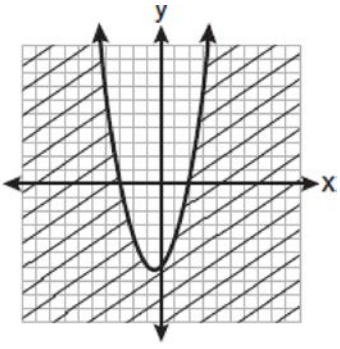
331 The members of a men's club have a choice of wearing black or red vests to their club meetings. A study done over a period of many years determined that the percentage of black vests worn is 60%. If there are 10 men at a club meeting on a given night, what is the probability, to the *nearest thousandth*,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

332 Which graph best represents the inequality $y + 6 \geq x^2 - x$?

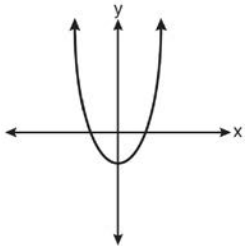
1) 

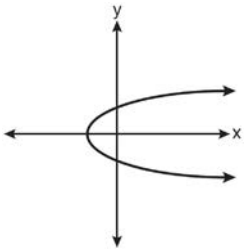
2) 

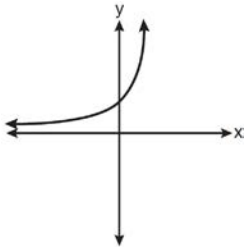
3) 

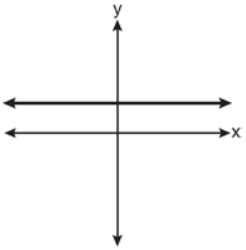
4) 

333 Which graph represents a one-to-one function?

1) 

2) 

3) 

4) 

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

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

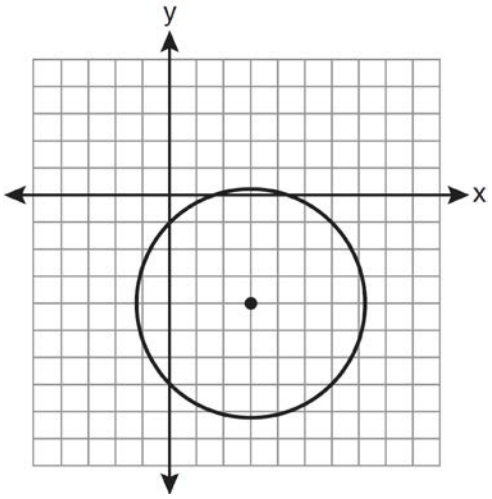
2) $\log \frac{x^2 z}{y^3}$

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

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

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

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

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

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

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

1) $-720x^2$
2) $-240x$
3) $720x^2$
4) $1,080x^3$

340 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) $\sum_{k=1}^{20}(2k-1)$
2) $\sum_{k=2}^{40}(k-1)$
3) $\sum_{k=-1}^{37}(k+2)$
4) $\sum_{k=1}^{39}(2k-1)$

341 The value of the expression $2\sum_{n=0}^{2}(n^2+2^n)$ is

1) 12
2) 22
3) 24
4) 26

342 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) $\left\{x \mid -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$
4) $\left\{x \mid -\frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$

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

344 Expressed as a function of a positive acute angle, $\cos(-305°)$ is equal to

1) $-\cos 55°$
2) $\cos 55°$
3) $-\sin 55°$
4) $\sin 55°$

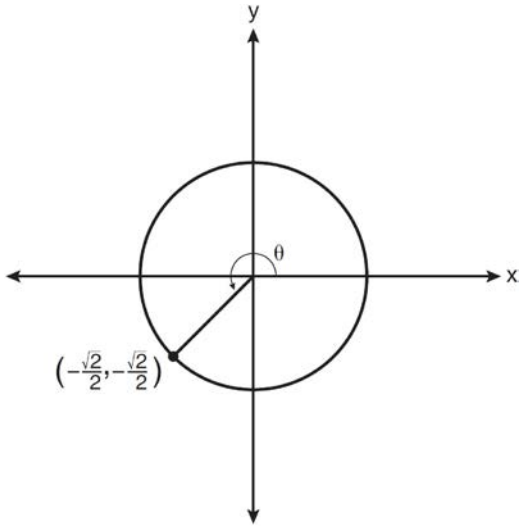
345 What is the common ratio of the geometric sequence whose first term is 27 and fourth term is 64?

1) $\frac{3}{4}$
2) $\frac{64}{81}$
3) $\frac{4}{3}$
4) $\frac{37}{3}$

346 In simplest form, $\sqrt{-300}$ is equivalent to

1) $3i\sqrt{10}$
2) $5i\sqrt{12}$
3) $10i\sqrt{3}$
4) $12i\sqrt{5}$

347 In the diagram below of a unit circle, the ordered pair $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ 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

348 In ΔABC, $m\angle A = 120$, $b = 10$, and $c = 18$. What is the area of ΔABC to the *nearest square inch*?

1) 52
2) 78
3) 90
4) 156

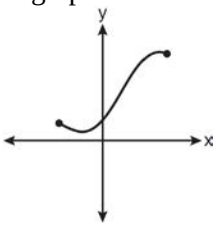
349 The principal would like to assemble a committee of 8 students from the 15-member student council. How many different committees can be chosen?
1) 120
2) 6,435
3) 32,432,400
4) 259,459,200

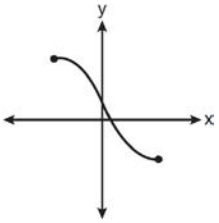
350 Use the discriminant to determine all values of k that would result in the equation $x^2 - kx + 4 = 0$ having equal roots.

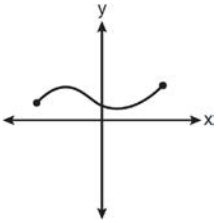
351 In ΔABC, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?
1) 73.7 and 106.3
2) 73.7 and 163.7
3) 78.3 and 101.7
4) 78.3 and 168.3

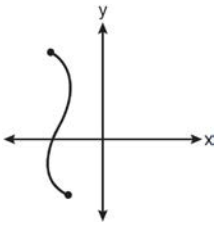
352 The value of the expression $\sum_{r=3}^{5}(-r^2 + r)$ is
1) −38
2) −12
3) 26
4) 62

353 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.

354 Which graph does *not* represent a function?
1) 

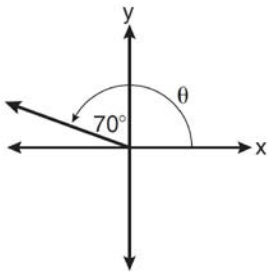
2) 

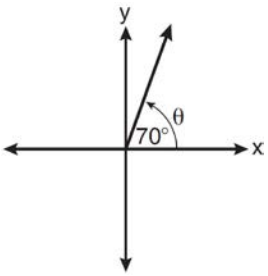
3) 

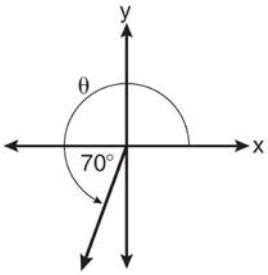
4) 

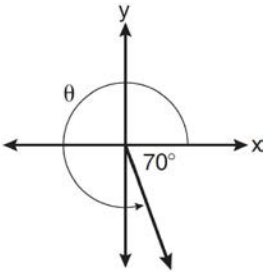
355 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to
1) $x^2(4x + 6)(3x - 2)$
2) $2(2x^2 + 3x)(3x^2 - 2x)$
3) $2x^2(2x - 3)(3x + 2)$
4) $2x^2(2x + 3)(3x - 2)$

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

1) 

2) 

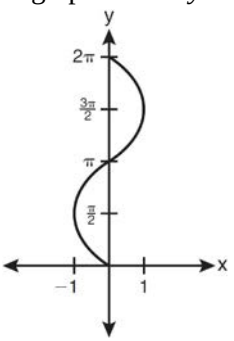
3) 

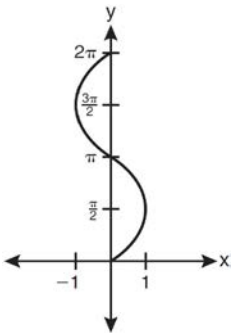
4) 

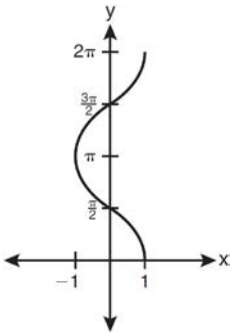
357 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to

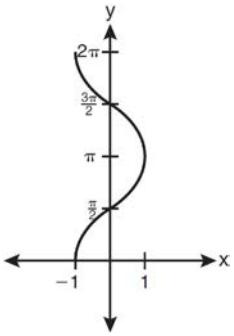
1) $(x-1)^2 + (y+3)^2 = -3$
2) $(x-1)^2 + (y+3)^2 = 7$
3) $(x+1)^2 + (y+3)^2 = 7$
4) $(x+1)^2 + (y+3)^2 = 10$

358 Which graph shows $y = \cos^{-1}x$?

1) 

2) 

3) 

4) 

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

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

361 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.

362 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.

363 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) $\frac{8!}{4!}$
3) $\frac{8!}{2! + 2!}$
4) $\frac{8!}{2! \cdot 2!}$

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

365 The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to

1) $\sqrt[3]{(x^2 - 1)^2}$
2) $\frac{1}{\sqrt[3]{(x^2 - 1)^2}}$
3) $\sqrt{(x^2 - 1)^3}$
4) $\frac{1}{\sqrt{(x^2 - 1)^3}}$

366 What is the domain of the function $f(x) = \sqrt{x - 2} + 3$?

1) $(-\infty, \infty)$
2) $(2, \infty)$
3) $[2, \infty)$
4) $[3, \infty)$

367 The solution set of $4^{x^2 + 4x} = 2^{-6}$ is

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

368 If $\sin A = \frac{2}{3}$ where $0° < A < 90°$, what is the value of $\sin 2A$?

1) $\frac{2\sqrt{5}}{3}$
2) $\frac{2\sqrt{5}}{9}$
3) $\frac{4\sqrt{5}}{9}$
4) $-\frac{4\sqrt{5}}{9}$

369 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) $-\cos^2\theta - 1$

370 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to

1) $\sin x$
2) $\sin 7x$
3) $\cos x$
4) $\cos 7x$

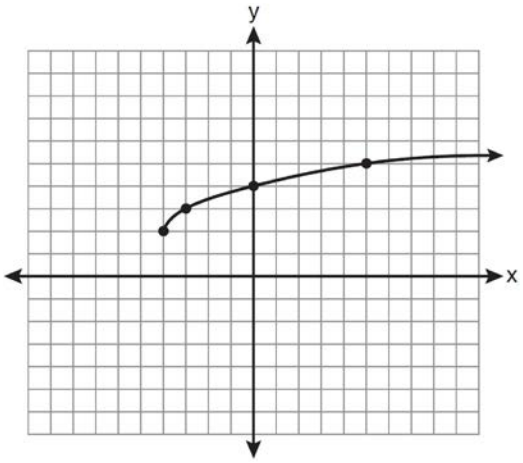
371 When $\frac{3}{2}x^2 - \frac{1}{4}x - 4$ is subtracted from $\frac{5}{2}x^2 - \frac{3}{4}x + 1$, the difference is

1) $-x^2 + \frac{1}{2}x - 5$
2) $x^2 - \frac{1}{2}x + 5$
3) $-x^2 - x - 3$
4) $x^2 - x - 3$

372 The expression $(3 - 7i)^2$ is equivalent to

1) $-40 + 0i$
2) $-40 - 42i$
3) $58 + 0i$
4) $58 - 42i$

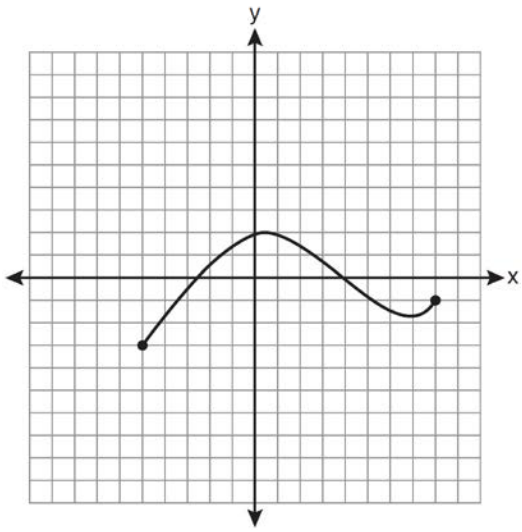
373 What are the domain and the range of the function shown in the graph below?



1) $\{x|x > -4\}; \{y|y > 2\}$
2) $\{x|x \geq -4\}; \{y|y \geq 2\}$
3) $\{x|x > 2\}; \{y|y > -4\}$
4) $\{x|x \geq 2\}; \{y|y \geq -4\}$

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

375 The graph below represents the function $y = f(x)$.



State the domain and range of this function.

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

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

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

1) $-\frac{9}{8}$
2) -1
3) $-\frac{8}{9}$
4) $\frac{8}{9}$

378 What is the period of the function $y = \frac{1}{2}\sin\left(\frac{x}{3} - \pi\right)$?

1) $\frac{1}{2}$
2) $\frac{1}{3}$
3) $\frac{2}{3}\pi$
4) 6π

379 The solution set of the inequality $x^2 - 3x > 10$ is

1) $\{x|-2 < x < 5\}$
2) $\{x|0 < x < 3\}$
3) $\{x|x < -2 \text{ or } x > 5\}$
4) $\{x|x < -5 \text{ or } x > 2\}$

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

1) $\sin A = \frac{5}{8}$
2) $\sin A = \frac{8}{5}$
3) $\cos A = \frac{5}{8}$
4) $\cos A = \frac{8}{5}$

381 What is a formula for the nth 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) $b_n = 10(2)^{n-1}$

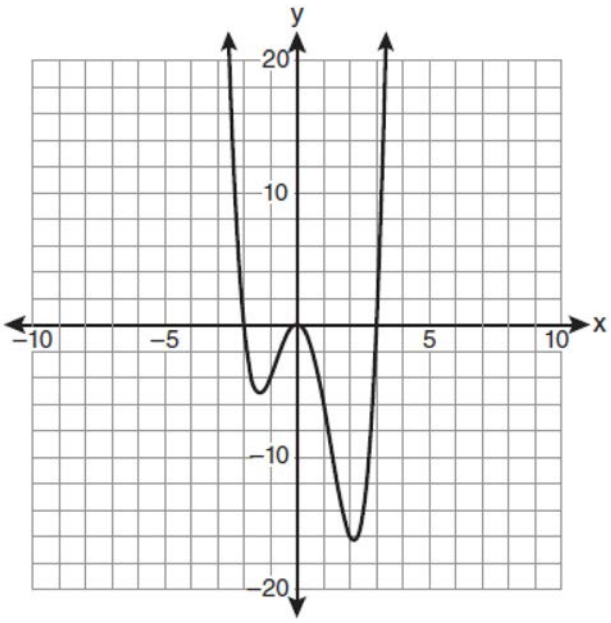
382 The lengths of 100 pipes have a normal distribution with a mean of 102.4 inches and a standard deviation of 0.2 inch. If one of the pipes measures exactly 102.1 inches, its length lies
1) below the 16th percentile
2) between the 50th and 84th percentiles
3) between the 16th and 50th percentiles
4)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

383 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

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

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

386 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) $\{-2, 0, 3\}$

387 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) $0, -1, -2$

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

389 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?

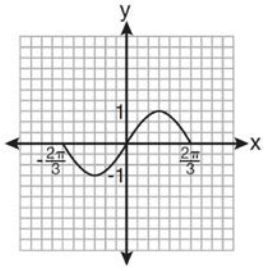
1) 8.2
2) 8.3
3) 67.3
4) 69.3

390 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

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

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

1)


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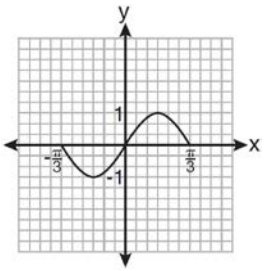
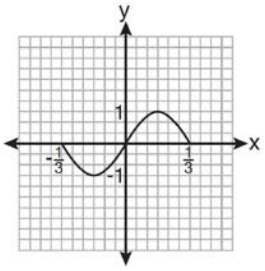
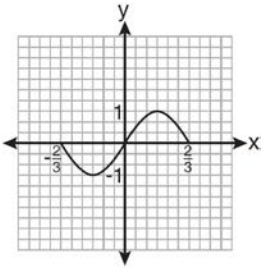


3)


4)


393 Which arithmetic sequence has a common difference of 4?

1) $\{0, 4n, 8n, 12n, \ldots\}$
2) $\{n, 4n, 16n, 64n, \ldots\}$
3) $\{n + 1, n + 5, n + 9, n + 13, \ldots\}$
4) $\{n + 4, n + 16, n + 64, n + 256, \ldots\}$

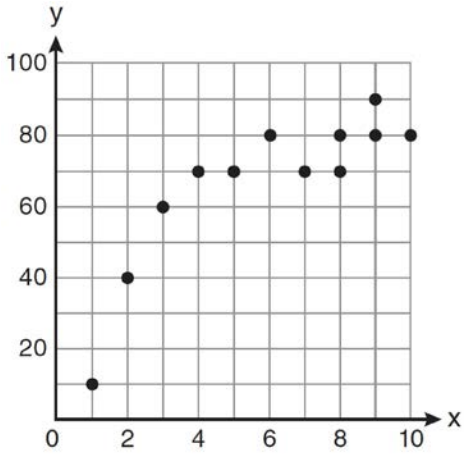
394 Factor the expression $12t^8 - 75t^4$ completely.

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

396 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) $4x^2 + 3x - 2 = 0$

397 Samantha constructs the scatter plot below from a set of data.



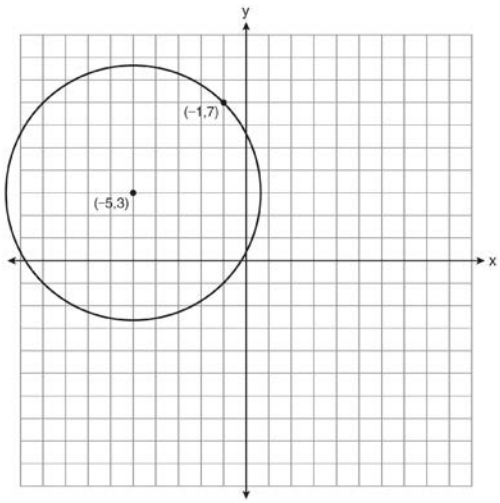
Based on her scatter plot, which regression model would be most appropriate?

1) exponential
2) linear
3) logarithmic
4) power

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

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

400 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.

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

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

403 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.

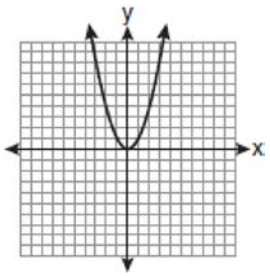
404 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to

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

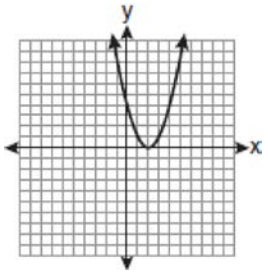
405 The value of $\tan 126°43'$ to the *nearest ten-thousandth* is

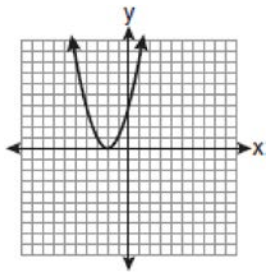
1) −1.3407
2) −1.3408
3) −1.3548
4) −1.3549

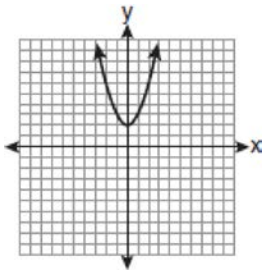
406 The graph below shows the function f(x).

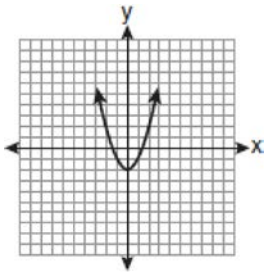


Which graph represents the function f($x + 2$)?

1)


2)


3)


4)


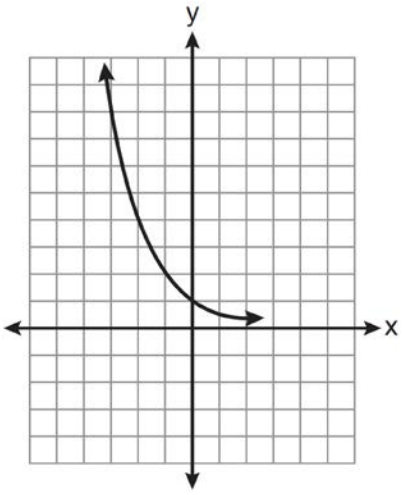
407 What is the number of degrees in an angle whose radian measure is $\frac{11\pi}{12}$?

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

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

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

409 Which equation is represented by the graph below?



1) $y = 5^x$
2) $y = 0.5^x$
3) $y = 5^{-x}$
4) $y = 0.5^{-x}$

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

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

412 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) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

413 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.

414 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

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

416 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

417 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

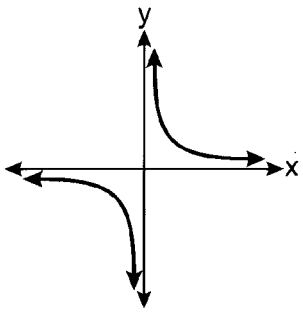
418 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is

1) -1
2) $-\frac{1}{x}$
3) $\frac{1}{x^2}$
4) $\frac{1}{(x-1)^2}$

419 What is the conjugate of $-2 + 3i$?

1) $-3 + 2i$
2) $-2 - 3i$
3) $2 - 3i$
4) $3 + 2i$

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

1)


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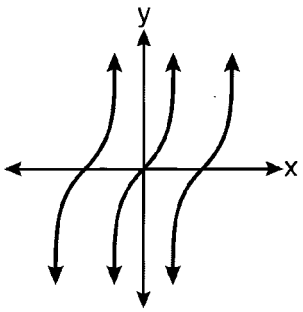

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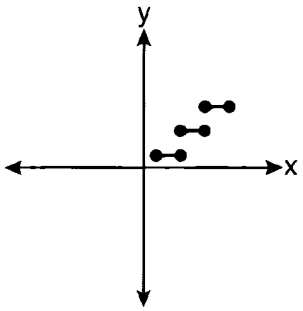
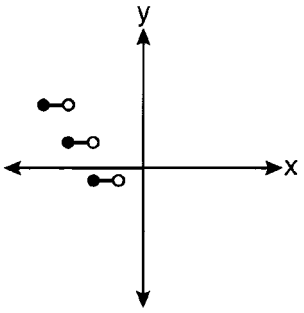
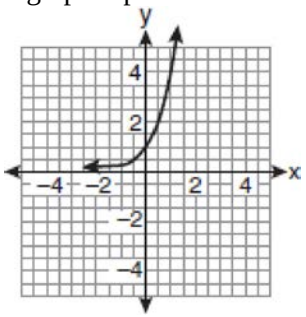
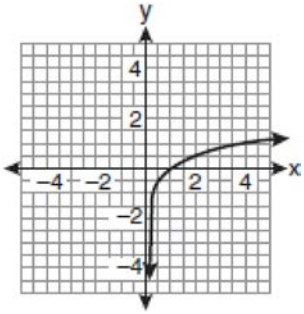


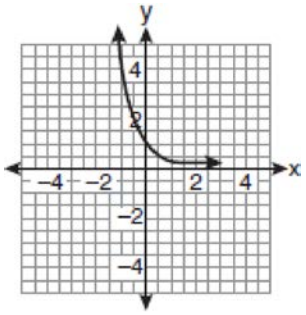
4)


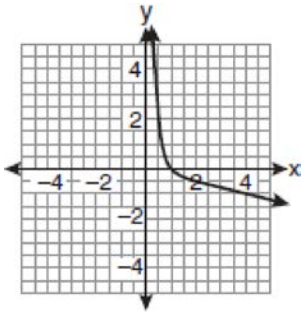
421 If $\tan A = \frac{2}{3}$ and $\sin B = \frac{5}{\sqrt{41}}$ and angles A and B are in Quadrant I, find the value of $\tan(A + B)$.

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

1) 

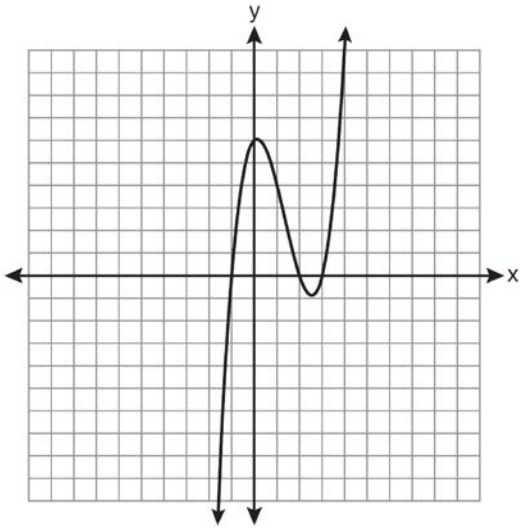
2) 

3) 

4) 

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

424 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

425 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) $f(x) = \log_2 x$

426 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

427 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

428 What is the solution of the equation $2\log_4(5x) = 3$?

1) 6.4
2) 2.56
3) $\frac{9}{5}$
4) $\frac{8}{5}$

429 What is the common difference of the arithmetic sequence $5, 8, 11, 14$?

1) $\frac{8}{5}$
2) -3
3) 3
4) 9

Algebra 2/Trigonometry Regents at Random
Answer Section

1 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

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

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

4 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

5 ANS: 3 PTS: 2 REF: 061306a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

6 ANS: 2
Since the coefficient of t is greater than 0, $r > 0$.

PTS: 2 REF: 011303a2 STA: A2.S.8 TOP: Correlation Coefficient

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

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

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

10 ANS: 2

$\frac{30}{(x+3)(x-3)} + \frac{(x+3)(x-3)}{(x+3)(x-3)} = \frac{5(x+3)}{(x-3)(x+3)}$ 3 is an extraneous root.

$$30 + x^2 - 9 = 5x + 15$$
$$x^2 - 5x + 6 = 0$$
$$(x-3)(x-2) = 0$$
$$x = 2$$

PTS: 2 REF: 061417a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

11 ANS: 2 PTS: 2 REF: 011417a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

12 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

13 ANS: 2 PTS: 2 REF: 061216a2 STA: A2.A.42
TOP: Compositions of Functions KEY: variables

14 ANS: 1
(4) shows the strongest linear relationship, but if $r < 0$, $b < 0$. The Regents announced that a correct solution was not provided for this question and all students should be awarded credit.

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

15 ANS:

$216\left(\frac{\pi}{180}\right) \approx 3.8$

PTS: 2 REF: 061232a2 STA: A2.M.2 TOP: Radian Measure
KEY: radians

16 ANS: 4

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

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

17 ANS: 3

$\log 4m^2 = \log 4 + \log m^2 = \log 4 + 2\log m$

PTS: 2 REF: 061321a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs

18 ANS: 4

$$\frac{x}{x-\sqrt{x}} \times \frac{x+\sqrt{x}}{x+\sqrt{x}} = \frac{x^2+x\sqrt{x}}{x^2-x} = \frac{x(x+\sqrt{x})}{x(x-1)} = \frac{x+\sqrt{x}}{x-1}$$

PTS: 2 REF: 061325a2 STA: A2.A.15 TOP: Rationalizing Denominators
KEY: index = 2

19 ANS:

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

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

20 ANS: 3

$$\sqrt{9}\sqrt{-1}\sqrt{2} - \sqrt{16}\sqrt{-1}\sqrt{2} = 3i\sqrt{2} - 4i\sqrt{2} = -i\sqrt{2}$$

PTS: 2 REF: 061404a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers

21 ANS:

$${}_5C_4 \cdot 0.28^4 \cdot 0.72^1 + {}_5C_5 \cdot 0.28^5 \cdot 0.72^0 \approx 0.024$$

PTS: 4 REF: 011437a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

22 ANS: 1 PTS: 2 REF: 061223a2 STA: A2.S.15
TOP: Binomial Probability KEY: modeling

23 ANS:

$$K = ab\sin C = 6 \cdot 6\sin 50 \approx 27.6$$

PTS: 2 REF: 011429a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

24 ANS: 2

$$\log 9 - \log 20$$

$$\log 3^2 - \log(10 \cdot 2)$$

$$2\log 3 - (\log 10 + \log 2)$$

$$2b - (1 + a)$$

$$2b - a - 1$$

PTS: 2 REF: 011326a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: expressing logs algebraically

25 ANS:

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

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

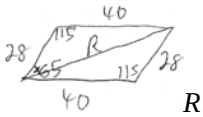
PTS: 4 REF: 011236a2 STA: A2.A.73 TOP: Law of Sines
KEY: advanced

26 ANS:

$\frac{2\sqrt{3}}{3}$. If $\sin 60 = \frac{\sqrt{3}}{2}$, 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:



$R = \sqrt{28^2 + 40^2 - 2(28)(40)\cos 115} \approx 58$ $\frac{58}{\sin 115} = \frac{40}{\sin x}$

$x \approx 39$

PTS: 6 REF: 061439a2 STA: A2.A.73 TOP: Vectors

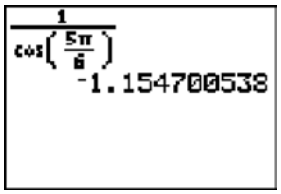
28 ANS: 1 PTS: 2 REF: 061408a2 STA: A2.A.24
TOP: Completing the Square

29 ANS: 4 PTS: 2 REF: 061207a2 STA: A2.A.19
TOP: Properties of Logarithms KEY: antilogarithms

30 ANS: 3 PTS: 2 REF: 061412a2 STA: A2.A.60
TOP: Finding the Terminal Side of an Angle

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

32 ANS: 1



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

33 ANS: 1

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

$A = 58$

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

34 ANS: 3

$h(-8) = \frac{1}{2}(-8) - 2 = -4 - 2 = -6$. $g(-6) = \frac{1}{2}(-6) + 8 = -3 + 8 = 5$

PTS: 2 REF: 011403a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

35 ANS: 4

$\cos 2A = 1 - 2\sin^2 A = 1 - 2\left(\frac{1}{3}\right)^2 = 1 - \frac{2}{9} = \frac{7}{9}$

PTS: 2 REF: 011311a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: evaluating

36 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

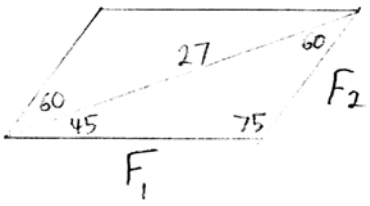
37 ANS: 1

$\sin(180 + x) = (\sin 180)(\cos x) + (\cos 180)(\sin x) = 0 + (-\sin x) = -\sin x$

PTS: 2 REF: 011318a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: identities

38 ANS: 1 PTS: 2 REF: 061316a2 STA: A2.S.8
TOP: Correlation Coefficient

39 ANS:



$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}$. $\frac{27}{\sin 75} = \frac{F_2}{\sin 45}$.

$F_1 \approx 24$ $F_1 \approx 20$

PTS: 4 REF: 061238a2 STA: A2.A.73 TOP: Vectors

40 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

41 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

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

43 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

44 ANS: 1 PTS: 2 REF: 011306a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

45 ANS:

$$\frac{31 - 19}{7 - 4} = \frac{12}{3} = 4 \quad x + (4 - 1)4 = 19 \quad a_n = 7 + (n - 1)4$$

$$x + 12 = 19$$

$$x = 7$$

PTS: 2 REF: 011434a2 STA: A2.A.29 TOP: Sequences

46 ANS:

$$4xi + 5yi^8 + 6xi^3 + 2yi^4 = 4xi + 5y - 6xi + 2y = 7y - 2xi$$

PTS: 2 REF: 011433a2 STA: A2.N.7 TOP: Imaginary Numbers

47 ANS: 2

$$\frac{-\frac{3}{32}a^3b^4}{\frac{1}{64}a^5b^3} = -\frac{6b}{a^2}$$

PTS: 2 REF: 061326a2 STA: A2.A.31 TOP: Sequences

48 ANS:

$$83°50' \cdot \frac{\pi}{180} \approx 1.463 \text{ radians} \quad s = \theta r = 1.463 \cdot 12 \approx 17.6$$

PTS: 2 REF: 011435a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

49 ANS: 3

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

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

$4x>8$ $\quad$ $4x<2$

$x>2$ $\quad$ $x<\frac{1}{2}$

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

50 ANS: 3 PTS: 2 REF: 011305a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

51 ANS: 4 PTS: 2 REF: 061303a2 STA: A2.A.43
TOP: Defining Functions

52 ANS: 3

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

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

53 ANS: 2

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

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

54 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

55 ANS:

$y = 180.377(0.954)^x$

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

56 ANS:

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

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

57 ANS: 2

$\frac{5}{\sin 32} = \frac{8}{\sin E}$ $\quad 57.98 + 32 < 180$

$E \approx 57.98$ $\quad (180 - 57.98) + 32 < 180$

PTS: 2 REF: 011419a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

58 ANS: 1

$5 \cdot \frac{180}{\pi} \approx 286$

PTS: 2 REF: 011427a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

59 ANS: 3

$\frac{-b}{a} = \frac{-(-4)}{1} = 4$. If the sum is 4, the roots must be 7 and –3.

PTS: 2 REF: 011418a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: advanced

60 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

61 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

62 ANS: 2

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

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

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

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

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

$$300 = t$$

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

63 ANS: 3

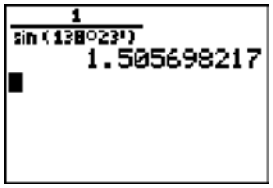
$6n^{-1} < 4n^{-1}$. Flip sign when multiplying each side of the inequality by n, since a negative number.

$$\frac{6}{n} < \frac{4}{n}$$

$$6 > 4$$

PTS: 2 REF: 061314a2 STA: A2.N.1 TOP: Negative and Fractional Exponents

64 ANS: 4



PTS: 2 REF: 061217a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

65 ANS: 1

$2x - 1 > 5$. $2x - 1 < -5$

$2x > 6$ $2x > -4$

$x > 3$ $x < -2$

PTS: 2 REF: 061307a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

66 ANS: 2

$$\frac{8\pi}{5} \cdot \frac{180}{\pi} = 288$$

PTS: 2 REF: 061302a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

67 ANS: 4 PTS: 2 REF: 011406a2 STA: A2.S.1
TOP: Analysis of Data

68 ANS: 1

$\frac{{}_6P_6}{3!2!} = \frac{720}{12} = 60$

PTS: 2 REF: 011324a2 STA: A2.S.10 TOP: Permutations

69 ANS: 1 PTS: 2 REF: 011402a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

70 ANS: 3

$x^2 + y^2 - 16x + 6y + 53 = 0$

$x^2 - 16x + 64 + y^2 + 6y + 9 = -53 + 64 + 9$

$(x-8)^2 + (y+3)^2 = 20$

PTS: 2 REF: 011415a2 STA: A2.A.47 TOP: Equations of Circles

71 ANS: 2

$\cos(x-y) = \cos x \cos y + \sin x \sin y$

$= b \cdot b + a \cdot a$

$= b^2 + a^2$

PTS: 2 REF: 061421a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: simplifying

72 ANS:

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

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

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

73 ANS:

$5\csc\theta = 8$

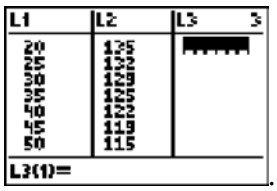
$\csc\theta = \frac{8}{5}$

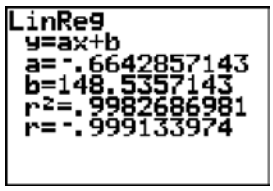
$\sin\theta = \frac{5}{8}$

$\theta \approx 141$

PTS: 2 REF: 061332a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

74 ANS: 1





PTS: 2 REF: 061225a2 STA: A2.S.8 TOP: Correlation Coefficient

75 ANS:

$$(x+4)^2 = 17x - 4$$

$$x^2 + 8x + 16 = 17x - 4$$

$$x^2 - 9x + 20 = 0$$

$$(x-4)(x-5) = 0$$

$$x = 4, 5$$

PTS: 4 REF: 011336a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

76 ANS:

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

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

$x > 5$ $x < -1$

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

77 ANS:

$$\frac{\cot x \sin x}{\sec x} = \frac{\frac{\cos x}{\sin x}\sin x}{\frac{1}{\cos x}} = \cos^2 x$$

PTS: 2 REF: 061334a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

78 ANS: 3

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

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

79 ANS:

Less than 60 inches is below 1.5 standard deviations from the mean. $0.067 \cdot 450 \approx 30$

PTS: 2 REF: 061428a2 STA: A2.S.5 TOP: Normal Distributions
KEY: predict

80 ANS: 4

$\frac{13}{\sin 40} = \frac{20}{\sin M}$. $81 + 40 < 180$. $(180 - 81) + 40 < 180$

$M \approx 81$

PTS: 2 REF: 061327a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

81 ANS: 2

Top 6.7% = 1.5 s.d. $+ \sigma = 1.5(104) + 576 = 732$

PTS: 2 REF: 011420a2 STA: A2.S.5 TOP: Normal Distributions
KEY: predict

82 ANS:

$g(10) = \left(a(10)\sqrt{1 - x} \right)^2 = 100a^2(-9) = -900a^2$

PTS: 2 REF: 061333a2 STA: A2.A.41 TOP: Functional Notation

83 ANS: 3

$x + y = 5$. $-5 + y = 5$

$y = -x + 5$ $y = 10$

$(x + 3)^2 + (-x + 5 - 3)^2 = 53$

$x^2 + 6x + 9 + x^2 - 4x + 4 = 53$

$2x^2 + 2x - 40 = 0$

$x^2 + x - 20 = 0$

$(x + 5)(x - 4) = 0$

$x = -5, 4$

PTS: 2 REF: 011302a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

84 ANS:

$x^3 + 5x^2 - 4x - 20 = 0$

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

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

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

$x = \pm 2, -5$

PTS: 4 REF: 061437a2 STA: A2.A.26 TOP: Solving Polynomial Equations

85 ANS: 3

$42 = \frac{1}{2}(a)(8)\sin 61$

$42 \approx 3.5a$

$12 \approx a$

PTS: 2 REF: 011316a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic

86 ANS: 1

$20(-2) = x(-2x + 2)$

$-40 = -2x^2 + 2x$

$2x^2 - 2x - 40 = 0$

$x^2 - x - 20 = 0$

$(x + 4)(x - 5) = 0$

$x = -4, 5$

PTS: 2 REF: 011321a2 STA: A2.A.5 TOP: Inverse Variation

87 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

88 ANS:

${}_5C_0 \cdot 0.57^0 \cdot 0.43^5 + {}_5C_1 \cdot 0.57^1 \cdot 0.43^4 + {}_5C_2 \cdot 0.57^2 \cdot 0.43^3 \approx 0.37$

PTS: 4 REF: 061438a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

89 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

90 ANS: 3

$$\frac{a+\frac{b}{c}}{d-\frac{b}{c}} = \frac{\frac{ac+b}{c}}{\frac{cd-b}{c}} = \frac{ac+b}{c} \cdot \frac{c}{cd-b} = \frac{ac+b}{cd-b}$$

PTS: 2 REF: 011405a2 STA: A2.A.17 TOP: Complex Fractions

91 ANS: 2

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

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

92 ANS: 3

$\frac{x+16}{x-2} - \frac{7(x-2)}{x-2} \le 0$ $-6x+30=0$ $x-2=0$. Check points such that $x<2$, $2<x<5$, and $x>5$. If $x=1$,

$\frac{-6x+30}{x-2} \le 0$ $-6x=-30$ $x=2$

$x=5$

$\frac{-6(1)+30}{1-2} = \frac{24}{-1} = -24$, which is less than 0. If $x=3$, $\frac{-6(3)+30}{3-2} = \frac{12}{1} = 12$, which is greater than 0. If $x=6$, $\frac{-6(6)+30}{6-2} = \frac{-6}{4} = -\frac{3}{2}$, which is less than 0.

PTS: 2 REF: 011424a2 STA: A2.A.23 TOP: Rational Inequalities

93 ANS: 4 PTS: 2 REF: 061427a2 STA: A2.A.63
TOP: Domain and Range

94 ANS: 4 PTS: 2 REF: 011409a2 STA: A2.S.10
TOP: Permutations

95 ANS: 2

$\tan 30 = \frac{\sqrt{3}}{3}$. $\text{Arc}\cos\frac{\sqrt{3}}{k} = 30$

$\frac{\sqrt{3}}{k} = \cos 30$

$k = 2$

PTS: 2 REF: 061323a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced

96 ANS: 1

$\frac{2\pi}{b} = 4\pi$

$b = \frac{1}{2}$

PTS: 2 REF: 011425a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

97 ANS: 1
$(4a + 4) - (2a + 1) = 2a + 3$

PTS: 2 REF: 011401a2 STA: A2.A.30 TOP: Sequences
98 ANS: 1 PTS: 2 REF: 061401a2 STA: A2.S.2
TOP: Analysis of Data
99 ANS: 1
The binomials are conjugates, so use FL.

PTS: 2 REF: 061201a2 STA: A2.N.3 TOP: Operations with Polynomials
100 ANS: 2

$$\frac{1 - \frac{4}{x}}{1 - \frac{2}{x} - \frac{8}{x^2}} \times \frac{x^2}{x^2} = \frac{x^2 - 4x}{x^2 - 2x - 8} = \frac{x(x-4)}{(x-4)(x+2)} = \frac{x}{x+2}$$

PTS: 2 REF: 061305a2 STA: A2.A.17 TOP: Complex Fractions
101 ANS: 4
$(x + i)^2 - (x - i)^2 = x^2 + 2xi + i^2 - (x^2 - 2xi + i^2) = 4xi$

PTS: 2 REF: 011327a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers
102 ANS: 3
${}_3C_1 \cdot {}_5C_2 = 3 \cdot 10 = 30$

PTS: 2 REF: 061422a2 STA: A2.S.12 TOP: Combinations
103 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
104 ANS: 2
$2^2 \cdot 3 = 12$. $6^2 d = 12$

$4^2 \cdot \frac{3}{4} = 12$ $36d = 12$

$d = \frac{1}{3}$

PTS: 2 REF: 061310a2 STA: A2.A.5 TOP: Inverse Variation
105 ANS: 3 PTS: 2 REF: 011422a2 STA: A2.A.54
TOP: Graphing Logarithmic Functions

106 ANS:

$30700 = 50e^{3t}$

$614 = e^{3t}$

$\ln 614 = \ln e^{3t}$

$\ln 614 = 3t \ln e$

$\ln 614 = 3t$

$2.14 \approx t$

PTS: 2 REF: 011333a2 STA: A2.A.6 TOP: Exponential Growth

107 ANS: 3

$2! \cdot 2! \cdot 2! = 8$

PTS: 2 REF: 061425a2 STA: A2.S.10 TOP: Permutations

108 ANS: 1

$\frac{1}{7-\sqrt{11}} \cdot \frac{7+\sqrt{11}}{7+\sqrt{11}} = \frac{7+\sqrt{11}}{49-11} = \frac{7+\sqrt{11}}{38}$

PTS: 2 REF: 011404a2 STA: A2.N.5 TOP: Rationalizing Denominators

109 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

110 ANS:

$\log_{(x+3)}(2x+3)(x+5) = 2$ $\quad -6$ is extraneous

$(x+3)^2 = (2x+3)(x+5)$

$x^2 + 6x + 9 = 2x^2 + 13x + 15$

$x^2 + 7x + 6 = 0$

$(x+6)(x+1) = 0$

$x = -1$

PTS: 6 REF: 011439a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: applying properties of logarithms

111 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

112 ANS: 3 PTS: 2 REF: 061416a2 STA: A2.A.12
TOP: Evaluating Exponential Expressions

113 ANS: 1 PTS: 2 REF: 011310a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

114 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

PTS: 2 REF: 011412a2 STA: A2.A.5 TOP: Inverse Variation

115 ANS:

$\frac{13}{x} = 10 - x$. $x = \frac{10 \pm \sqrt{100 - 4(1)(13)}}{2(1)} = \frac{10 \pm \sqrt{48}}{2} = \frac{10 \pm 4\sqrt{3}}{2} = 5 \pm 2\sqrt{3}$

$13 = 10x - x^2$

$x^2 - 10x + 13 = 0$

PTS: 4 REF: 061336a2 STA: A2.A.23 TOP: Solving Rationals
KEY: irrational and complex solutions

116 ANS: 1

$f(g(x)) = 2(x + 5)^2 - 3(x + 5) + 1 = 2(x^2 + 10x + 25) - 3x - 15 + 1 = 2x^2 + 17x + 36$

PTS: 2 REF: 061419a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

117 ANS: 3 PTS: 2 REF: 061407a2 STA: A2.N.3
TOP: Operations with Polynomials

118 ANS:

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

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

119 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

120 ANS: 2

The binomials are conjugates, so use FL.

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

121 ANS:

$\frac{2 \pm \sqrt{(-2)^2 - 4(6)(-3)}}{2(6)} = \frac{2 \pm \sqrt{76}}{12} = \frac{2 \pm \sqrt{4}\sqrt{19}}{12} = \frac{2 \pm 2\sqrt{19}}{12} = \frac{1 \pm \sqrt{19}}{6}$

PTS: 2 REF: 011332a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

122 ANS: 3

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

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

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

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

125 ANS: 1 PTS: 2 REF: 061409a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

126 ANS: 4

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

PTS: 2 REF: 061426a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs

127 ANS: 2

$\frac{\cot x}{\csc x} = \frac{\frac{\cos x}{\sin x}}{\frac{1}{\sin x}} = \cos x$

PTS: 2 REF: 061410a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

128 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

129 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43
TOP: Defining Functions

130 ANS: 3

$(3i)(2i)^2(m+i)$

$(3i)(4i^2)(m+i)$

$(3i)(-4)(m+i)$

$(-12i)(m+i)$

$-12mi - 12i^2$

$-12mi + 12$

PTS: 2 REF: 061319a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

131 ANS: 3
As originally written, alternatives (2) and (3) had no domain restriction, so that both were correct.

PTS: 2 REF: 061405a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations

132 ANS: 3 PTS: 2 REF: 061418a2 STA: A2.A.51
TOP: Domain and Range

133 ANS: 4 PTS: 2 REF: 061206a2 STA: A2.A.60
TOP: Unit Circle

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

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

135 ANS: 2
$\bar{x} \pm \sigma$

153 ± 22

131 – 175

PTS: 2 REF: 011307a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

136 ANS: 3
$\sqrt[3]{6a^4b^2} + \sqrt[3]{(27 \cdot 6)a^4b^2}$

$a\sqrt[3]{6ab^2} + 3a\sqrt[3]{6ab^2}$

$4a\sqrt[3]{6ab^2}$

PTS: 2 REF: 011319a2 STA: A2.N.2 TOP: Operations with Radicals

137 ANS:

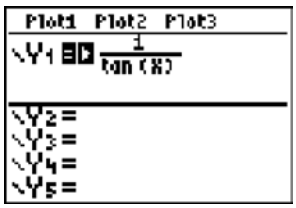
$K = ab\sin C = 18 \cdot 22\sin 60 = 396\dfrac{\sqrt{3}}{2} = 198\sqrt{3}$

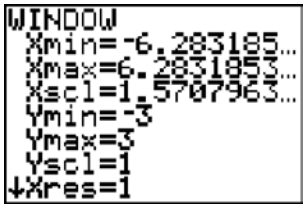
PTS: 2 REF: 061234a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

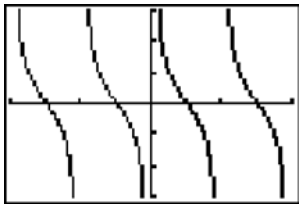
138 ANS: 3
34.1% + 19.1% = 53.2%

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

139 ANS: 3







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

140 ANS:

$${}_7C_3\left(\frac{1}{4}\right)^3\left(\frac{3}{4}\right)^4 = 35\left(\frac{1}{64}\right)\left(\frac{81}{256}\right) = \frac{2835}{16384} \approx 0.173$$

PTS: 2 REF: 061335a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

141 ANS: 4

$$\frac{x^2+9x-22}{x^2-121} \div (2-x) = \frac{(x+11)(x-2)}{(x+11)(x-11)} \cdot \frac{-1}{x-2} = \frac{-1}{x-11}$$

PTS: 2 REF: 011423a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: Division

142 ANS: 3

$$1000 = 500e^{.05t}$$

$$2 = e^{.05t}$$

$$\ln 2 = \ln e^{.05t}$$

$$\frac{\ln 2}{.05} = \frac{.05t \cdot \ln e}{.05}$$

$$13.9 \approx t$$

PTS: 2 REF: 061313a2 STA: A2.A.6 TOP: Exponential Growth

143 ANS: 1 PTS: 2 REF: 061210a2 STA: A2.A.9
TOP: Negative Exponents

144 ANS:

$$\sec\theta \sin\theta \cot\theta = \frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta} = 1$$

PTS: 2 REF: 011428a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

145 ANS: 1 PTS: 2 REF: 011314a2 STA: A2.N.3
TOP: Operations with Polynomials

146 ANS: 2 PTS: 2 REF: 061322a2 STA: A2.A.73
TOP: Law of Sines KEY: modeling

147 ANS: 1

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

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

148 ANS:

$2x - 3 > 5$ or $2x - 3 < -5$

$2x > 8$ $\quad$ $2x < -2$

$x > 4$ $\quad$ $x < -1$

PTS: 2 REF: 061430a2 STA: A2.A.1 TOP: Absolute Value Inequalities

149 ANS:

$(x + yi)(x - yi) = x^2 - y^2 i^2 = x^2 + y^2$

PTS: 2 REF: 061432a2 STA: A2.N.8 TOP: Conjugates of Complex Numbers

150 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

PTS: 2 REF: 011330a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships

151 ANS: 3

If $\csc P > 0$, $\sin P > 0$. If $\cot P < 0$ and $\sin P > 0$, $\cos P < 0$

PTS: 2 REF: 061320a2 STA: A2.A.60 TOP: Finding the Terminal Side of an Angle

152 ANS: 1 PTS: 2 REF: 061324a2 STA: A2.A.9
TOP: Negative Exponents

153 ANS:

$x(x + 3) = 10$

$x^2 + 3x - 10 = 0$

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

$x = -5, 2$

PTS: 2 REF: 011431a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

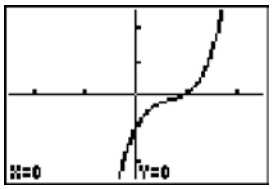
154 ANS: 4 PTS: 1 REF: 011312a2 STA: A2.A.56
TOP: Determining Trigonometric Functions KEY: degrees, common angles

155 ANS: 4

$\sin(\theta + 90) = \sin\theta \cdot \cos 90 + \cos\theta \cdot \sin 90 = \sin\theta \cdot (0) + \cos\theta \cdot (1) = \cos\theta$

PTS: 2 REF: 061309a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: identities

156 ANS: 4



PTS: 2 REF: 061222a2 STA: A2.A.50 TOP: Solving Polynomial Equations

157 ANS: 2

$(x+2)^2 = -9$

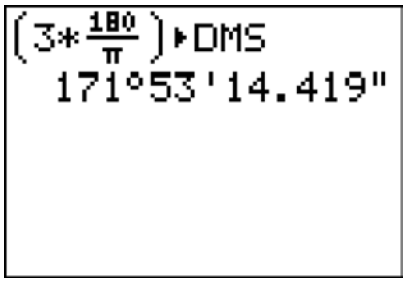
$x+2 = \pm\sqrt{-9}$

$x = -2 \pm 3i$

PTS: 2 REF: 011408a2 STA: A2.A.24 TOP: Completing the Square

158 ANS:

$3 \times \frac{180}{\pi} \approx 171.89° \approx 171°53'$.



PTS: 2 REF: 011335a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

159 ANS: 4

$8^{3k+4} = 4^{2k-1}$.

$(2^3)^{3k+4} = (2^2)^{2k-1}$

$2^{9k+12} = 2^{4k-2}$

$9k+12 = 4k-2$

$5k = -14$

$k = -\frac{14}{5}$

PTS: 2 REF: 011309a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

160 ANS: 4

$2x^2 - 7x - 5 = 0$

$\frac{c}{a} = \frac{-5}{2}$

PTS: 2 REF: 061414a2 STA: A2.A.20 TOP: Roots of Quadratics

161 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.53
TOP: Graphing Exponential Functions

162 ANS:

Ordered, the heights are 71, 71, 72, 74, 74, 75, 78, 79, 79, 83. $Q_1 = 72$ and $Q_3 = 79$. $79 - 72 = 7$.

PTS: 2 REF: 011331a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

163 ANS: 2

$\frac{1}{2}(22)(13)\sin 55 \approx 117$

PTS: 2 REF: 061403a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic

164 ANS:

$3x^2 - 11x + 6 = 0$. Sum $\frac{-b}{a} = \frac{11}{3}$. Product $\frac{c}{a} = \frac{6}{3} = 2$

PTS: 2 REF: 011329a2 STA: A2.A.20 TOP: Roots of Quadratics

165 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

166 ANS: 2 PTS: 2 REF: 061301a2 STA: A2.S.1
TOP: Analysis of Data

167 ANS: 3

$\frac{4}{-2} = -2$

PTS: 2 REF: 011304a2 STA: A2.A.31 TOP: Sequences

168 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

169 ANS: 4

$x = 2y$. $y^2 - (3y)^2 + 32 = 0$. $x = 3(-2) = -6$

$$y^2 - 9y^2 = -32$$
$$-8y^2 = -32$$
$$y^2 = 4$$
$$y = \pm 2$$

PTS: 2 REF: 061312a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

170 ANS: 4

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

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

171 ANS:

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

$x^2+x-1 = 16x^2-24x+9$

$0 = 15x^2-25x+10$

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

$0 = (3x-2)(x-1)$

$x = \frac{2}{3},\ x \neq 1$

$-4\left(\frac{2}{3}\right)+3 \geq 0$

$\frac{1}{3} \geq 0$

$-4(1)+3 < 0$

1 is extraneous

PTS: 6 REF: 011339a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

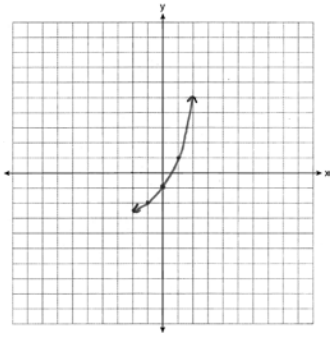
172 ANS:

$$\frac{1+\frac{3}{x}}{1-\frac{5}{x}-\frac{24}{x^2}} \cdot \frac{x^2}{x^2} = \frac{x^2+3x}{x^2-5x-24} = \frac{x(x+3)}{(x-8)(x+3)} = \frac{x}{x-8}$$

PTS: 4 REF: 061436a2 STA: A2.A.17 TOP: Complex Fractions

173 ANS: 1 PTS: 2 REF: 061420a2 STA: A2.A.34
TOP: Sigma Notation

174 ANS:



PTS: 2 REF: 011234a2 STA: A2.A.53 TOP: Graphing Exponential Functions

175 ANS:

$\frac{100}{\sin 32} = \frac{b}{\sin 105} \cdot \frac{100}{\sin 32} = \frac{a}{\sin 43}$

$b \approx 182.3$ $a \approx 128.7$

PTS: 4 REF: 011338a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

176 ANS:

$2x - 1 = 27^{\frac{4}{3}}$

$2x - 1 = 81$

$2x = 82$

$x = 41$

PTS: 2 REF: 061329a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

177 ANS:

$\frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} = \frac{\sqrt{6}}{4}$

PTS: 2 REF: 061331a2 STA: A2.A.56 TOP: Determining Trigonometric Functions
KEY: degrees, common angles

178 ANS: 3

$3x^3 - 5x^2 - 48x + 80$

$x^2(3x - 5) - 16(3x - 5)$

$(x^2 - 16)(3x - 5)$

$(x + 4)(x - 4)(3x - 5)$

PTS: 2 REF: 011317a2 STA: A2.A.7 TOP: Factoring by Grouping

179 ANS:

Sum $\frac{-b}{a} = -\frac{1}{12}$. Product $\frac{c}{a} = -\frac{1}{2}$

PTS: 2 REF: 061328a2 STA: A2.A.20 TOP: Roots of Quadratics

180 ANS:

$y = 215.983(1.652)^x$. $215.983(1.652)^7 \approx 7250$

PTS: 4 REF: 011337a2 STA: A2.S.7 TOP: Exponential Regression

181 ANS:

$3 - 2x \geq 7$ or $3 - 2x \leq -7$

$-2x \geq 4$ $\quad -2x \leq -10$

$x \leq -2$ $\quad x \geq 5$

PTS: 2 REF: 011334a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

182 ANS: 4 PTS: 2 REF: 011323a2 STA: A2.A.2
TOP: Using the Discriminant KEY: determine nature of roots given equation

183 ANS:

$y = 0.488(1.116)^x$

PTS: 2 REF: 061429a2 STA: A2.S.7 TOP: Exponential Regression

184 ANS: 3 PTS: 2 REF: 061308ge STA: A2.A.51
TOP: Domain and Range

185 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

186 ANS: 4

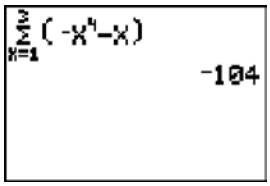
$4 + 3(2 - x) + 3(3 - x) + 3(4 - x) + 3(5 - x)$

$4 + 6 - 3x + 9 - 3x + 12 - 3x + 15 - 3x$

$46 - 12x$

PTS: 2 REF: 061315a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

187 ANS:



−104.

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

188 ANS:

$\frac{15}{\sin 103} = \frac{a}{\sin 42}$. $\frac{1}{2}(15)(10.3)\sin 35 \approx 44$

$a \approx 10.3$

PTS: 4 REF: 061337a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: advanced

189 ANS:

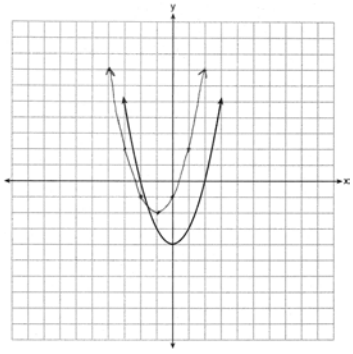
$a_n = 9n - 4$. $S_n = \frac{20(5 + 176)}{2} = 1810$

$a_1 = 9(1) - 4 = 5$

$a_{20} = 9(20) - 4 = 176$

PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

190 ANS:



PTS: 2 REF: 061435a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

191 ANS: 1 PTS: 2 REF: 061317a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

192 ANS:

$2\sin^2 x + 5\sin x - 3 = 0$

$(2\sin x - 1)(\sin x + 3) = 0$

$$\sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

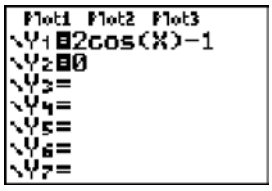
PTS: 4 REF: 011436a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: quadratics

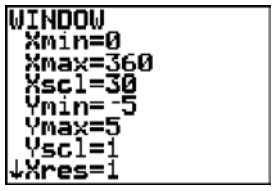
193 ANS: 2

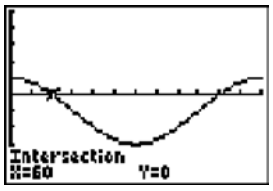
$\frac{2\pi}{6} = \frac{\pi}{3}$

PTS: 2 REF: 061413a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

194 ANS: 4







$2\cos\theta = 1$

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

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

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

195 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

196 ANS: 4

$$(a-1)^2 + (a-2)^2 + (a-3)^2 + (a-4)^2$$

$$(a^2 - 2a + 1) + (a^2 - 4a + 4) + (a^2 - 6a + 9) + (a^2 - 8a + 16)$$

$$4a^2 - 20a + 30$$

PTS: 2 REF: 011414a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

197 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

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

199 ANS: 2

If $\sin A = -\frac{7}{25}$, $\cos A = \frac{24}{25}$, and $\tan A = \frac{\sin A}{\cos A} = \frac{-\frac{7}{25}}{\frac{24}{25}} = -\frac{7}{24}$

PTS: 2 REF: 011413a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced

200 ANS:

$\sec x = \sqrt{2}$

$\cos x = \frac{1}{\sqrt{2}}$

$\cos x = \frac{\sqrt{2}}{2}$

$x = 45°, 315°$

PTS: 2 REF: 061434a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

201 ANS: 2 PTS: 2 REF: 011315a2 STA: A2.A.55
TOP: Trigonometric Ratios

202 ANS:

$-4x + 5 < 13$ $-4x + 5 > -13$ $-2 < x < 4.5$

$-4x < 8$ $-4x > -18$

$x > -2$ $x < 4.5$

PTS: 2 REF: 011432a2 STA: A2.A.1 TOP: Absolute Value Inequalities

203 ANS: 2 PTS: 2 REF: 061218a2 STA: A2.A.43
TOP: Defining Functions

204 ANS:

$2.5 \cdot \frac{180}{\pi} \approx 143°14'$

PTS: 2 REF: 061431a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

205 ANS: 3

$-\sqrt{2} \sec x = 2$

$\sec x = -\frac{2}{\sqrt{2}}$

$\cos x = -\frac{\sqrt{2}}{2}$

$x = 135, 225$

PTS: 2 REF: 011322a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

206 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

207 ANS: 3

$S_8 = \frac{3(1 - (-4)^8)}{1 - (-4)} = \frac{196,605}{5} = -39,321$

PTS: 2 REF: 061304a2 STA: A2.A.35 TOP: Summations
KEY: geometric

208 ANS:

$\sigma_x \approx 6.2$. 6 scores are within a population standard deviation of the mean. $Q_3 - Q_1 = 41 - 37 = 4$

$\bar{x} \approx 38.2$

PTS: 4 REF: 061338a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced

209 ANS: 2

$b^2 - 4ac = (-9)^2 - 4(2)(4) = 81 - 32 = 49$

PTS: 2 REF: 011411a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

210 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

211 ANS: 3

$5000\left(1 + \frac{.03}{4}\right)^{4 \cdot 5} = 5000(1.0075)^{20} \approx 5805.92$

PTS: 2 REF: 011410a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

212 ANS:

$x^4 + 4x^3 + 4x^2 + 16x = 0$

$x(x^3 + 4x^2 + 4x + 16) = 0$

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

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

$x = 0, \pm 2i, -4$

PTS: 6 REF: 061339a2 STA: A2.A.26 TOP: Solving Polynomial Equations

213 ANS: 4 PTS: 2 REF: 061411a2 STA: A2.A.30
TOP: Sequences

214 ANS:

$(5x - 1)^{\frac{1}{3}} = 4$

$5x - 1 = 64$

$5x = 65$

$x = 13$

PTS: 2 REF: 061433a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

215 ANS: 2

$60 = -16t^2 + 5t + 105$ $t = \frac{-5 \pm \sqrt{5^2 - 4(-16)(45)}}{2(-16)} \approx \frac{-5 \pm 53.89}{-32} \approx 1.84$

$0 = -16t^2 + 5t + 45$

PTS: 2 REF: 061424a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

216 ANS: 4

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

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

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

PTS: 2 REF: 011426a2 STA: A2.A.7 TOP: Factoring by Grouping

217 ANS:

$\sqrt{27^2 + 32^2 - 2(27)(32)\cos 132} \approx 54$

PTS: 4 REF: 011438a2 STA: A2.A.73 TOP: Law of Cosines
KEY: applied

218 ANS: 1

If $\sin x = 0.8$, then $\cos x = 0.6$. $\tan \frac{1}{2}x = \sqrt{\frac{1-0.6}{1+0.6}} = \sqrt{\frac{0.4}{1.6}} = 0.5$.

PTS: 2 REF: 061220a2 STA: A2.A.77 TOP: Half Angle Identities

219 ANS: 2

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

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

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

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

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

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

220 ANS: 1

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

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

221 ANS: 4

$\left(\sqrt[3]{27x^2}\right)\left(\sqrt[3]{16x^4}\right) = \sqrt[3]{3^3 \cdot 2^4 \cdot x^6} = 3 \cdot 2 \cdot x^2\sqrt[3]{2} = 6x^2\sqrt[3]{2}$

PTS: 2 REF: 011421a2 STA: A2.N.2 TOP: Operations with Radicals

222 ANS: 3

$\frac{3y}{2y-6} + \frac{9}{6-2y} = \frac{3y}{2y-6} - \frac{9}{2y-6} = \frac{3y-9}{2y-6} = \frac{3(y-3)}{2(y-3)} = \frac{3}{2}$

PTS: 2 REF: 011325a2 STA: A2.A.16 TOP: Addition and Subtraction of Rationals

223 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles

224 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

225 ANS: 4 PTS: 2 REF: 011219a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations

226 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

227 ANS: 4

$r = \sqrt{(6-3)^2 + (5-(-4))^2} = \sqrt{9+81} = \sqrt{90}$

PTS: 2 REF: 061415a2 STA: A2.A.48 TOP: Equations of Circles

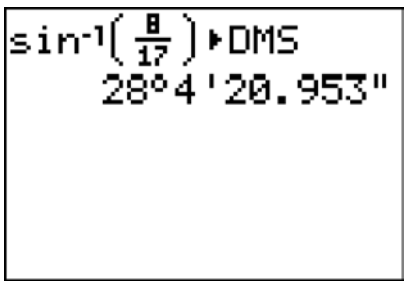
228 ANS: 4 PTS: 2 REF: 061402a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

229 ANS:

$$\frac{{}_{10}P_{10}}{3!\cdot 3!\cdot 2!} = \frac{3,628,800}{72} = 50,400$$

PTS: 2 REF: 061330a2 STA: A2.S.10 TOP: Permutations

230 ANS: 2



$\sin S = \frac{8}{17}$

$S = \sin^{-1}\frac{8}{17}$

$S \approx 28°4'$

PTS: 2 REF: 061311a2 STA: A2.A.55 TOP: Trigonometric Ratios

231 ANS: 3

${}_8C_3 \cdot x^{8-3} \cdot (-2)^3 = 56x^5 \cdot (-8) = -448x^5$

PTS: 2 REF: 011308a2 STA: A2.A.36 TOP: Binomial Expansions

232 ANS: 3

$(-5)^2 - 4(2)(0) = 25$

PTS: 2 REF: 061423a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine equation given nature of roots

233 ANS: 2

$\sqrt{2x-4} = x-2$

$2x - 4 = x^2 - 4x + 4$

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

$0 = (x-4)(x-2)$

$x = 4, 2$

PTS: 2 REF: 061406a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

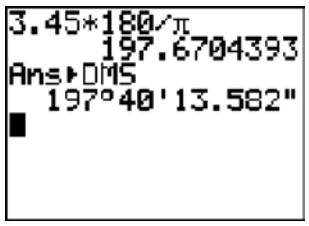
234 ANS:

$Q_1 = 3.5$ and $Q_3 = 10.5$. $10.5 - 3.5 = 7$.

PTS: 2 REF: 011430a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

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

236 ANS:



197°40'. $3.45 \times \frac{180}{\pi} \approx 197°40'$.

PTS: 2 REF: fall0931a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

Algebra 2/Trigonometry Regents at Random
Answer Section

237 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

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

239 ANS: 3

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

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

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

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

241 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

242 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

243 ANS:
Sum $\frac{-b}{a} = -\frac{11}{5}$. Product $\frac{c}{a} = -\frac{3}{5}$

PTS: 2 REF: 061030a2 STA: A2.A.20 TOP: Roots of Quadratics

244 ANS:
45, 225 $2\tan C - 3 = 3\tan C - 4$

$$1 = \tan C$$

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

$$C = 45, 225$$

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

245 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

246 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

247 ANS: 2
$4^{2x+5} = 8^{3x}$.

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

$$2^{4x+10} = 2^{9x}$$

$$4x + 10 = 9x$$

$$10 = 5x$$

$$2 = x$$

PTS: 2 REF: 061105a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

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

PTS: 2 REF: 081001a2 STA: A2.N.4 TOP: Operations with Irrational Expressions
KEY: without variables | index = 2

249 ANS: 2

$$\frac{\frac{x}{4} - \frac{1}{x}}{\frac{1}{2x} + \frac{1}{4}} = \frac{\frac{x^2 - 4}{4x}}{\frac{2x + 4}{8x}} = \frac{(x+2)(x-2)}{4x} \times \frac{8x}{2(x+2)} = x - 2$$

PTS: 2 REF: fall0920a2 STA: A2.A.17 TOP: Complex Fractions

250 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

251 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

252 ANS:

7.4

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

253 ANS: 4

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

$49 = 34 - 30\cos A$

$15 = -30\cos A$

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

$120 = A$

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

254 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

255 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.

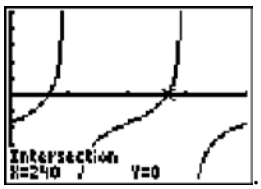
PTS: 2 REF: 011125a2 STA: A2.S.10 TOP: Permutations

256 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

257 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

258 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

259 ANS:

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

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

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

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

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

260 ANS: 4 PTS: 2 REF: 061026a2 STA: A2.A.29
TOP: Sequences

261 ANS: 2

$\frac{10}{\sin 35} = \frac{13}{\sin B}$. $35 + 48 < 180$

$B \approx 48, 132$ $35 + 132 < 180$

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

262 ANS:

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

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

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

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

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

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

263 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

264 ANS:

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

$C \approx 33$

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

265 ANS: 3

Cofunctions tangent and cotangent are complementary

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

266 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

267 ANS: 3

$68\% \times 50 = 34$

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

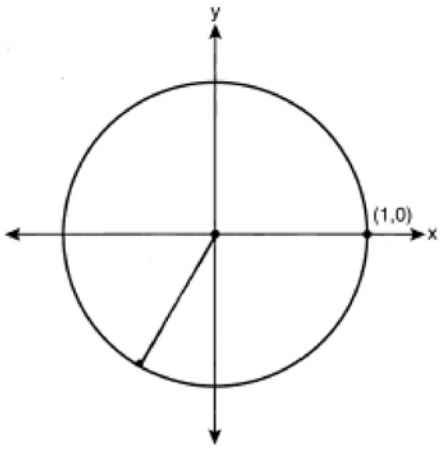
268 ANS: 4 PTS: 2 REF: 061124a2 STA: A2.S.3
TOP: Average Known with Missing Data

269 ANS: 3

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

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

270 ANS:

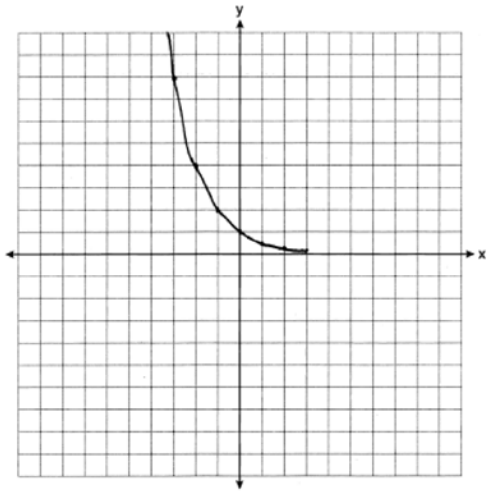


$-\frac{\sqrt{3}}{2}$

PTS: 2 REF: 061033a2 STA: A2.A.60 TOP: Unit Circle

271 ANS: 4 PTS: 2 REF: 061120a2 STA: A2.A.19
TOP: Properties of Logarithms KEY: splitting logs

272 ANS:



$y = 0$

PTS: 2 REF: 061031a2 STA: A2.A.53 TOP: Graphing Exponential Functions

273 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

274 ANS:

$\pm\frac{3}{2}, -\frac{1}{2}$. $8x^3 + 4x^2 - 18x - 9 = 0$

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

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

$4x^2 - 9 = 0$ or $2x + 1 = 0$

$(2x + 3)(2x - 3) = 0$ $x = -\frac{1}{2}$

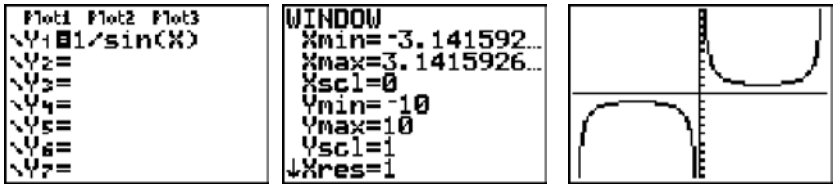
$x = \pm\frac{3}{2}$

PTS: 4 REF: fall0937a2 STA: A2.A.26 TOP: Solving Polynomial Equations

275 ANS: 1 PTS: 2 REF: 061018a2 STA: A2.A.22

TOP: Solving Radicals KEY: extraneous solutions

276 ANS: 1



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

277 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

278 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

279 ANS: 2

$8^2 = 64$

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

280 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

281 ANS: 4

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

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

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

$6x + 2 = 3x + 6$

$3x = 4$

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

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

282 ANS: 3 PTS: 2 REF: fall0913a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

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

284 ANS: 1 PTS: 2 REF: 061013a2 STA: A2.A.38
TOP: Defining Functions

285 ANS: 1

$6x - 7 \le 5$ $6x - 7 \ge -5$

$6x \le 12$ $6x \ge 2$

$x \le 2$ $x \ge \frac{1}{3}$

PTS: 2 REF: fall0905a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

286 ANS:

$(x + 3)^2 + (y - 4)^2 = 25$

PTS: 2 REF: fall0929a2 STA: A2.A.49 TOP: Writing Equations of Circles

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

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

289 ANS: 1 PTS: 2 REF: 011117a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

290 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

291 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

292 ANS: 1

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

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

293 ANS: 3

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

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

$0 = x^2 + x - 12$

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

$x = -4 \quad x = 3$

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

294 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

295 ANS: 1

${}_{10}C_4 = 210$

PTS: 2 REF: 061113a2 STA: A2.S.11 TOP: Combinations

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

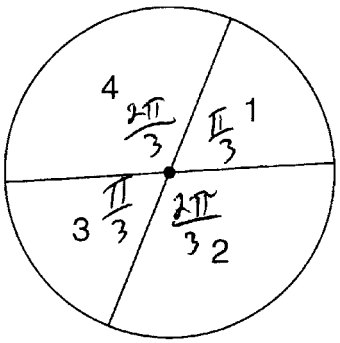
297 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

298 ANS: 2



$$\frac{\frac{\pi}{3}+\frac{\pi}{3}}{2\pi}=\frac{\frac{2\pi}{3}}{2\pi}=\frac{1}{3}$$

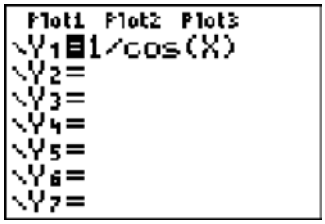
PTS: 2 REF: 011108a2 STA: A2.S.13 TOP: Geometric Probability

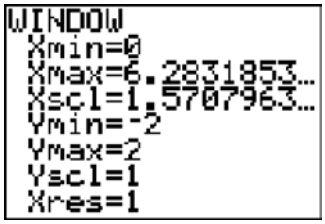
299 ANS: 3

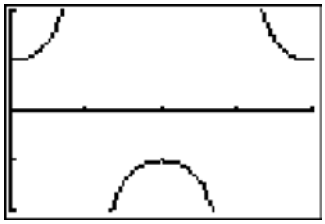
$x = 5^4 = 625$

PTS: 2 REF: 061106a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

300 ANS: 3







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

301 ANS: 2

$6(x^2 - 5) = 6x^2 - 30$

PTS: 2 REF: 011109a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

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

303 ANS: 2

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

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

304 ANS: 1

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

$6 \neq -10$ $8a = 4$ $8 - 2 \neq -10$

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

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

305 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

306 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: Quadratics with Irrational Solutions

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

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

309 ANS: 1

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

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

310 ANS:

$\frac{51}{243}$. ${}_5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2 = \frac{40}{243}$

${}_5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1 = \frac{10}{243}$

${}_5C_3\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0 = \frac{1}{243}$

PTS: 4 REF: 061138a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

311 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

312 ANS:
$\frac{\sqrt{13}}{2}$. $\sin\theta = \frac{y}{\sqrt{x^2+y^2}} = \frac{2}{\sqrt{(-3)^2+2^2}} = \frac{2}{\sqrt{13}}$. $\csc\theta = \frac{\sqrt{13}}{2}$.

PTS: 2 REF: fall0933a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

313 ANS:

$$16^{2x+3} = 64^{x+2}$$
$$(4^2)^{2x+3} = (4^3)^{x+2}$$
$$4x+6 = 3x+6$$
$$x = 0$$

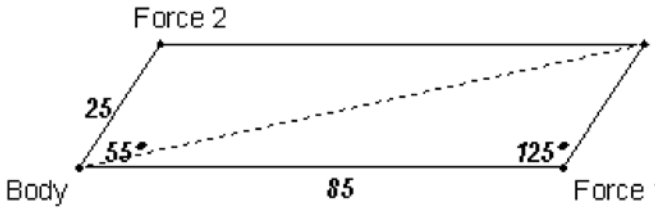
PTS: 2 REF: 011128a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

314 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

315 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

316 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

317 ANS:

$$\frac{5(3+\sqrt{2})}{7} \cdot \frac{5}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{5(3+\sqrt{2})}{9-2} = \frac{5(3+\sqrt{2})}{7}$$

PTS: 2 REF: fall0928a2 STA: A2.N.5 TOP: Rationalizing Denominators

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

319 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

320 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

321 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

322 ANS: 3

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

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

323 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

324 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

325 ANS: 1

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

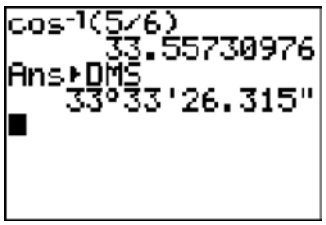
PTS: 2 REF: 081002a2 STA: A2.M.2 TOP: Radian Measure
KEY: radians

326 ANS:

$y = 10.596(1.586)^x$

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

327 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

328 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: Quadratics with Irrational Solutions

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

330 ANS:

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

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

331 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

332 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

333 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

334 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

335 ANS:

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

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

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

337 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

338 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

339 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

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

341 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

342 ANS: 3 PTS: 2 REF: 061022a2 STA: A2.A.63
TOP: Domain and Range

343 ANS:

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

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

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

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

$$3x = 1$$

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

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

344 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

PTS: 2 REF: 061104a2 STA: A2.A.57 TOP: Reference Angles

345 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

346 ANS: 3

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

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

347 ANS: 3 PTS: 2 REF: 011104a2 STA: A2.A.64

TOP: Using Inverse Trigonometric Functions KEY: unit circle

348 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

349 ANS: 2

${}_{15}C_8 = 6,435$

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

350 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

351 ANS: 3

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

$C \approx 78.3$

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

352 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

353 ANS:

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

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

354 ANS: 4 PTS: 2 REF: 011101a2 STA: A2.A.38

TOP: Defining Functions KEY: graphs

355 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

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

357 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

358 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

359 ANS:

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

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

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

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

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

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

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

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

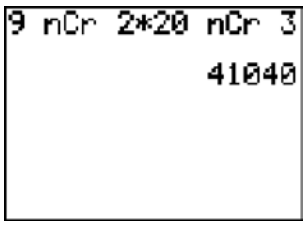
PTS: 6 REF: 081039a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

360 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

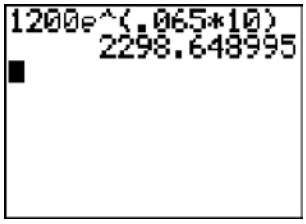
361 ANS:



41,040.

PTS: 2 REF: fall0935a2 STA: A2.S.12 TOP: Sample Space

362 ANS:



2,298.65.

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

363 ANS: 4 PTS: 2 REF: fall0925a2 STA: A2.S.10
TOP: Permutations

364 ANS:

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

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

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

366 ANS: 3 PTS: 2 REF: fall0923a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

367 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

368 ANS: 3

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

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

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

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

369 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

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

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

372 ANS: 2

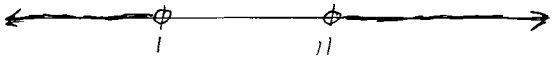
$(3 - 7i)(3 - 7i) = 9 - 21i - 21i + 49i^2 = 9 - 42i - 49 = -40 - 42i$

PTS: 2 REF: fall0901a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

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

374 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

375 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

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

377 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

378 ANS: 4

$$\frac{2\pi}{b} = \frac{2\pi}{\frac{1}{3}} = 6\pi$$

PTS: 2 REF: 061027a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

379 ANS: 3

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

$(x-5)(x+2) > 0$ $x - 5 < 0$ and $x + 2 < 0$

$x - 5 > 0$ and $x + 2 > 0$ $x < 5$ and $x < -2$

$x > 5$ and $x > -2$ $x < -2$

$x > 5$

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

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

381 ANS: 1

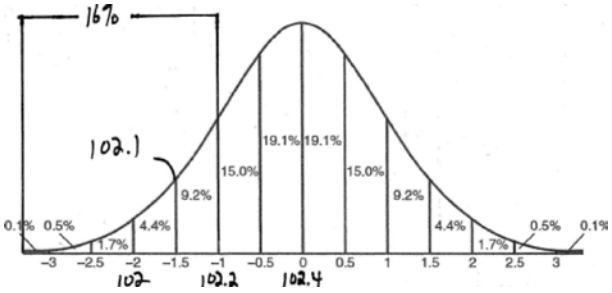
common difference is 2. $b_n = x + 2n$

$10 = x + 2(1)$

$8 = x$

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

382 ANS: 1



PTS: 2 REF: fall0915a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

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

384 ANS: 1 PTS: 2 REF: fall0914a2 STA: A2.A.9
TOP: Negative and Fractional Exponents

385 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7
TOP: Imaginary Numbers

386 ANS: 4 PTS: 2 REF: 061005a2 STA: A2.A.50
TOP: Solving Polynomial Equations

387 ANS: 2

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

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

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

$x = 0, -2, 1$

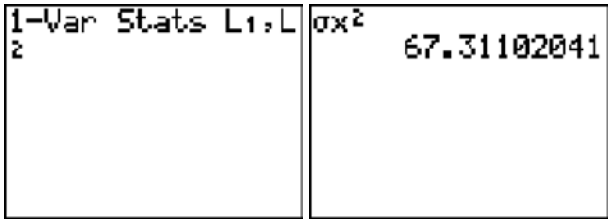
PTS: 2 REF: 011103a2 STA: A2.A.26 TOP: Solving Polynomial Equations

388 ANS:

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

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

389 ANS: 3



PTS: 2 REF: fall0924a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

390 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

391 ANS:

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

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

392 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

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

394 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

395 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

396 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

397 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
TOP: Regression

398 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

399 ANS:

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

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

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

400 ANS:

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

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

401 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

402 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

403 ANS:

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

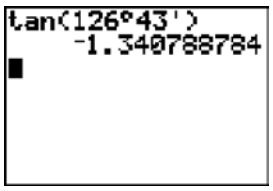
PTS: 4 REF: 081038a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

404 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

405 ANS: 2



PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

406 ANS: 2 PTS: 2 REF: fall0926a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

407 ANS: 2

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

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

408 ANS: 3

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

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

409 ANS: 2 PTS: 2 REF: 061108a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

410 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

411 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

412 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

413 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

414 ANS: 4

$s = \theta r = 2 \cdot 4 = 8$

PTS: 2 REF: fall0922a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

415 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

416 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

417 ANS: 1

$_9C_3a^6(-4b)^3 = -5376a^6b^3$

PTS: 2 REF: 061126a2 STA: A2.A.36 TOP: Binomial Expansions

418 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

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

420 ANS: 3 PTS: 2 REF: 061114a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

421 ANS:

$\frac{23}{2}$ $\cos^2 B + \sin^2 B = 1$ $\tan B = \frac{\sin B}{\cos B} = \frac{\frac{5}{\sqrt{41}}}{\frac{4}{\sqrt{41}}} = \frac{5}{4}$

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

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

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

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

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

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

422 ANS: 2

$f^{-1}(x) = \log_4 x$

PTS: 2 REF: fall0916a2 STA: A2.A.54 TOP: Graphing Logarithmic Functions

423 ANS:

$y = x^2 - 6$. $f^{-1}(x)$ 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

424 ANS: 2

The roots are $-1, 2, 3$.

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

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

426 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

427 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

428 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

429 ANS: 3 PTS: 2 REF: 061001a2 STA: A2.A.30
TOP: Sequences