

JMAP

REGENTS AT RANDOM

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

www.jmap.org

Dear Sir

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

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

Algebra 2/Trigonometry Regents at Random

1 Which function is one-to-one?

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

2 Which function is one-to-one?

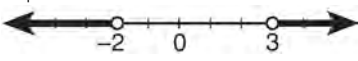
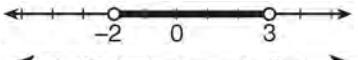
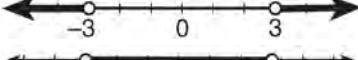
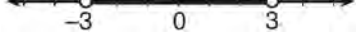
- 1) $k(x) = x^2 + 2$
- 2) $g(x) = x^3 + 2$
- 3) $f(x) = |x| + 2$
- 4) $j(x) = x^4 + 2$

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

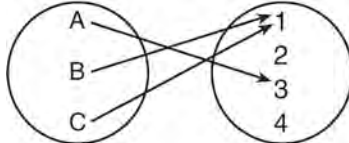
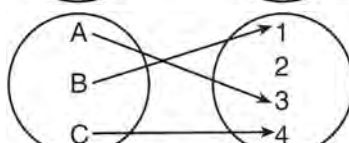

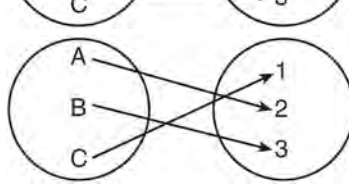
4 If $\tan\left(\arccos \frac{\sqrt{3}}{k}\right) = \frac{\sqrt{3}}{3}$, then k is

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

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

- 1) 
- 2) 
- 3) 
- 4) 

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

- 1) 
- 2) 
- 3) 
- 4) 

7 The discriminant of a quadratic equation is 24. The roots are

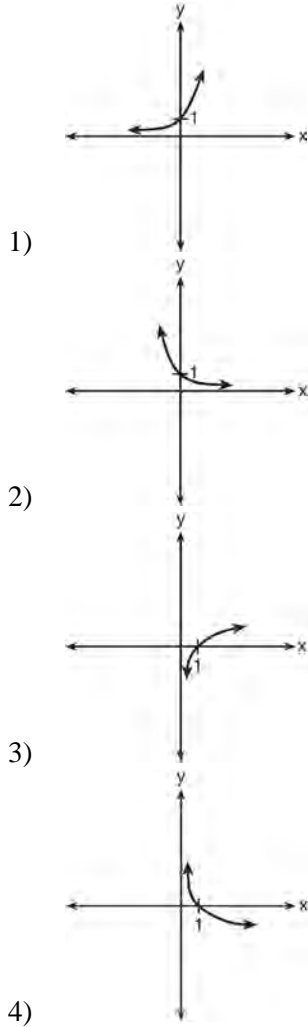
- 1) imaginary
- 2) real, rational, and equal
- 3) real, rational, and unequal
- 4) real, irrational, and unequal

8 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) $4a^2 - 20a + 30$

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

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



11 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.

12 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

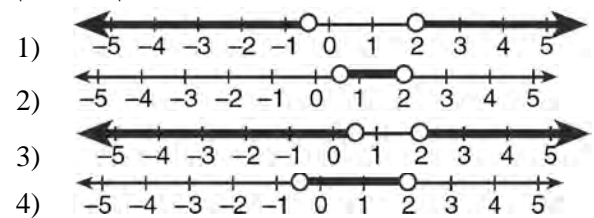
$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

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

13 Which graph represents the solution set of

$$\left| \frac{4x-5}{3} \right| > 1?$$



14 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

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

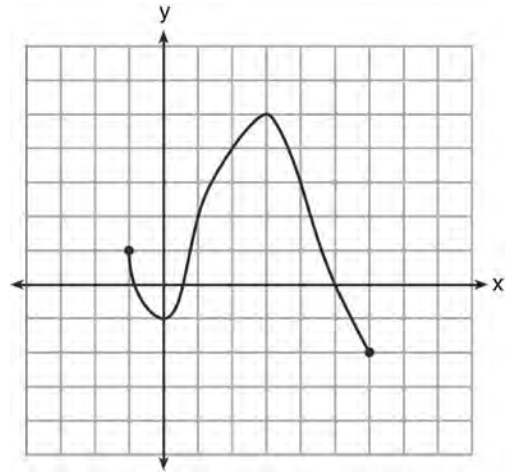
16 Find, to the nearest tenth, the radian measure of 216° .

17 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?

18 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) $\frac{q \sin R}{\sin Q}$

19 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) $-2 \leq y \leq 5$

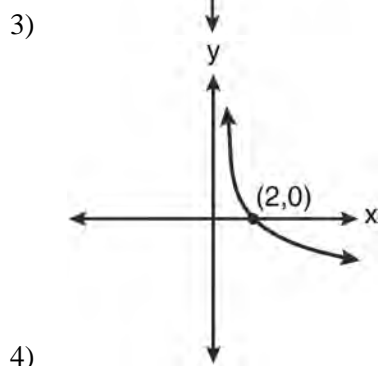
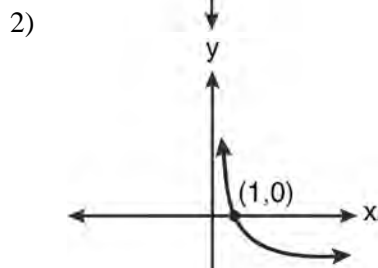
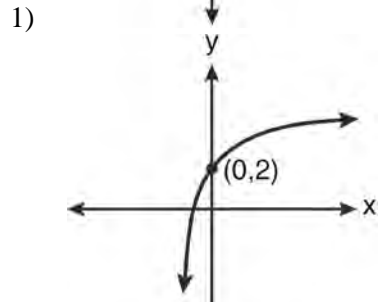
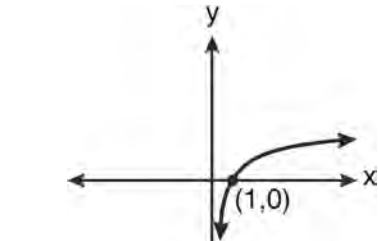
20 A spinner is divided into eight equal sections. Five sections are red and three are green. If the spinner is spun three times, what is the probability that it lands on red *exactly* twice?

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

21 Perform the indicated operations and simplify completely:

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

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



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

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

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

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

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

26 Which equation has roots with the sum equal to $\frac{9}{4}$ and the product equal to $\frac{3}{4}$?



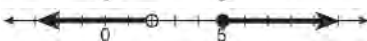

- 1) $4x^2 + 9x + 3 = 0$
- 2) $4x^2 + 9x - 3 = 0$
- 3) $4x^2 - 9x + 3 = 0$
- 4) $4x^2 - 9x - 3 = 0$

27 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) $\cos x + \sin x$

28 Which graph represents the solution set of

$$\frac{x+16}{x-2} \leq 7?$$

- 1) 
- 2) 
- 3) 
- 4) 

29 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%.

30 A population of rabbits doubles every 60 days

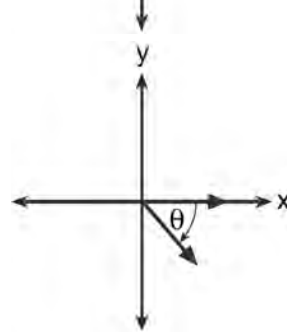
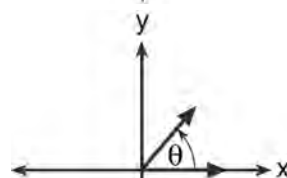
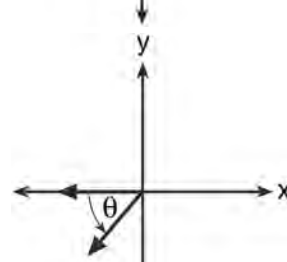
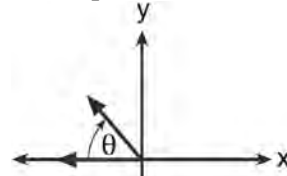
according to the formula $P = 10(2)^{\frac{t}{60}}$, where P is the population of rabbits on day t . What is the value of t when the population is 320?

- 1) 240
2) 300
3) 660
4) 960

31 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

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



33 The expression $4 + \sum_{k=2}^5 3(k-x)$ is equal to

- 1) $58 - 4x$
- 2) $46 - 4x$
- 3) $58 - 12x$
- 4) $46 - 12x$

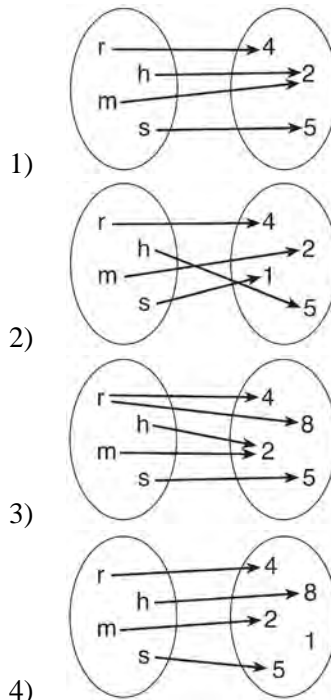
34 As shown in the table below, a person's target heart rate during exercise changes as the person gets older.

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

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



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

- 37 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
- 38 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.
- 39 Approximately how many degrees does five radians equal?
- 1) 286
 - 2) 900
 - 3) $\frac{\pi}{36}$
 - 4) 5π
- 40 What is the solution set of the equation $-\sqrt{2} \sec x = 2$ when $0^\circ \leq x < 360^\circ$?
- 1) $\{45^\circ, 135^\circ, 225^\circ, 315^\circ\}$
 - 2) $\{45^\circ, 315^\circ\}$
 - 3) $\{135^\circ, 225^\circ\}$
 - 4) $\{225^\circ, 315^\circ\}$
- 41 Find the third term in the recursive sequence $a_{k+1} = 2a_k - 1$, where $a_1 = 3$.
- 42 Solve algebraically for all exact values of x in the interval $0 \leq x < 2\pi$: $2 \sin^2 x + 5 \sin x = 3$
- 43 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
- 44 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) $(x^2-4)(x-3)$
- 45 Find the solution of the inequality $x^2 - 4x > 5$, algebraically.
- 46 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) $-x^3 - 2x^2 + 5x + 4$

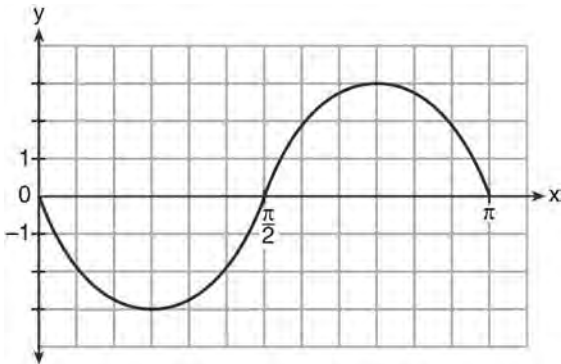
- 47 Max solves a quadratic equation by completing the square. He shows a correct step:

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

What are the solutions to his equation?

- 1) $2 \pm 3i$
 - 2) $-2 \pm 3i$
 - 3) $3 \pm 2i$
 - 4) $-3 \pm 2i$
- 48 Determine the sum and the product of the roots of the equation $12x^2 + x - 6 = 0$.

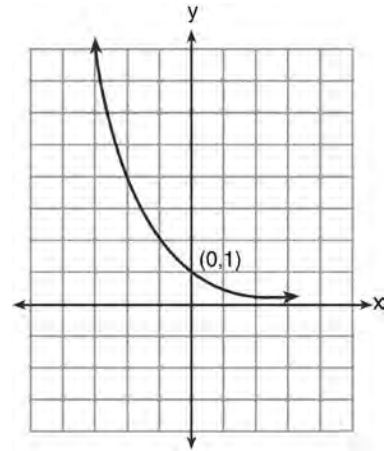
- 49 Write an equation for the graph of the trigonometric function shown below.



- 50 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) $2x^4y^2$

- 51 What is the equation of the graph shown below?



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

- 52 What is the common ratio of the sequence

$$\frac{1}{64} a^5 b^3, -\frac{3}{32} a^3 b^4, \frac{9}{16} ab^5, \dots?$$

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

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

Lin Reg

$$y = a + bx$$

$$a = 59.026$$

$$b = 6.767$$

1) $r = .8643$

Lin Reg

$$y = a + bx$$

$$a = .7$$

$$b = 24.2$$

2) $r = .8361$

Lin Reg

$$y = a + bx$$

$$a = 2.45$$

$$b = .95$$

3) $r = .6022$

Lin Reg

$$y = a + bx$$

$$a = -2.9$$

$$b = 24.1$$

4) $r = -.8924$

- 54 Given $\triangle ABC$ with $a = 9$, $b = 10$, and $m\angle B = 70$, what type of triangle can be drawn?

- 1) an acute triangle, only
- 2) an obtuse triangle, only
- 3) both an acute triangle and an obtuse triangle
- 4) neither an acute triangle nor an obtuse triangle

- 55 What is the solution set for $2\cos\theta - 1 = 0$ in the interval $0^\circ \leq \theta < 360^\circ$?

- 1) $\{30^\circ, 150^\circ\}$
- 2) $\{60^\circ, 120^\circ\}$
- 3) $\{30^\circ, 330^\circ\}$
- 4) $\{60^\circ, 300^\circ\}$

- 56 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) $3\sin^2 x$

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

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

2) $3xy^3$

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

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

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

- 59 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) $\log 16 + 2\log m$

- 60 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

61 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

62 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

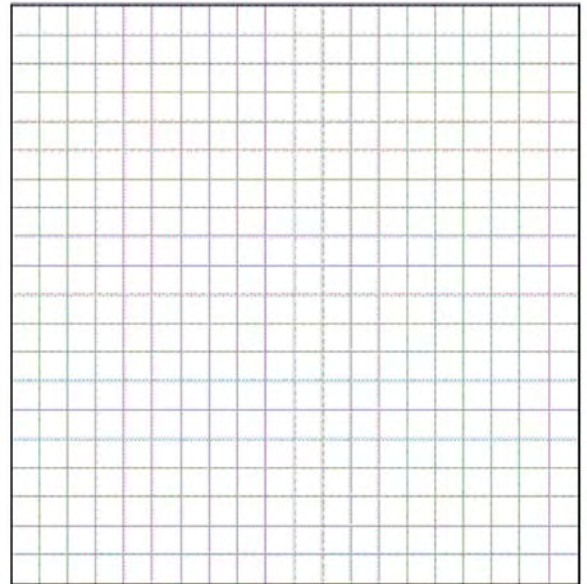
63 A math club has 30 boys and 20 girls. Which expression represents the total number of different 5-member teams, consisting of 3 boys and 2 girls, that can be formed?

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

64 The value of $\sin(180 + x)$ is equivalent to

- 1) $-\sin x$
- 2) $-\sin(90 - x)$
- 3) $\sin x$
- 4) $\sin(90 - x)$

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



66 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.

67 Express the exact value of $\csc 60^\circ$, with a rational denominator.

68 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

69 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) $(8, 3)$

70 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) $(-4, 9)$

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

72 The area of triangle ABC is 42. If $AB = 8$ and
 $m\angle B = 61$, the length of BC is approximately

- 1) 5.1
- 2) 9.2
- 3) 12.0
- 4) 21.7

73 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.

74 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 $\sec P > 0$

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

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

- 76 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

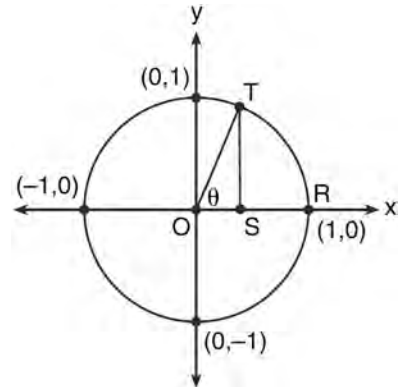
- 77 What is the common difference in the sequence $2a + 1, 4a + 4, 6a + 7, 8a + 10, \dots$?
- 1) $2a + 3$
 - 2) $-2a - 3$
 - 3) $2a + 5$
 - 4) $-2a + 5$

- 78 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

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

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

- 81 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}

- 82 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 $^{\circ}\text{F}$ (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*.

- 83 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
- 84 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) $-\frac{x}{x-2}$
- 85 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*.
- 86 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.

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

- 88 Solve the equation below algebraically, and express the result in simplest radical form:

$$\frac{13}{x} = 10 - x$$

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

- 90 Which summation represents $5 + 7 + 9 + 11 + \dots + 43$?

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

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

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

to

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

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

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

94 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

95 The value of $\csc 138^\circ 23'$ rounded to four decimal places is

- 1) -1.3376
- 2) -1.3408
- 3) 1.5012
- 4) 1.5057

96 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.

97 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

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

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

99 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) $\frac{x^2}{2y^3}$

- 100 If $x = 3i$, $y = 2i$, and $z = m + i$, the expression xy^2z equals
- 1) $-12 - 12mi$
 - 2) $-6 - 6mi$
 - 3) $12 - 12mi$
 - 4) $6 - 6mi$
- 101 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) $\{\pm 2, \pm 2i\}$
- 102 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) $\{y | y \in \text{real numbers}\}$
- 103 In $\triangle DEF$, $d = 5$, $e = 8$, and $m\angle D = 32$. How many distinct triangles can be drawn given these measurements?
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 0
- 104 If $f(x) = \sqrt{9 - x^2}$, what are its domain and range?
- 1) domain: $\{x | -3 \leq x \leq 3\}$; range: $\{y | 0 \leq y \leq 3\}$
 - 2) domain: $\{x | x \neq \pm 3\}$; range: $\{y | 0 \leq y \leq 3\}$
 - 3) domain: $\{x | x \leq -3 \text{ or } x \geq 3\}$; range: $\{y | y \neq 0\}$
 - 4) domain: $\{x | x \neq 3\}$; range: $\{y | y \geq 0\}$
- 105 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
- 106 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) $(x + 1)(x - 1)(x + 2)$
- 107 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) $\frac{7 - \sqrt{11}}{60}$
- 108 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) $2a^2b^3\sqrt{21a^2b}$
 - 3) $4a^3\sqrt{6ab^2}$
 - 4) $10a^2b^3\sqrt{8}$

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

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

110 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) $(x + 4)(x - 4)(3x - 5)(3x - 5)$

111 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

112 The expression $\frac{a + \frac{b}{c}}{d - \frac{b}{c}}$ is equivalent to

- 1) $\frac{c + 1}{d - 1}$
- 2) $\frac{a + b}{d - b}$
- 3) $\frac{ac + b}{cd - b}$
- 4) $\frac{ac + 1}{cd - 1}$

113 The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \dots$ is

- 1) $-13, 107$
- 2) $-21, 845$
- 3) $-39, 321$
- 4) $-65, 535$

114 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.

115 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 = $-\frac{2}{3}$

- 116 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.

- 117 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) $\frac{x + \sqrt{x}}{x - 1}$

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

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

- 119 Which expression is equivalent to $(3x^2)^{-1}$?

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

- 120 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

- 121 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.

122 What is the middle term in the expansion of

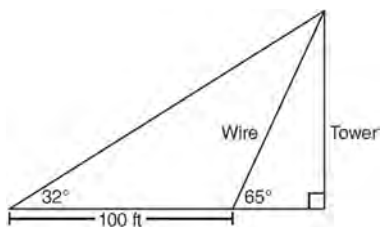
$$\left(\frac{x}{2} - 2y\right)^6?$$

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

123 If d varies inversely as t , and $d = 20$ when $t = 2$, what is the value of t when $d = -5$?

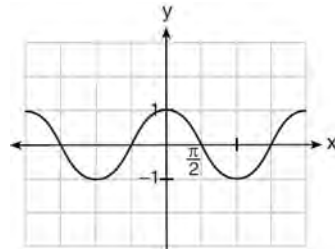
- 1) 8
- 2) 2
- 3) -8
- 4) -2

124 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.

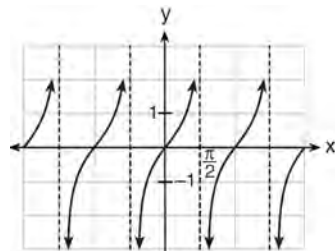


125 Convert 3 radians to degrees and express the answer to the nearest minute.

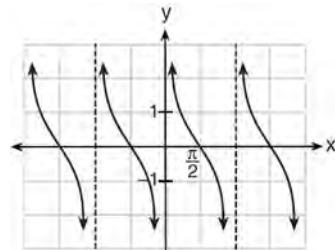
126 Which is a graph of $y = \cot x$?



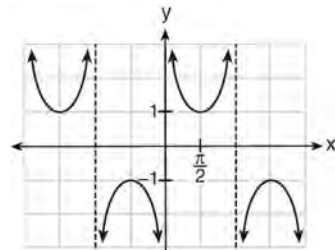
1)



2)



3)



4)

127 The points $(2, 3)$, $(4, \frac{3}{4})$, 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

- 128 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

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

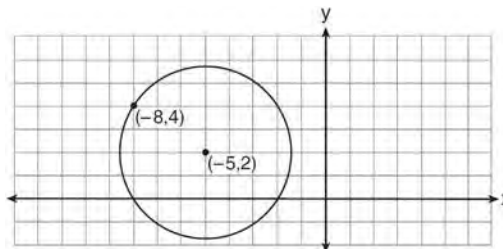
- 130 Which problem involves evaluating ${}_6P_4$?
- 1) How many different four-digit ID numbers can be formed using 1, 2, 3, 4, 5, and 6 without repetition?
 - 2) How many different subcommittees of four can be chosen from a committee having six members?
 - 3) How many different outfits can be made 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?

- 131 A sequence has the following terms: $a_1 = 4$, $a_2 = 10$, $a_3 = 25$, $a_4 = 62.5$. Which formula represents the n th 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) $a_n = 4(2.5)^{n-1}$

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

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

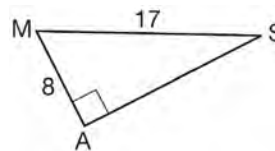
- 134 Write an equation of the circle shown in the diagram below.



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

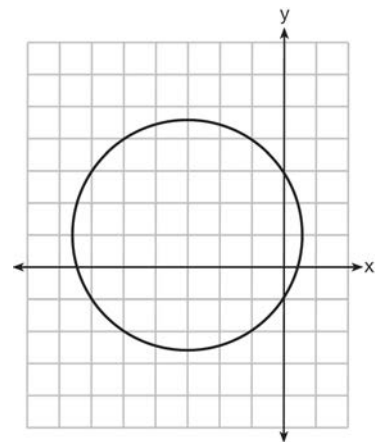
- 1) $-\frac{2}{3}$
- 2) $\frac{2}{3}$
- 3) $-\frac{7}{9}$
- 4) $\frac{7}{9}$

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



- 1) $28^\circ 1'$
- 2) $28^\circ 4'$
- 3) $61^\circ 56'$
- 4) $61^\circ 93'$

- 137 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) $y = 3 \sin 4x$
- 138 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
- 139 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 $(e, 1)$.
- 140 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) $\frac{\pi}{2} \leq x \leq \frac{3\pi}{2}$
- 141 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) ${}_8C_5$
- 142 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%
- 143 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) $(x + 3)^2 + (y - 1)^2 = 13$

- 144 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

- 145 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 $\{y|y \geq 0\}$

- 146 In $\triangle KLM$, $KL = 20$, $LM = 13$, 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

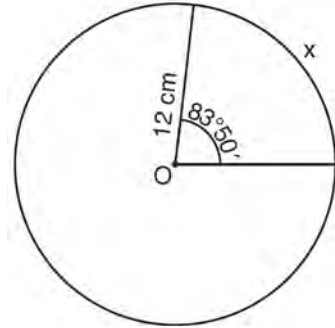
- 147 Which ordered pair is in the solution set of the system of equations shown below?

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

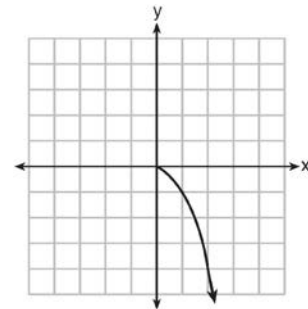
$$3y - x = 0$$

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

- 148 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 $83^\circ 50'$.

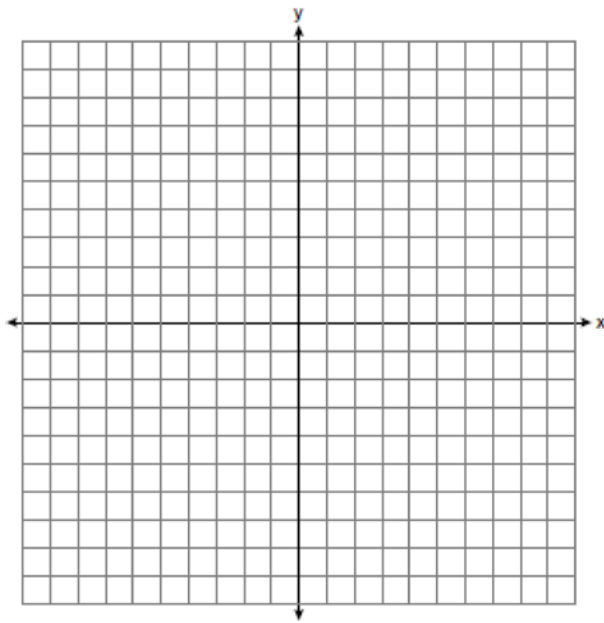


- 149 What is the range of the function shown below?

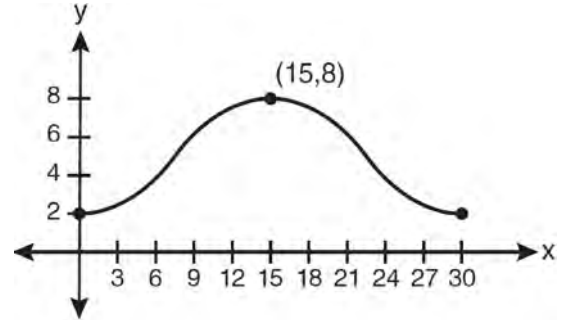


- 1) $x \leq 0$
 - 2) $x \geq 0$
 - 3) $y \leq 0$
 - 4) $y \geq 0$
- 150 What is the sum of the first 19 terms of the sequence 3, 10, 17, 24, 31, ...?
- 1) 1188
 - 2) 1197
 - 3) 1254
 - 4) 1292

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



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

- 152 What is the common ratio of the geometric sequence shown below?
 $-2, 4, -8, 16, \dots$

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

- 153 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) $\frac{1}{11 - x}$

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

- 156 Express the product of $\cos 30^\circ$ and $\sin 45^\circ$ in simplest radical form.

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

158 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) $\frac{11!}{2! \cdot 2! \cdot 2!}$

159 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) $-\frac{24}{25}$

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

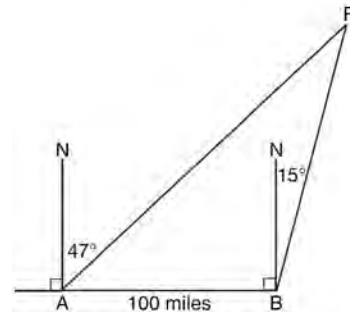
- 1) $2b - a + 1$
- 2) $2b - a - 1$
- 3) $b^2 - a + 10$
- 4) $\frac{2b}{a+1}$

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

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

163 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.]



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164 Solve algebraically for x :

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

165 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) $-\frac{1}{4}$

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

167 How many negative solutions to the equation

$$2x^3 - 4x^2 + 3x - 1 = 0$$
 exist?

- 1) 1
- 2) 2
- 3) 3
- 4) 0

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

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

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

171 In the interval $0^\circ \leq x < 360^\circ$, $\tan x$ is undefined when x equals

- 1) 0° and 90°
- 2) 90° and 180°
- 3) 180° and 270°
- 4) 90° and 270°

172 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.

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

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

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

176 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) $4n^{-1} > (6n)^{-1}$

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

178 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) $\log 6 + 2 \log a$

179 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) $-\frac{1}{2} - \frac{3}{2}i$

180 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.

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

182 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

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

184 Which value of k satisfies the equation
 $8^{3k+4} = 4^{2k-1}$?

- 1) -1
- 2) $-\frac{9}{4}$
- 3) -2
- 4) $-\frac{14}{5}$

- 185 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.

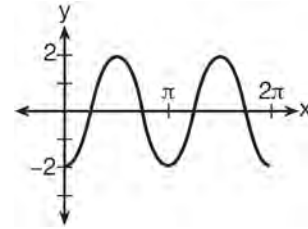
- 186 The expression $\sin(\theta + 90)^\circ$ is equivalent to
- 1) $-\sin \theta$
 - 2) $-\cos \theta$
 - 3) $\sin \theta$
 - 4) $\cos \theta$

- 187 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° .

- 188 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) $\frac{x^2}{16} - \frac{x}{6} - \frac{1}{9}$

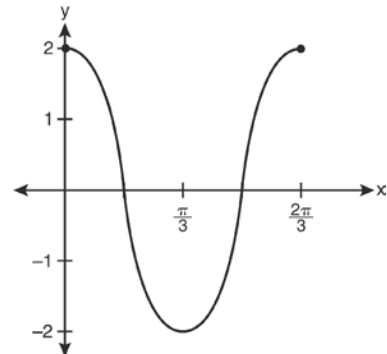
- 189 In parallelogram $BFLO$, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal BL is drawn, what is the area of $\triangle BLF$?
- 1) 11.4
 - 2) 14.1
 - 3) 22.7
 - 4) 28.1

- 190 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) $y = -2 \cos \frac{1}{2}x$

- 191 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) $y = 2 \sin \frac{2\pi}{3}x$

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

Algebra 2/Trigonometry Regents at Random

193 What is the domain of the function

$$f(x) = \sqrt{x-2} + 3?$$

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

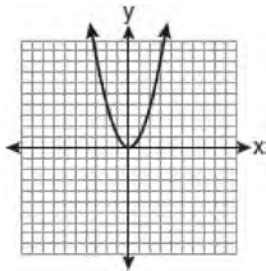
194 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to

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

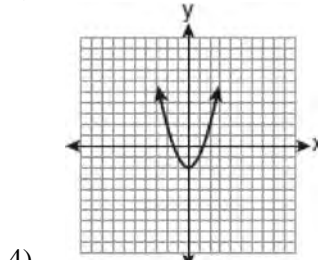
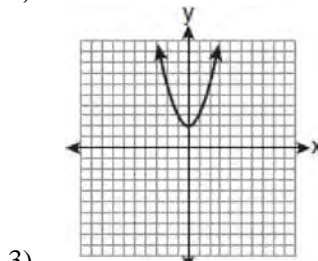
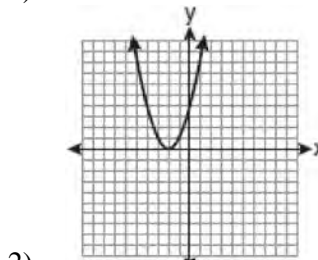
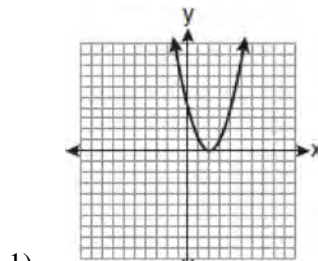
195 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to

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

196 The graph below shows the function $f(x)$.



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



197 The value of the expression $\sum_{r=3}^5 (-r^2 + r)$ is

- 1) -38
- 2) -12
- 3) 26
- 4) 62

198 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) $2\sqrt{x+2}$

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

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

200 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*.

201 Which arithmetic sequence has a common difference of 4?

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

202 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

203 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

204 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}

- 205 What is the fifteenth term of the geometric sequence $-\sqrt{5}, \sqrt{10}, -2\sqrt{5}, \dots$?
- 1) $-128\sqrt{5}$
 - 2) $128\sqrt{10}$
 - 3) $-16384\sqrt{5}$
 - 4) $16384\sqrt{10}$
- 206 In simplest form, $\sqrt{-300}$ is equivalent to
- 1) $3i\sqrt{10}$
 - 2) $5i\sqrt{12}$
 - 3) $10i\sqrt{3}$
 - 4) $12i\sqrt{5}$
- 207 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) $\frac{7\pi}{6}$
- 208 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.
- 209 Find the sum and product of the roots of the equation $5x^2 + 11x - 3 = 0$.
- 210 In $\triangle ABC$, $m\angle A = 32$, $a = 12$, and $b = 10$. Find the measures of the missing angles and side of $\triangle ABC$. Round each measure to the nearest tenth.
- 211 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) $2x^2 - 6x + 4 = 0$
- 212 The conjugate of $7 - 5i$ is
- 1) $-7 - 5i$
 - 2) $-7 + 5i$
 - 3) $7 - 5i$
 - 4) $7 + 5i$
- 213 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
- 214 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) $4x^2 + 3x - 2 = 0$

- 215 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) $-\cos^2 \theta - 1$
- 216 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.
- 217 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) $\{x | 0 \leq x \leq \pi\}$
 - 2) $\{x | 0 \leq x \leq 2\pi\}$
 - 3) $\left\{x \mid -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$
 - 4) $\left\{x \mid -\frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$
- 218 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) $\frac{20!}{3!}$
 - 3) ${}_{20}C_3$
 - 4) ${}_{20}P_3$
- 219 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) $2x^2(2x + 3)(3x - 2)$
- 220 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) $\csc^2 \theta$
- 221 The expression $(3 - 7i)^2$ is equivalent to
- 1) $-40 + 0i$
 - 2) $-40 - 42i$
 - 3) $58 + 0i$
 - 4) $58 - 42i$
- 222 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) $\frac{3 \pm 3\sqrt{5}}{2}$

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

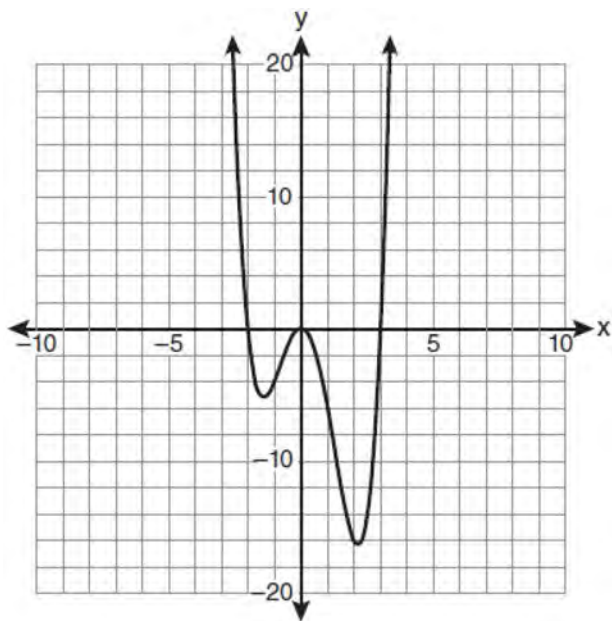
$$\{(0, 1), (1, 2), (2, 4), (3, 8)\}$$

Which equation represents $f(x)$?

- 1) $f(x) = 2^x$
- 2) $f(x) = 2x$
- 3) $f(x) = x + 1$
- 4) $f(x) = \log_2 x$

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

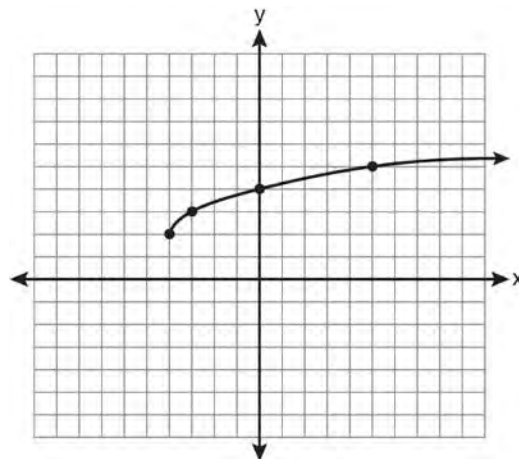
- 225 The graph of $y = f(x)$ is shown below.



Which set lists all the real solutions of $f(x) = 0$?

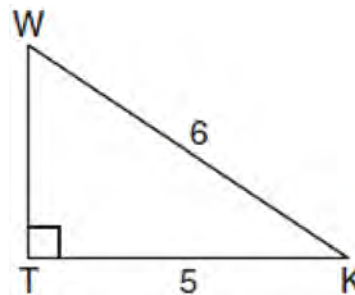
- 1) $\{-3, 2\}$
- 2) $\{-2, 3\}$
- 3) $\{-3, 0, 2\}$
- 4) $\{-2, 0, 3\}$

- 226 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) $\{x|x \geq 2\}; \{y|y \geq -4\}$

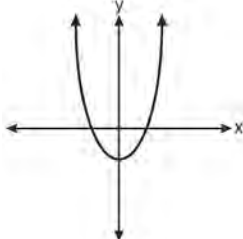
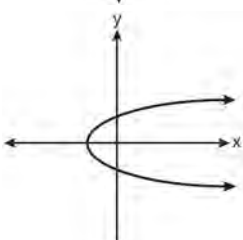
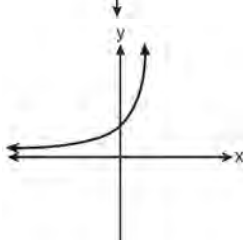
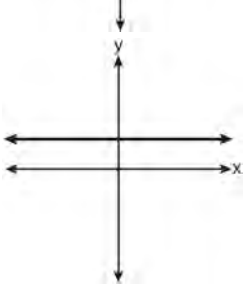
- 227 In the diagram below of right triangle KTW , $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.



What is the measure of $\angle K$, to the nearest minute?

- 1) $33^\circ 33'$
- 2) $33^\circ 34'$
- 3) $33^\circ 55'$
- 4) $33^\circ 56'$

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

- 1) 
- 2) 
- 3) 
- 4) 

229 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 $\tan(A + B)$.

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

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

232 What is the coefficient of the fourth term in the expansion of $(a - 4b)^9$?

- 1) $-5,376$
- 2) -336
- 3) 336
- 4) $5,376$

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

234 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

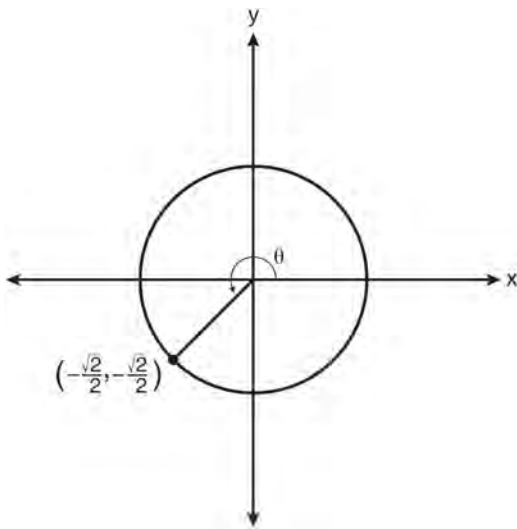
235 Express as a single fraction the exact value of $\sin 75^\circ$.

236 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) $\{x | x < -5 \text{ or } x > 2\}$

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

- 238 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
- 239 The solution set of the equation $\sqrt{x+3} = 3-x$ is
- 1) $\{1\}$
 - 2) $\{0\}$
 - 3) $\{1, 6\}$
 - 4) $\{2, 3\}$

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

- 241 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

- 242 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
- 243 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

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

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

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

- 1) $\log \frac{x^2}{y^3z}$
- 2) $\log \frac{x^2z}{y^3}$
- 3) $\log \frac{2x}{3yz}$
- 4) $\log \frac{2xz}{3y}$

247 Find all values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $\sin 2\theta = \sin \theta$.

248 Which relation is *not* a function?

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

- 249 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

250 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

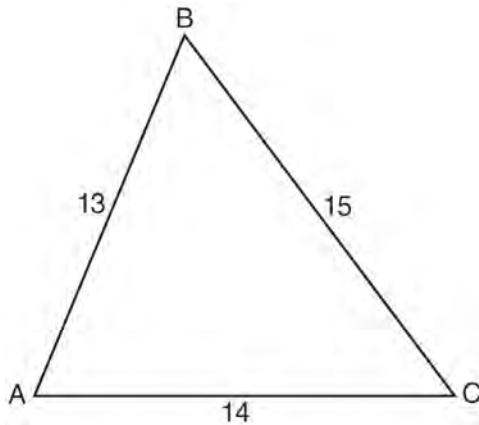
Using $x = 1$ to represent the year 1986 and y to represent the number of new stores, write the exponential regression equation for these data. Round all values to the nearest thousandth.

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

252 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) $-\frac{63}{65}$

253 In $\triangle ABC$, $a = 15$, $b = 14$, and $c = 13$, as shown in the diagram below. What is the $m\angle C$, to the nearest degree?



- 1) 53
- 2) 59
- 3) 67
- 4) 127

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

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

255 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

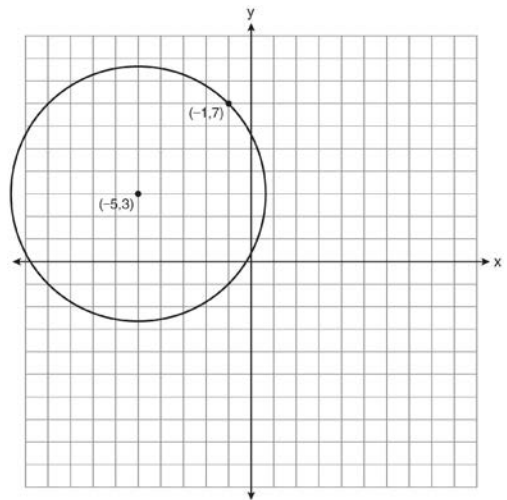
256 Solve algebraically for all values of x :

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

257 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

258 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.

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

260 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

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

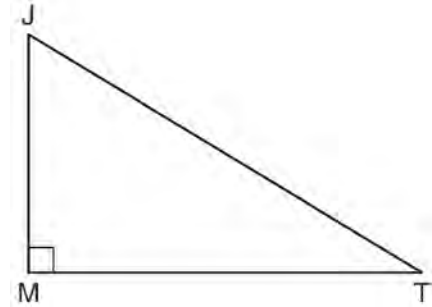
262 In a triangle, two sides that measure 6 cm and 10 cm form an angle that measures 80° . Find, to the nearest degree, the measure of the smallest angle in the triangle.

263 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

264 Express the sum $7 + 14 + 21 + 28 + \dots + 105$ using sigma notation.

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

266 The value of $\tan 126^\circ 43'$ to the nearest ten-thousandth is

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

267 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) $\cos A = \frac{8}{5}$

268 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.

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

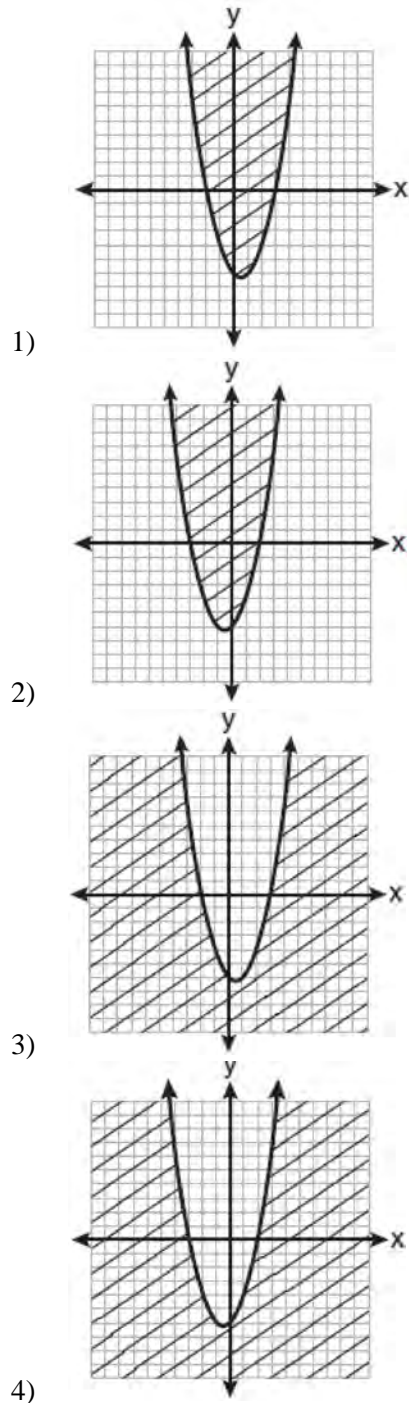
- 1) $\sin x$
- 2) $\sin 7x$
- 3) $\cos x$
- 4) $\cos 7x$

270 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.]

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



272 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.

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



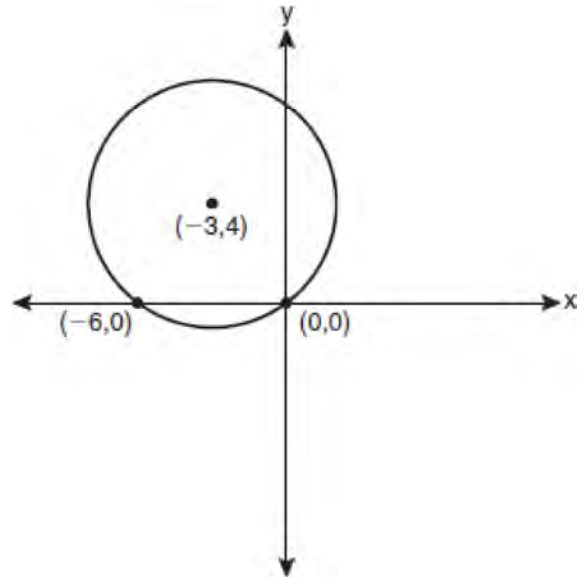
274 What is the range of $f(x) = (x + 4)^2 + 7$?

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

275 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) $\{(0, 1), (1, 0), (2, 0), (3, 2)\}$

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



277 The equation $y - 2 \sin \theta = 3$ may be rewritten as

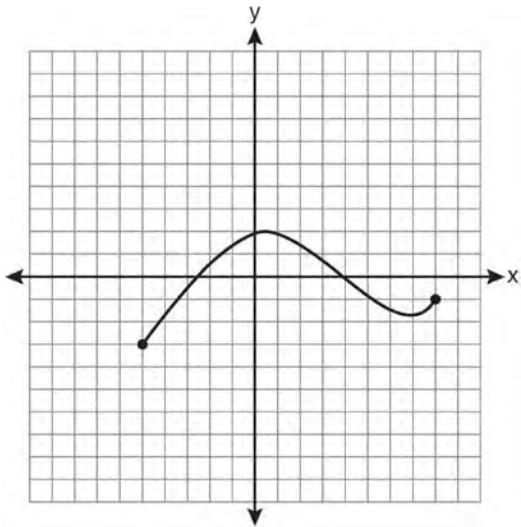
- 1) $f(y) = 2 \sin x + 3$
- 2) $f(y) = 2 \sin \theta + 3$
- 3) $f(x) = 2 \sin \theta + 3$
- 4) $f(\theta) = 2 \sin \theta + 3$

278 Written in simplest form, the expression $\frac{\frac{x}{4} - \frac{1}{x}}{\frac{1}{2x} + \frac{1}{4}}$

is equivalent to

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

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



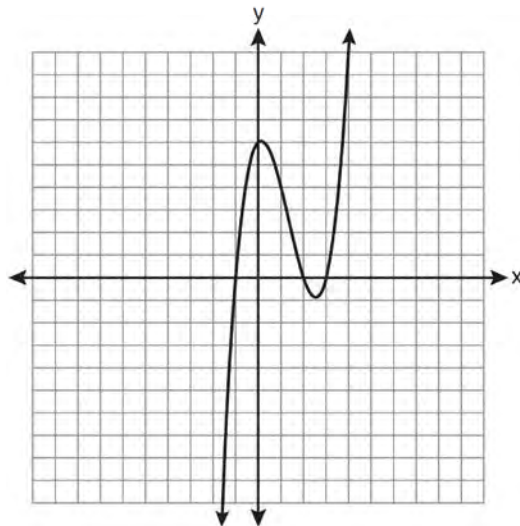
State the domain and range of this function.

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

281 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) $\frac{{}^{15}P_2 \cdot {}^5P_1}{{}^{30}P_3}$

282 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

283 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) $17 = \frac{446 + 16x}{26 + x}$

284 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.

285 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) $\frac{7\pi}{3}$

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

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

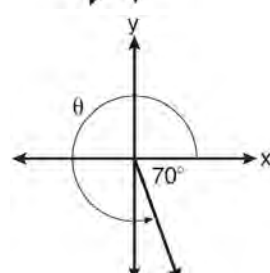
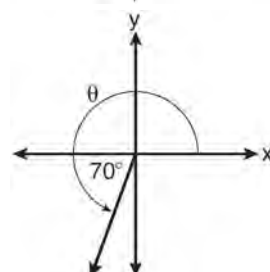
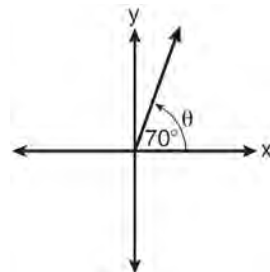
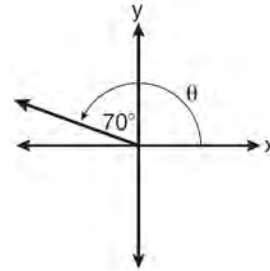
287 If $\angle A$ is acute and $\tan A = \frac{2}{3}$, then

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

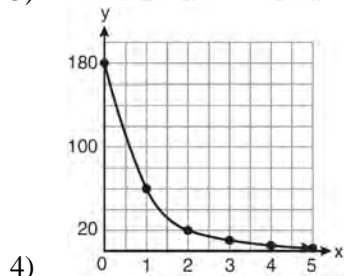
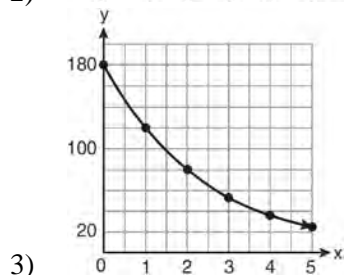
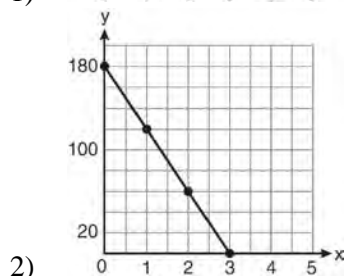
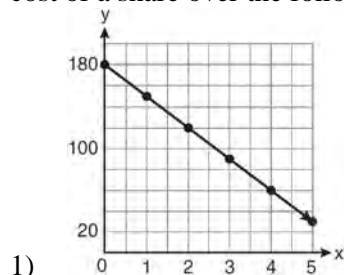
288 What is the fifteenth term of the sequence $5, -10, 20, -40, 80, \dots$?

- 1) $-163,840$
- 2) $-81,920$
- 3) $81,920$
- 4) $327,680$

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



- 290 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?



- 291 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*?

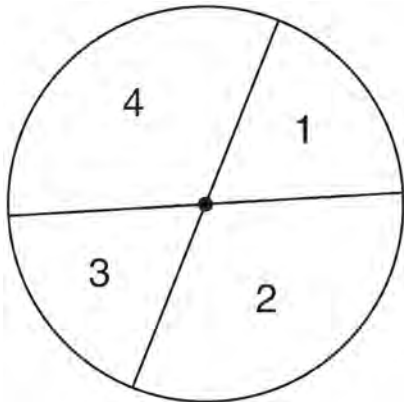
- 1) $8!$
- 2) $\frac{8!}{4!}$
- 3) $\frac{8!}{2!+2!}$
- 4) $\frac{8!}{2! \cdot 2!}$

- 292 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.

- 293 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?

- 294 What is the fourth term in the expansion of $(3x - 2)^5$?
- 1) $-720x^2$
 - 2) $-240x$
 - 3) $720x^2$
 - 4) $1,080x^3$

- 295 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) $\frac{2}{3}$
- 296 What is the solution of the equation $2\log_4(5x) = 3$?
- 1) 6.4
 - 2) 2.56
 - 3) $\frac{9}{5}$
 - 4) $\frac{8}{5}$

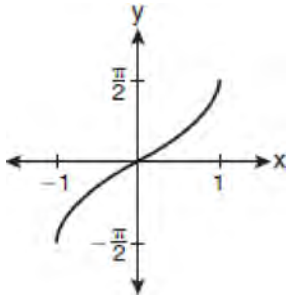
- 297 If $r = \sqrt[3]{\frac{A^2B}{C}}$, then $\log r$ can be represented by
- 1) $\frac{1}{6}\log A + \frac{1}{3}\log B - \log C$
 - 2) $3(\log A^2 + \log B - \log C)$
 - 3) $\frac{1}{3}\log(A^2 + B) - C$
 - 4) $\frac{2}{3}\log A + \frac{1}{3}\log B - \frac{1}{3}\log C$

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

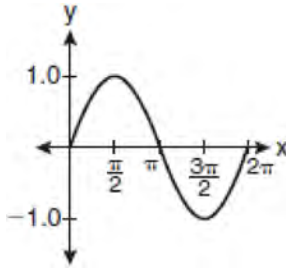
- 1) $\sum_{k=1}^{20} (2k-1)$
- 2) $\sum_{k=2}^{40} (k-1)$
- 3) $\sum_{k=-1}^{37} (k+2)$
- 4) $\sum_{k=1}^{39} (2k-1)$

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

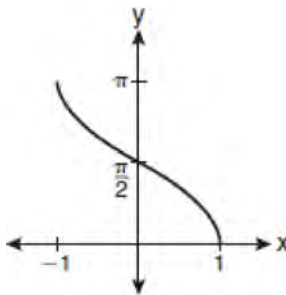
300 Which graph represents the equation $y = \cos^{-1}x$?



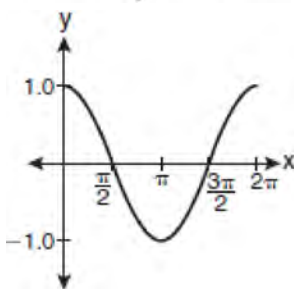
1)



2)



3)

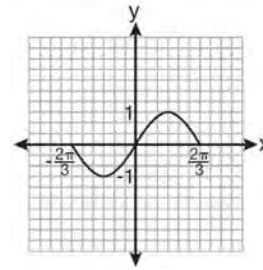


4)

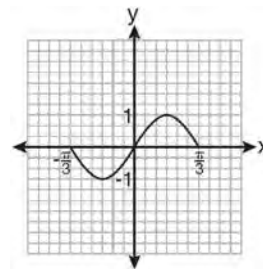
301 Starting with $\sin^2 A + \cos^2 A = 1$, derive the formula $\tan^2 A + 1 = \sec^2 A$.

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

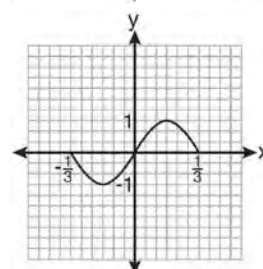
303 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?



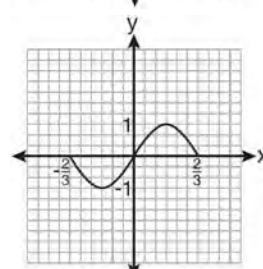
1)



2)



3)



4)

304 What is a formula for the n th term of sequence B shown below?

$$B = 10, 12, 14, 16, \dots$$

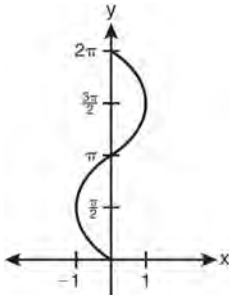
1) $b_n = 8 + 2n$

2) $b_n = 10 + 2n$

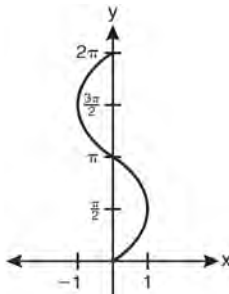
3) $b_n = 10(2)^n$

4) $b_n = 10(2)^{n-1}$

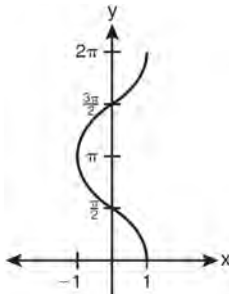
305 Which graph shows $y = \cos^{-1}x$?



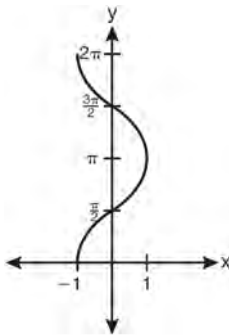
1)



2)



3)



4)

306 If $\sin A = \frac{2}{3}$ where $0^\circ < A < 90^\circ$, 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) $-\frac{4\sqrt{5}}{9}$

307 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) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

308 In $\triangle ABC$, $a = 3$, $b = 5$, and $c = 7$. What is $m\angle C$?

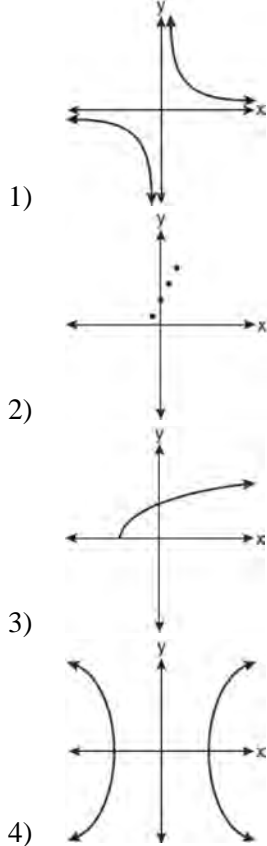
- 1) 22
- 2) 38
- 3) 60
- 4) 120

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

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

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

311 Which graph does *not* represent a function?



312 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.

313 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) $\frac{17 + 5\sqrt{3}}{14}$

314 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.

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

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

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

- 317 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.

- 318 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) $x^2 + 6x - 5$

- 319 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) $\frac{8}{9}$

- 320 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.

- 321 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.

- 322 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) $a^{-2}b^{-1}$

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

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

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

326 What is the formula for the n th term of the sequence 54, 18, 6, ...?

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

327 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) $4x^8y^{28}$

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

329 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.

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

331 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) $(-6, -3)$

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

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

$$a_1 = -3$$

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

334 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

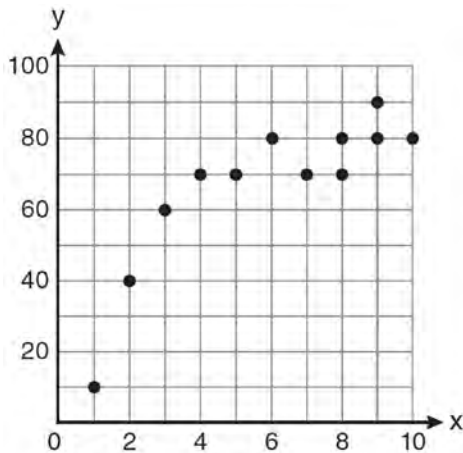
3) 3

4) 6

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

- 336 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
- 337 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.
- 338 The expression $\log_8 64$ is equivalent to
- 1) 8
 - 2) 2
 - 3) $\frac{1}{2}$
 - 4) $\frac{1}{8}$
- 339 What are the values of θ in the interval $0^\circ \leq \theta < 360^\circ$ that satisfy the equation $\tan \theta - \sqrt{3} = 0$?
- 1) $60^\circ, 240^\circ$
 - 2) $72^\circ, 252^\circ$
 - 3) $72^\circ, 108^\circ, 252^\circ, 288^\circ$
 - 4) $60^\circ, 120^\circ, 240^\circ, 300^\circ$
- 340 If $f(x) = x^2 - 6$ and $g(x) = 2^x - 1$, determine the value of $(g \circ f)(-3)$.
- 341 The value of x in the equation $4^{2x+5} = 8^{3x}$ is
- 1) 1
 - 2) 2
 - 3) 5
 - 4) -10
- 342 Evaluate: $10 + \sum_{n=1}^5 (n^3 - 1)$
- 343 In $\triangle ABC$, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?
- 1) 73.7 and 106.3
 - 2) 73.7 and 163.7
 - 3) 78.3 and 101.7
 - 4) 78.3 and 168.3
- 344 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

- 345 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
- 346 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 $g(x) = -\frac{1}{2}x + 4$
- 347 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

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

349 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) $\frac{4}{5}x$

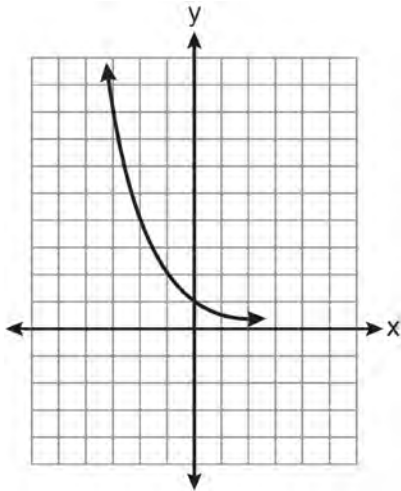
350 What is the period of the function $f(\theta) = -2\cos 3\theta$?

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

351 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) $\frac{5}{18}$

352 Which equation is represented by the graph below?



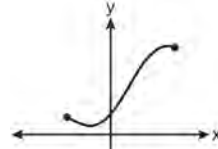
- 1) $y = 5^x$
- 2) $y = 0.5^x$
- 3) $y = 5^{-x}$
- 4) $y = 0.5^{-x}$

353 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?

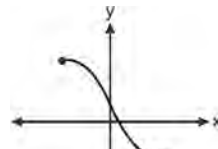
- 1) the size of the sample
- 2) the size of the population
- 3) the method of analyzing the data
- 4) the method of choosing the students who were surveyed

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

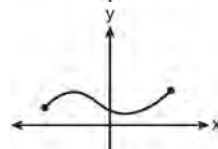
355 Which graph does *not* represent a function?



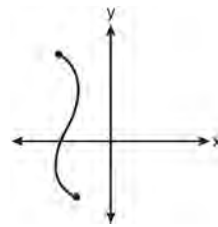
1)



2)



3)



4)

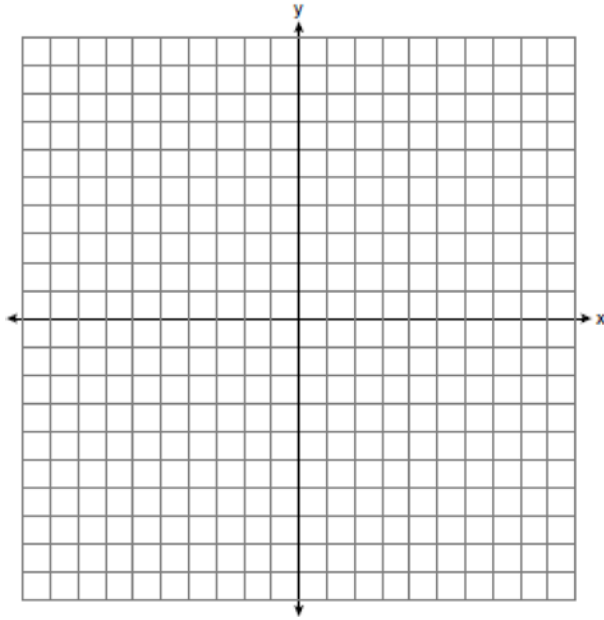
356 Which value of r represents data with a strong negative linear correlation between two variables?

- 1) -1.07
- 2) -0.89
- 3) -0.14
- 4) 0.92

357 The product of i^7 and i^5 is equivalent to

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

- 358 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.



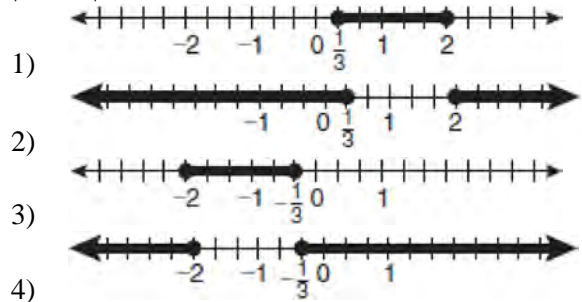
- 359 If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be
- 1) $(x + 3)^2 = 7$
 - 2) $(x - 3)^2 = 7$
 - 3) $(x - 3)^2 = 11$
 - 4) $(x - 6)^2 = 34$

- 360 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

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

- 362 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) $\frac{37}{3}$

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



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

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

366 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.

367 The table below shows the first-quarter averages for Mr. Harper's statistics class.

Statistics Class Averages

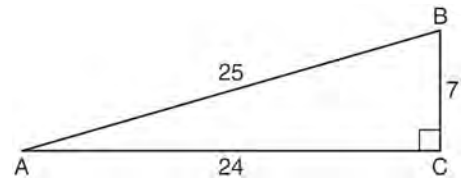
Quarter Averages	Frequency
99	1
97	5
95	4
92	4
90	7
87	2
84	6
81	2
75	1
70	2
65	1

What is the population variance for this set of data?

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

368 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.

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

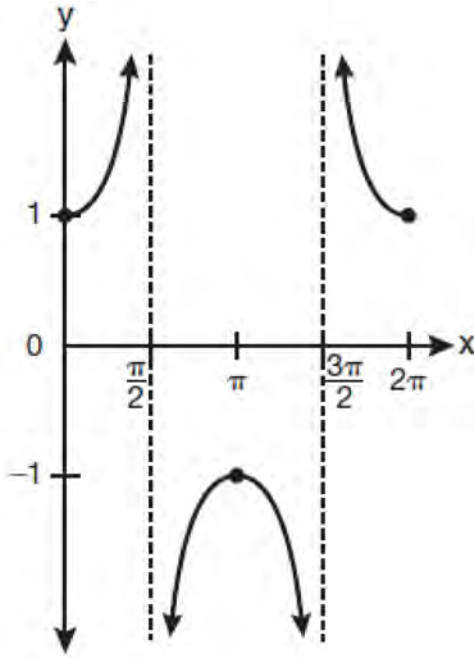


- 1) $\frac{25}{24}$
- 2) $\frac{25}{7}$
- 3) $\frac{24}{7}$
- 4) $\frac{7}{24}$

370 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) $\frac{\sqrt{3}}{a}$

371 Which equation is represented by the graph below?



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

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

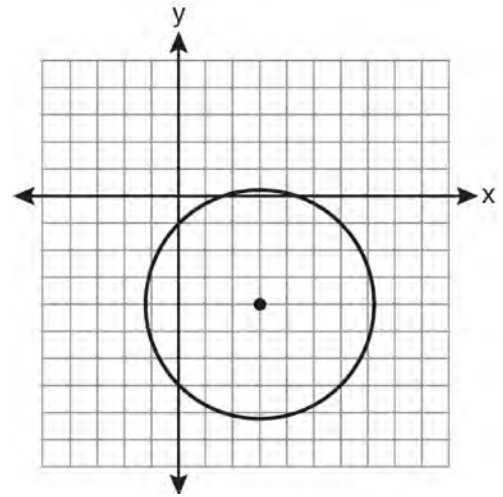
- 1) -1
- 2) $-\frac{1}{x}$
- 3) $\frac{1}{x^2}$
- 4) $\frac{1}{(x-1)^2}$

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

374 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) $\frac{7 \pm \sqrt{73}}{4}$

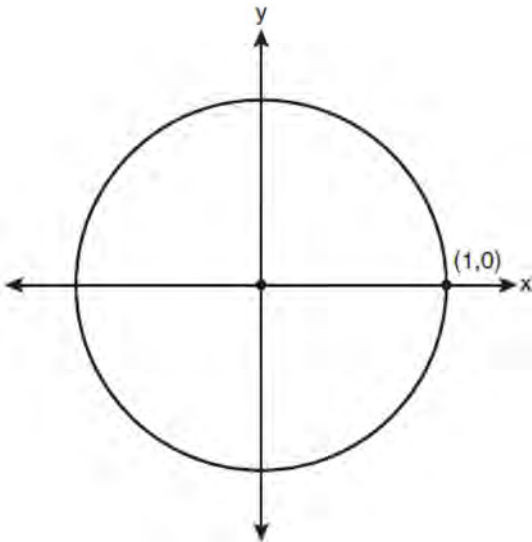
375 Which equation represents the circle shown in the graph below that passes through the point $(0, -1)$?



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

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

- 377 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 $\sin 240^\circ$.



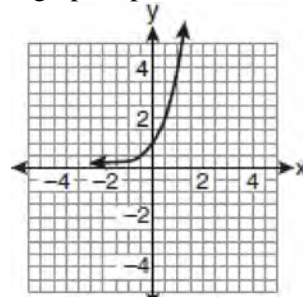
- 378 What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?

- 1) -30°
- 2) 60°
- 3) 150°
- 4) 240°

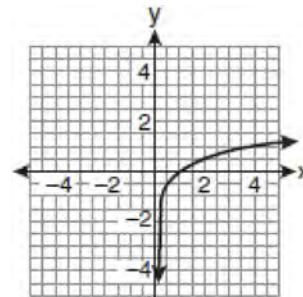
- 379 The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to

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

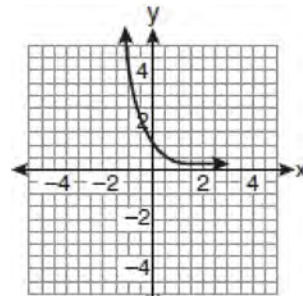
- 380 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?



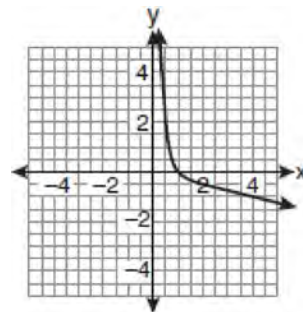
1)



2)



3)



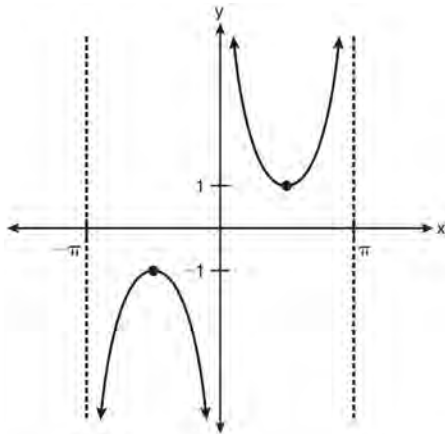
4)

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

- 382 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

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

- 384 Which equation is sketched in the diagram below?



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

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

- 386 The expression $\frac{4}{5 - \sqrt{13}}$ is equivalent to

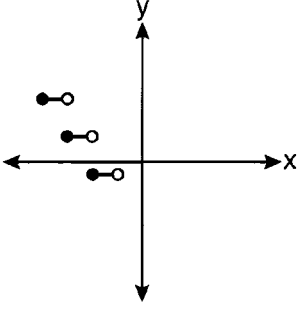
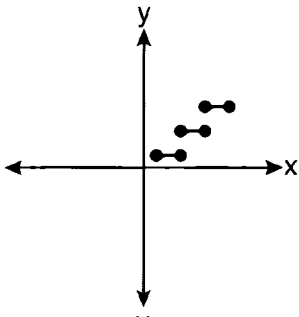
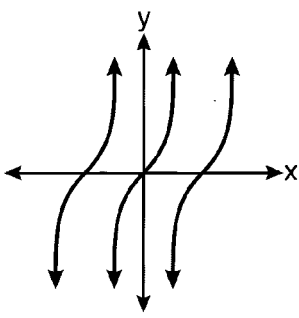
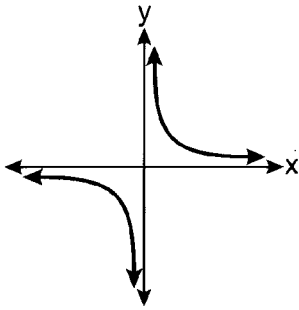
- 1) $\frac{4\sqrt{13}}{5\sqrt{13} - 13}$
- 2) $\frac{4(5 - \sqrt{13})}{38}$
- 3) $\frac{5 + \sqrt{13}}{3}$
- 4) $\frac{4(5 + \sqrt{13})}{38}$

- 387 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

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

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

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



390 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

Algebra 2/Trigonometry Regents at Random Answer Section

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

2 ANS: 2 PTS: 2 REF: 061218a2 STA: A2.A.43
TOP: Defining Functions

3 ANS:

$$\begin{aligned} 7. \quad 4 - \sqrt{2x-5} &= 1 \\ -\sqrt{2x-5} &= -3 \\ 2x - 5 &= 9 \\ 2x &= 14 \\ x &= 7 \end{aligned}$$

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

4 ANS: 2

$$\begin{aligned} \tan 30 &= \frac{\sqrt{3}}{3} \cdot \text{Arc cos } \frac{\sqrt{3}}{k} = 30 \\ \frac{\sqrt{3}}{k} &= \cos 30 \\ k &= 2 \end{aligned}$$

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

5 ANS: 1

$$\begin{aligned} 2x - 1 &> 5 & 2x - 1 &< -5 \\ 2x &> 6 & 2x &> -4 \\ x &> 3 & x &< -2 \end{aligned}$$

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

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

7 ANS: 4 PTS: 2 REF: 011323a2 STA: A2.A.2
TOP: Using the Discriminant KEY: determine nature of roots given equation

8 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

9 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

10 ANS: 3 PTS: 2 REF: 011422a2 STA: A2.A.54

TOP: Graphing Logarithmic Functions

11 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

12 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

13 ANS: 3

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

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

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

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

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

KEY: graph

14 ANS: 1

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

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

KEY: degrees

15 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

16 ANS:

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

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

17 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: advanced18 ANS: 2 PTS: 2 REF: 061322a2 STA: A2.A.73
TOP: Law of Sines KEY: modeling19 ANS: 1 PTS: 2 REF: 061202a2 STA: A2.A.51
TOP: Domain and Range

20 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

21 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: division22 ANS: 1 PTS: 2 REF: 061211a2 STA: A2.A.54
TOP: Graphing Logarithmic Functions

23 ANS:

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

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

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

KEY: advanced

24 ANS: 3 PTS: 2 REF: 061219a2 STA: A2.N.8

TOP: Conjugates of Complex Numbers

25 ANS: 1

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

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

26 ANS: 3

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

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

KEY: basic

27 ANS: 2 PTS: 2 REF: 011208a2 STA: A2.A.67

TOP: Proving Trigonometric Identities

28 ANS: 3

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

$$\frac{-6x+30}{x-2} \leq 0 \quad \begin{array}{l} -6x = -30 \\ x = 5 \end{array} \quad x = 2$$

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

$$\frac{-6(6)+30}{6-2} = \frac{-6}{4} = -\frac{3}{2}, \text{ which is less than } 0.$$

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

29 ANS:

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

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

30 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

31 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

32 ANS: 4 PTS: 2 REF: 061206a2 STA: A2.A.60

TOP: Unit Circle

33 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

34 ANS: 1

L1	L2	L3	3
20	125		
25	125		
30	125		
35	125		
40	125		
45	115		
50	115		
L3(1)=			

LinReg
y=ax+b
a=.6642857143
b=148.5357143
r ² =.9982686981
r=.999133974

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

35 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43

TOP: Defining Functions

36 ANS: 1 PTS: 2 REF: 061223a2 STA: A2.S.15

TOP: Binomial Probability KEY: modeling

37 ANS: 2

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

PTS: 2

REF: 011420a2

STA: A2.S.5

TOP: Normal Distributions

KEY: predict

38 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

39 ANS: 1

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

PTS: 2

REF: 011427a2

STA: A2.M.2

TOP: Radian Measure

KEY: degrees

40 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

41 ANS:

$$a_1 = 3. \quad a_2 = 2(3) - 1 = 5. \quad a_3 = 2(5) - 1 = 9.$$

PTS: 2

REF: 061233a2

STA: A2.A.33

TOP: Recursive Sequences

42 ANS:

$$2\sin^2x + 5\sin x - 3 = 0$$

$$(2\sin x - 1)(\sin x + 3) = 0$$

$$\sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

PTS: 4 REF: 011436a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: quadratics

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

44 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

45 ANS:

$$x < -1 \text{ or } x > 5. \quad x^2 - 4x - 5 > 0. \quad x - 5 > 0 \text{ and } x + 1 > 0 \text{ or } x - 5 < 0 \text{ and } x + 1 < 0$$

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

$$x > 5$$

$$x < -1$$

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

46 ANS: 1 PTS: 2 REF: 011314a2 STA: A2.N.3
TOP: Operations with Polynomials

47 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

48 ANS:

$$\text{Sum } \frac{-b}{a} = -\frac{1}{12}. \quad \text{Product } \frac{c}{a} = -\frac{1}{2}$$

PTS: 2 REF: 061328a2 STA: A2.A.20 TOP: Roots of Quadratics

49 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

50 ANS: 3

$${}^3C_2(2x^4)^1(-y)^2 = 6x^4y^2$$

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

51 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.53

TOP: Graphing Exponential Functions

52 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

53 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

54 ANS: 1

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

$$A = 58$$

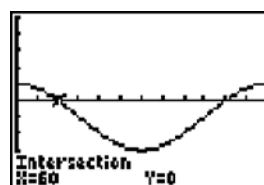
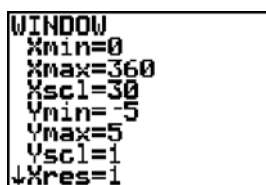
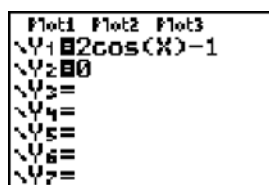
PTS: 2 REF: 011210a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

55 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

56 ANS: 2 PTS: 2 REF: 061216a2 STA: A2.A.42

TOP: Compositions of Functions KEY: variables

57 ANS: 1 PTS: 2 REF: 011306a2 STA: A2.A.8

TOP: Negative and Fractional Exponents

58 ANS:

$$3x^2 - 11x + 6 = 0. \text{ Sum } \frac{-b}{a} = \frac{11}{3}. \text{ Product } \frac{c}{a} = \frac{6}{3} = 2$$

PTS: 2 REF: 011329a2 STA: A2.A.20 TOP: Roots of Quadratics

59 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

60 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

61 ANS: 3

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

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

62 ANS: 4

$${}_{15}C_5 = 3,003. \quad {}_{25}C_5 = {}_{25}C_{20} = 53,130. \quad {}_{25}C_{15} = 3,268,760.$$

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

63 ANS: 2 PTS: 2 REF: 011417a2 STA: A2.S.9

TOP: Differentiating Permutations and Combinations

64 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

65 ANS:

$$3 - 2x \geq 7 \quad \text{or} \quad 3 - 2x \leq -7$$

$$-2x \geq 4 \quad -2x \leq -10$$

$$x \leq -2 \quad x \geq 5$$

PTS: 2 REF: 011334a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

66 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

67 ANS:

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

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

68 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

69 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

70 ANS: 3

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

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

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

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

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

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

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

$$x = -5, 4$$

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

KEY: equations

71 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

72 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

73 ANS:

$$y = 215.983(1.652)^x. \quad 215.983(1.652)^7 \approx 7250$$

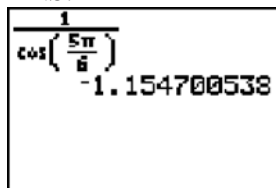
PTS: 4 REF: 011337a2 STA: A2.S.7 TOP: Exponential Regression

74 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

75 ANS: 1



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

76 ANS: 2

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

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

77 ANS: 1

$$(4a + 4) - (2a + 1) = 2a + 3$$

PTS: 2 REF: 011401a2 STA: A2.A.30 TOP: Sequences

78 ANS: 2 PTS: 2 REF: 061301a2 STA: A2.S.1

TOP: Analysis of Data

79 ANS: 1

$$5x + 29 = (x + 3)^2 \quad . \quad (-5) + 3 \text{ shows an extraneous solution.}$$

$$5x + 29 = x^2 + 6x + 9$$

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

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

$$x = -5, 4$$

PTS: 2 REF: 061213a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

80 ANS:

$$S_n = \frac{n}{2} (2a + (n-1)d)$$

$$= \frac{10}{2} (2(1) + (10-1)(-10))$$

$$= 5(2 - 90)$$

$$= 5(-88)$$

$$= -440$$

-104

-104.

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

81 ANS: 2 PTS: 2 REF: 011315a2 STA: A2.A.55
TOP: Trigonometric Ratios

82 ANS:

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

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

83 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

84 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

85 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

86 ANS:

$${}_{25}C_{20} = 53,130$$

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

87 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

88 ANS:

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

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

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

PTS: 4 REF: 061336a2 STA: A2.A.23 TOP: Solving Rationals

KEY: irrational and complex solutions

89 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

90 ANS: 2 PTS: 2 REF: 061205a2 STA: A2.A.34

TOP: Sigma Notation

91 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

92 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

93 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

94 ANS: 2

Since the coefficient of t is greater than 0, $r > 0$.

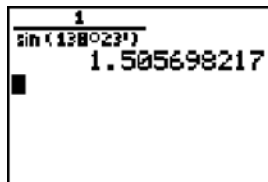
PTS: 2

REF: 011303a2

STA: A2.S.8

TOP: Correlation Coefficient

95 ANS: 4



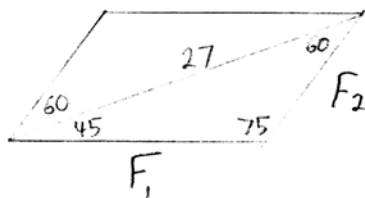
PTS: 2

REF: 061217a2

STA: A2.A.66

TOP: Determining Trigonometric Functions

96 ANS:



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

$$F_1 \approx 24 \quad F_2 \approx 20$$

PTS: 4

REF: 061238a2

STA: A2.A.73

TOP: Vectors

97 ANS: 4

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

PTS: 2

REF: 011204a2

STA: A2.A.42

TOP: Compositions of Functions

KEY: numbers

98 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

99 ANS: 1

PTS: 2

REF: 061324a2

STA: A2.A.9

TOP: Negative Exponents

100 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

101 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

102 ANS: 2 PTS: 2 REF: 011222a2 STA: A2.A.39

TOP: Domain and Range KEY: real domain

103 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

104 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39

TOP: Domain and Range KEY: real domain

105 ANS: 1 PTS: 2 REF: 061316a2 STA: A2.S.8

TOP: Correlation Coefficient

106 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

107 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

108 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

109 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

110 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

111 ANS: 4 PTS: 2 REF: 011201a2 STA: A2.S.2

TOP: Analysis of Data

112 ANS: 3

$$a + \frac{b}{c} = \frac{ac+b}{c}$$

$$d - \frac{b}{c} = \frac{cd-b}{c}$$

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

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

113 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

114 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

115 ANS: 2

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

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

116 ANS:

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

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

117 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

118 ANS: 3

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

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

119 ANS: 1 PTS: 2 REF: 011402a2 STA: A2.A.8

TOP: Negative and Fractional Exponents

120 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

121 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

122 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

123 ANS: 3

$$20 \cdot 2 = -5t$$

$$-8 = t$$

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

124 ANS:

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

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

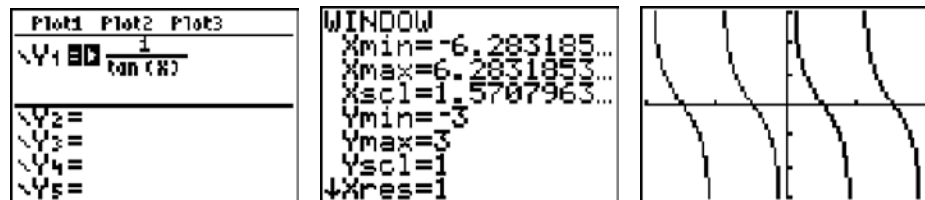
PTS: 4 REF: 011236a2 STA: A2.A.73 TOP: Law of Sines
KEY: advanced

125 ANS:

$$3 \times \frac{180}{\pi} \approx 171.89^\circ \approx 171^\circ 53'$$

PTS: 2 REF: 011335a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

126 ANS: 3



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

127 ANS: 2

$$2^2 \cdot 3 = 12 \quad 6^2 d = 12$$

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

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

PTS: 2 REF: 061310a2 STA: A2.A.5 TOP: Inverse Variation

128 ANS: 3

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

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

129 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

130 ANS: 1 PTS: 2 REF: 061317a2 STA: A2.S.9

TOP: Differentiating Permutations and Combinations

131 ANS: 4

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

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

132 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

133 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

134 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

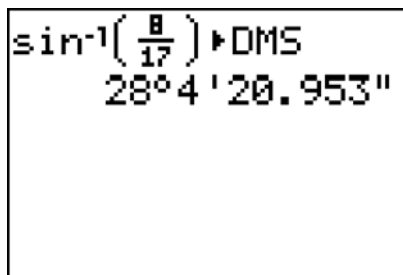
135 ANS: 4

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

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

KEY: evaluating

136 ANS: 2



$$\sin^{-1}\left(\frac{8}{17}\right) \text{ DMS}$$

$$28^{\circ}4'20.953''$$

$$\sin S = \frac{8}{17}$$

$$S = \sin^{-1} \frac{8}{17}$$

$$S \approx 28^{\circ}4'$$

PTS: 2 REF: 061311a2 STA: A2.A.55 TOP: Trigonometric Ratios

137 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: period138 ANS: 4 PTS: 2 REF: 011406a2 STA: A2.S.1
TOP: Analysis of Data139 ANS: 4 PTS: 2 REF: 011219a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations140 ANS: 3 PTS: 2 REF: 061224a2 STA: A2.A.63
TOP: Domain and Range141 ANS: 1 PTS: 2 REF: 011310a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations142 ANS: 3
 $34.1\% + 19.1\% = 53.2\%$ PTS: 2 REF: 011212a2 STA: A2.S.5 TOP: Normal Distributions
KEY: probability143 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles144 ANS: 2
 $\bar{x} \pm \sigma$

$$153 \pm 22$$

$$131 - 175$$

PTS: 2 REF: 011307a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval145 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

146 ANS: 4

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

$$M \approx 81$$

PTS: 2

REF: 061327a2

STA: A2.A.75

TOP: Law of Sines - The Ambiguous Case

147 ANS: 4

$$x = 2y. \quad y^2 - (3y)^2 + 32 = 0 \quad . \quad x = 3(-2) = -6$$

$$y^2 - 9y^2 = -32$$

$$-8y^2 = -32$$

$$y^2 = 4$$

$$y = \pm 2$$

PTS: 2

REF: 061312a2

STA: A2.A.3

TOP: Quadratic-Linear Systems

KEY: equations

148 ANS:

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

PTS: 2

REF: 011435a2

STA: A2.A.61

TOP: Arc Length

KEY: arc length

149 ANS: 3

PTS: 2

REF: 061308ge

STA: A2.A.51

TOP: Domain and Range

150 ANS: 3

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

PTS: 2

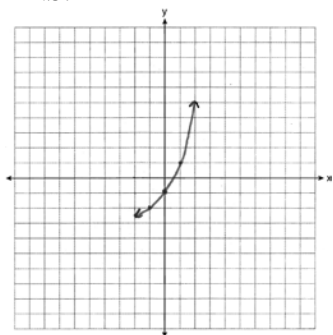
REF: 011202a2

STA: A2.A.35

TOP: Summations

KEY: arithmetic

151 ANS:



PTS: 2

REF: 011234a2

STA: A2.A.53

TOP: Graphing Exponential Functions

152 ANS: 3

$$\frac{4}{-2} = -2$$

PTS: 2 REF: 011304a2 STA: A2.A.31 TOP: Sequences

153 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

154 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

155 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

156 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

157 ANS:

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

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

158 ANS: 4 PTS: 2 REF: 011409a2 STA: A2.S.10

TOP: Permutations

159 ANS: 2

$$\text{If } \sin A = -\frac{7}{25}, \cos A = \frac{24}{25}, \text{ and } \tan A = \frac{\sin A}{\cos A} = \frac{-\frac{7}{25}}{\frac{24}{25}} = -\frac{7}{24}$$

PTS: 2 REF: 011413a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced

160 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

161 ANS: 4

PTS: 2

REF: 061207a2

STA: A2.A.19

TOP: Properties of Logarithms

KEY: antilogarithms

162 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

163 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

164 ANS:

$$\sqrt{x^2 + x - 1} = -4x + 3 \quad -4\left(\frac{2}{3}\right) + 3 \geq 0$$

$$x^2 + x - 1 = 16x^2 - 24x + 9$$

$$0 = 15x^2 - 25x + 10 \quad \frac{1}{3} \geq 0$$

$$0 = 3x^2 - 5x + 2 \quad -4(1) + 3 < 0$$

$$0 = (3x - 2)(x - 1) \quad 1 \text{ is extraneous}$$

$$x = \frac{2}{3}, x \neq 1$$

PTS: 6 REF: 011339a2 STA: A2.A.22 TOP: Solving Radicals

KEY: extraneous solutions

165 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

166 ANS:

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

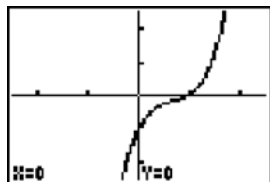
PTS: 2

REF: 061230a2

STA: A2.A.58

TOP: Reciprocal Trigonometric Relationships

167 ANS: 4



PTS: 2

REF: 061222a2

STA: A2.A.50

TOP: Solving Polynomial Equations

168 ANS:

$$K = ab \sin C = 18 \cdot 22 \sin 60 = 396 \frac{\sqrt{3}}{2} = 198\sqrt{3}$$

PTS: 2

REF: 061234a2

STA: A2.A.74

TOP: Using Trigonometry to Find Area

KEY: Parallelograms

169 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

170 ANS:

$$a_n = 9n - 4 \quad \cdot S_n = \frac{20(5 + 176)}{2} = 1810$$

$$a_1 = 9(1) - 4 = 5$$

$$a_{20} = 9(20) - 4 = 176$$

PTS: 2

REF: 011328a2

STA: A2.A.35

TOP: Summations

KEY: arithmetic

171 ANS: 4 PTS: 1 REF: 011312a2 STA: A2.A.56
TOP: Determining Trigonometric Functions KEY: degrees, common angles

172 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

173 ANS: 1 PTS: 2 REF: 061210a2 STA: A2.A.9
TOP: Negative Exponents

174 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

175 ANS:
 $\log_{(x+3)}(2x+3)(x+5) = 2$ -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

176 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

177 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

178 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

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

180 ANS:

$$\frac{15}{\sin 103} = \frac{a}{\sin 42} \cdot \frac{1}{2} (15)(10.3) \sin 35 \approx 44$$

$$a \approx 10.3$$

PTS: 4 REF: 061337a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: advanced

181 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

182 ANS: 1

$$\text{If } \sin x = 0.8, \text{ then } \cos x = 0.6. \tan \frac{1}{2}x = \sqrt{\frac{1-0.6}{1+0.6}} = \sqrt{\frac{0.4}{1.6}} = 0.5.$$

PTS: 2 REF: 061220a2 STA: A2.A.77 TOP: Half Angle Identities

183 ANS:

$$a + 15 + 2a = 90$$

$$3a + 15 = 90$$

$$3a = 75$$

$$a = 25$$

PTS: 2 REF: 011330a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships

184 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

185 ANS:

$$Q_1 = 3.5 \text{ and } Q_3 = 10.5. \quad 10.5 - 3.5 = 7.$$

PTS: 2 REF: 011430a2 STA: A2.S.4 TOP: Dispersion

KEY: range, quartiles, interquartile range, variance

186 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

187 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

188 ANS: 2

The binomials are conjugates, so use FL.

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

189 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

190 ANS: 3 PTS: 2 REF: 061306a2 STA: A2.A.72

TOP: Identifying the Equation of a Trigonometric Graph

191 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72

TOP: Identifying the Equation of a Trigonometric Graph

192 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

Algebra 2/Trigonometry Regents at Random Answer Section

193 ANS: 3 PTS: 2 REF: fall0923a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

194 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

195 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

196 ANS: 2 PTS: 2 REF: fall0926a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

197 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

198 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

199 ANS: 1

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

$$6 \neq -10 \quad 8a = 4 \quad 8 - 2 \neq -10$$

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

PTS: 2 REF: 011106a2 STA: A2.A.1 TOP: Absolute Value Equations
200 ANS: 7.4

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

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

202 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

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

204 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
205 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
206 ANS: 3
 $\sqrt{-300} = \sqrt{100} \sqrt{-1} \sqrt{3}$

PTS: 2 REF: 061006a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers
207 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
208 ANS:
 $12 \cdot 6 = 9w$
 $8 = w$

PTS: 2 REF: 011130a2 STA: A2.A.5 TOP: Inverse Variation
209 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

210 ANS:

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

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

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

211 ANS: 3

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

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

212 ANS: 4 PTS: 2 REF: 011111a2 STA: A2.N.8

TOP: Conjugates of Complex Numbers

213 ANS: 4

$$s = \theta r = 2 \cdot 4 = 8$$

PTS: 2 REF: fall0922a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

214 ANS: 3

$$S = \frac{-b}{a} = \frac{-(-3)}{4} = \frac{3}{4}. \quad P = \frac{c}{a} = \frac{-8}{4} = -2$$

PTS: 2 REF: fall0912a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: basic

215 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

216 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

- 217 ANS: 3 PTS: 2 REF: 061022a2 STA: A2.A.63
TOP: Domain and Range
- 218 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
- 219 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
- 220 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
- 221 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
- 222 ANS: 4
 $\frac{3 \pm \sqrt{(-3)^2 - 4(1)(-9)}}{2(1)} = \frac{3 \pm \sqrt{45}}{2} = \frac{3 \pm 3\sqrt{5}}{2}$

PTS: 2 REF: 061009a2 STA: A2.A.25 TOP: Quadratic Formula
- 223 ANS: 1 PTS: 2 REF: 061004a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph
- 224 ANS:
 $x^2 - 6x - 27 = 0, \frac{-b}{a} = 6, \frac{c}{a} = -27. \text{ If } a = 1 \text{ then } b = -6 \text{ and } c = -27$

PTS: 4 REF: 061130a2 STA: A2.A.21 TOP: Roots of Quadratics
KEY: basic
- 225 ANS: 4 PTS: 2 REF: 061005a2 STA: A2.A.50
TOP: Solving Polynomial Equations
- 226 ANS: 2 PTS: 2 REF: 081003a2 STA: A2.A.51
TOP: Domain and Range

227 ANS: 1

$$\cos K = \frac{5}{6}$$

$$K = \cos^{-1} \frac{5}{6}$$

$$K \approx 33^\circ 33'$$

PTS: 2 REF: 061023a2 STA: A2.A.55 TOP: Trigonometric Ratios

228 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

229 ANS:

$$\frac{23}{2} \quad \cos^2 B + \sin^2 B = 1 \quad \tan B = \frac{\sin B}{\cos B} = \frac{\frac{5}{\sqrt{41}}}{\frac{4}{\sqrt{41}}} = \frac{5}{4}$$

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

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

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

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

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

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

230 ANS: 3

$$x = 5^4 = 625$$

PTS: 2 REF: 061106a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

231 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

232 ANS: 1

$${}_9C_3 a^6 (-4b)^3 = -5376a^6 b^3$$

PTS: 2 REF: 061126a2 STA: A2.A.36 TOP: Binomial Expansions

233 ANS:

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

$$x = y^2 - 6$$

$$x + 6 = y^2$$

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

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

234 ANS: 3

$$68\% \times 50 = 34$$

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

235 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

236 ANS: 3

$$x^2 - 3x - 10 > 0 \quad \text{or}$$

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

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

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

$$x > 5$$

PTS: 2

REF: 011115a2

STA: A2.A.4

TOP: Quadratic Inequalities

KEY: one variable

237 ANS: 3

$$3x + 16 = (x + 2)^2 \quad . \quad -4 \text{ is an extraneous solution.}$$

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

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

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

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

PTS: 2

REF: 061121a2

STA: A2.A.22

TOP: Solving Radicals

KEY: extraneous solutions

238 ANS: 3

PTS: 2

REF: 011104a2

STA: A2.A.64

TOP: Using Inverse Trigonometric Functions

KEY: unit circle

239 ANS: 1

PTS: 2

REF: 061018a2

STA: A2.A.22

TOP: Solving Radicals

KEY: extraneous solutions

240 ANS: 4

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

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

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

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

$$3x = 4$$

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

PTS: 2

REF: 081008a2

STA: A2.A.27

TOP: Exponential Equations

KEY: common base not shown

241 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

242 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

243 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

244 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

245 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

246 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

247 ANS:

$$0, 60, 180, 300.$$

$$\sin 2\theta = \sin \theta$$

$$\sin 2\theta - \sin \theta = 0$$

$$2 \sin \theta \cos \theta - \sin \theta = 0$$

$$\sin \theta (2 \cos \theta - 1) = 0$$

$$\sin \theta = 0 \quad 2 \cos \theta - 1 = 0$$

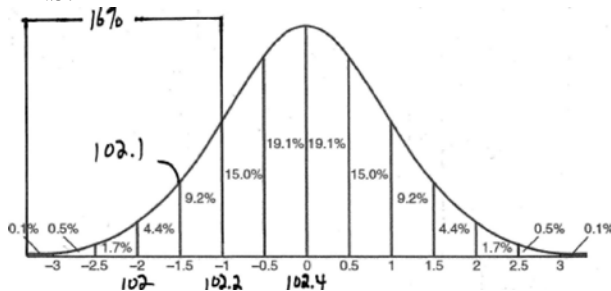
$$\theta = 0, 180 \quad \cos \theta = \frac{1}{2}$$

$$\theta = 60, 300$$

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

248 ANS: 1 PTS: 2 REF: 061013a2 STA: A2.A.38
TOP: Defining Functions

249 ANS: 1



PTS: 2 REF: fall0915a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

250 ANS:

$$y = 10.596(1.586)^x$$

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

251 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

252 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

253 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

254 ANS:

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

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

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

$$x = -\frac{9}{2} \text{ and } x = \frac{1}{2}$$

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

PTS: 6

REF: 061139a2

STA: A2.A.3

TOP: Quadratic-Linear Systems

KEY: equations

255 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

256 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

257 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

258 ANS:

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

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

259 ANS:

$$\frac{\sqrt{13}}{2} \cdot \sin \theta = \frac{y}{\sqrt{x^2 + y^2}} = \frac{2}{\sqrt{(-3)^2 + 2^2}} = \frac{2}{\sqrt{13}} \cdot \csc \theta = \frac{\sqrt{13}}{2}$$

PTS: 2 REF: fall0933a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

260 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

261 ANS:

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

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

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

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

$$3x=1$$

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

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

262 ANS:

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

$$C \approx 33$$

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

263 ANS: 1
 ${}_{10}C_4 = 210$

PTS: 2 REF: 061113a2 STA: A2.S.11 TOP: Combinations

264 ANS:

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

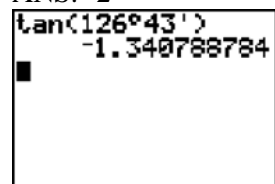
PTS: 2 REF: 081029a2 STA: A2.A.34 TOP: Sigma Notation

265 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

266 ANS: 2



A calculator screen showing the calculation of the tangent of an angle. The input is $\tan(126^\circ 43')$ and the output is -1.340788784 .

PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

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

268 ANS:

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

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

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

270 ANS:

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

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

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

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

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

271 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

272 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

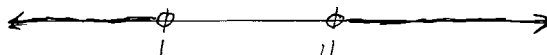
273 ANS:

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

$$|6 - x| > 5$$

$$6 - x > 5 \text{ or } 6 - x < -5$$

$$1 > x \text{ or } 11 < x$$



PTS: 2 REF: 061137a2 STA: A2.A.1 TOP: Absolute Value Inequalities

KEY: graph

274 ANS: 4 PTS: 2 REF: 061112a2 STA: A2.A.39

TOP: Domain and Range

KEY: real domain

275 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

276 ANS:

$$(x + 3)^2 + (y - 4)^2 = 25$$

PTS: 2 REF: fall0929a2 STA: A2.A.49 TOP: Writing Equations of Circles

277 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

278 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

279 ANS:

D: $-5 \leq x \leq 8$. R: $-3 \leq y \leq 2$

PTS: 2

REF: 011132a2

STA: A2.A.51

TOP: Domain and Range

280 ANS:

$$197^\circ 40'. \quad 3.45 \times \frac{180}{\pi} \approx 197^\circ 40'.$$

PTS: 2

REF: fall0931a2

STA: A2.M.2

TOP: Radian Measure

KEY: degrees

281 ANS: 1

PTS: 2

REF: 011117a2

STA: A2.S.9

TOP: Differentiating Permutations and Combinations

282 ANS: 2

The roots are $-1, 2, 3$.

PTS: 2

REF: 081023a2

STA: A2.A.50

TOP: Solving Polynomial Equations

283 ANS: 4

PTS: 2

REF: 061124a2

STA: A2.S.3

TOP: Average Known with Missing Data

284 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

285 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

286 ANS: 2

PTS: 2

REF: 081024a2

STA: A2.N.8

TOP: Conjugates of Complex Numbers

287 ANS: 3

Cofunctions tangent and cotangent are complementary

PTS: 2

REF: 061014a2

STA: A2.A.58

TOP: Cofunction Trigonometric Relationships

288 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

289 ANS: 4

PTS: 2

REF: 081005a2

STA: A2.A.60

TOP: Unit Circle

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

291 ANS: 4 PTS: 2 REF: fall0925a2 STA: A2.S.10
TOP: Permutations

292 ANS:

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

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

293 ANS:

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

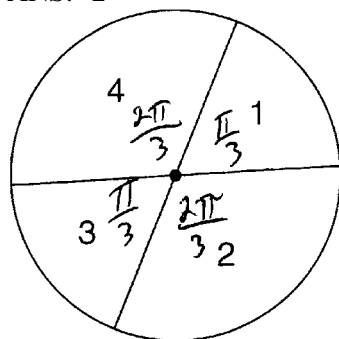
PTS: 4 REF: 061036a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

294 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

295 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

296 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

297 ANS: 4 PTS: 2 REF: 061120a2 STA: A2.A.19
TOP: Properties of Logarithms KEY: splitting logs

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

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

300 ANS: 3 PTS: 2 REF: fall0913a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

301 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

302 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

303 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

304 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

305 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

306 ANS: 3

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

$$\sin 2A = 2 \sin A \cos A$$

$$\cos^2 A = \frac{5}{9}$$

$$= 2\left(\frac{2}{3}\right)\left(\frac{\sqrt{5}}{3}\right)$$

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

$$= \frac{4\sqrt{5}}{9}$$

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

307 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

308 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

309 ANS: 3

PTS: 2

REF: 061001a2

STA: A2.A.30

TOP: Sequences

310 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

311 ANS: 4

PTS: 2

REF: fall0908a2

STA: A2.A.38

TOP: Defining Functions

KEY: graphs

312 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

313 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

314 ANS:

$$\frac{51}{243} \cdot {}_5C_3 \left(\frac{1}{3} \right)^3 \left(\frac{2}{3} \right)^2 = \frac{40}{243}$$

$${}_5C_4 \left(\frac{1}{3} \right)^4 \left(\frac{2}{3} \right)^1 = \frac{10}{243}$$

$${}_5C_3 \left(\frac{1}{3} \right)^5 \left(\frac{2}{3} \right)^0 = \frac{1}{243}$$

PTS: 4 REF: 061138a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

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

316 ANS:

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

$$1 = \tan C$$

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

$$C = 45, 225$$

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

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

318 ANS: 2

$$6(x^2 - 5) = 6x^2 - 30$$

PTS: 2 REF: 011109a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

319 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

320 ANS:

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

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

321 ANS:

$$y = 2.001x^{2.298}, 1,009. \quad y = 2.001(15)^{2.298} \approx 1009$$

PTS: 4 REF: fall0938a2 STA: A2.S.7 TOP: Power Regression

322 ANS: 1 PTS: 2 REF: fall0914a2 STA: A2.A.9

TOP: Negative and Fractional Exponents

323 ANS: 3

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

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

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

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

$$x = -3 \quad x = -1$$

PTS: 2 REF: 061015a2 STA: A2.A.27 TOP: Exponential Equations

KEY: common base shown

324 ANS:

$$2.5 \cdot \frac{180}{\pi} \approx 143.2^\circ$$

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

KEY: degrees

325 ANS:

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

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

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

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

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

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

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

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

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

KEY: basic

326 ANS: 4 PTS: 2 REF: 061026a2 STA: A2.A.29

TOP: Sequences

327 ANS: 1

$$\sqrt[4]{16x^2y^7} = 16^{\frac{1}{4}} x^{\frac{2}{4}} y^{\frac{7}{4}} = 2x^{\frac{1}{2}} y^{\frac{7}{4}}$$

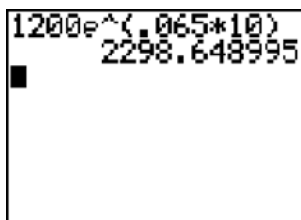
PTS: 2 REF: 061107a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

328 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

329 ANS:



1200e^(0.065*10)
2298.648995

2,298.65.

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

330 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

331 ANS: 1

PTS: 2

REF: 081022a2

STA: A2.A.46

TOP: Transformations with Functions and Relations

332 ANS:

$$3 \pm \sqrt{7}. \quad 2x^2 - 12x + 4 = 0$$

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

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

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

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

$$x - 3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

PTS: 4 REF: fall0936a2 STA: A2.A.24 TOP: Completing the Square

333 ANS:

-3, -5, -8, -12

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

334 ANS: 3

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

PTS: 2

REF: fall0902a2

STA: A2.A.42

TOP: Compositions of Functions

KEY: numbers

335 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

336 ANS: 3

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

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

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

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

$$23.1 \approx t$$

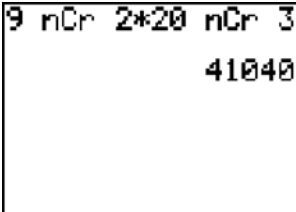
PTS: 2

REF: 061117a2

STA: A2.A.6

TOP: Exponential Growth

337 ANS:



9 nCr 2 * 20 nCr 3
41040

41,040.

PTS: 2

REF: fall0935a2

STA: A2.S.12

TOP: Sample Space

338 ANS: 2

$$8^2 = 64$$

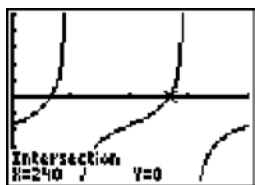
PTS: 2

REF: fall0909a2

STA: A2.A.18

TOP: Evaluating Logarithmic Expressions

339 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

340 ANS:

$$7. f(-3) = (-3)^2 - 6 = 3. \quad g(x) = 2^3 - 1 = 7.$$

PTS: 2 REF: 061135a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

341 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

342 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

343 ANS: 3

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

$$C \approx 78.3$$

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

- 344 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
- 345 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
 TOP: Regression
- 346 ANS: 3 PTS: 2 REF: 081027a2 STA: A2.A.44
 TOP: Inverse of Functions KEY: equations
- 347 ANS: 2
 ${}_{15}C_8 = 6,435$
- PTS: 2 REF: 081012a2 STA: A2.S.11 TOP: Combinations
- 348 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
- 349 ANS: 1
 The binomials are conjugates, so use FL.
- PTS: 2 REF: 061201a2 STA: A2.N.3 TOP: Operations with Polynomials
- 350 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
- 351 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
- 352 ANS: 2 PTS: 2 REF: 061108a2 STA: A2.A.52
 TOP: Identifying the Equation of a Graph
- 353 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
- 354 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
- 355 ANS: 4 PTS: 2 REF: 011101a2 STA: A2.A.38
 TOP: Defining Functions KEY: graphs

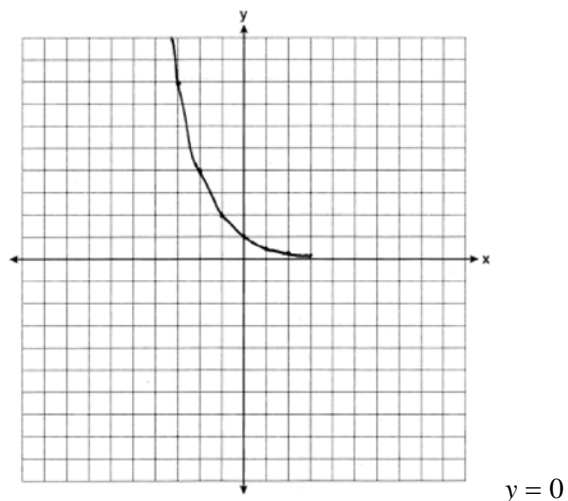
356 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8

TOP: Correlation Coefficient

357 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7

TOP: Imaginary Numbers

358 ANS:



PTS: 2 REF: 061031a2 STA: A2.A.53 TOP: Graphing Exponential Functions

359 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

360 ANS: 2

$$\frac{10}{\sin 35} = \frac{13}{\sin B} \quad 35 + 48 < 180$$

$$B \approx 48, 132 \quad 35 + 132 < 180$$

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

361 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

362 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

363 ANS: 1

$$6x - 7 \leq 5 \quad 6x - 7 \geq -5$$

$$6x \leq 12 \quad 6x \geq 2$$

$$x \leq 2 \quad x \geq \frac{1}{3}$$

PTS: 2 REF: fall0905a2 STA: A2.A.1 TOP: Absolute Value Inequalities

KEY: graph

364 ANS:

$$\pm \frac{3}{2}, -\frac{1}{2} \quad 8x^3 + 4x^2 - 18x - 9 = 0$$

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

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

$$4x^2 - 9 = 0 \text{ or } 2x + 1 = 0$$

$$(2x + 3)(2x - 3) = 0 \quad x = -\frac{1}{2}$$

$$x = \pm \frac{3}{2}$$

PTS: 4 REF: fall0937a2 STA: A2.A.26 TOP: Solving Polynomial Equations

365 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

366 ANS:

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

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

367 ANS: 3

1-Var Stats L1:L 2	σx^2 67.31102041
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PTS: 2 REF: fall0924a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

368 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

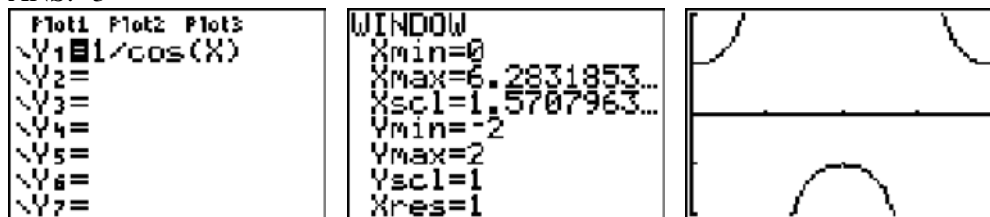
369 ANS: 2 PTS: 2 REF: 081010a2 STA: A2.A.55
TOP: Trigonometric Ratios

370 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

371 ANS: 3



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

372 ANS: 2

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

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

373 ANS:

$$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1. \quad {}_5C_0(2x)^5(-1)^0 = 32x^5. \quad {}_5C_1(2x)^4(-1)^1 = -80x^4. \quad {}_5C_2(2x)^3(-1)^2 = 80x^3. \\ {}_5C_3(2x)^2(-1)^3 = -40x^2. \quad {}_5C_4(2x)^1(-1)^4 = 10x. \quad {}_5C_5(2x)^0(-1)^5 = -1$$

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

374 ANS: 3

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

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

375 ANS: 2 PTS: 2 REF: 011126a2 STA: A2.A.49

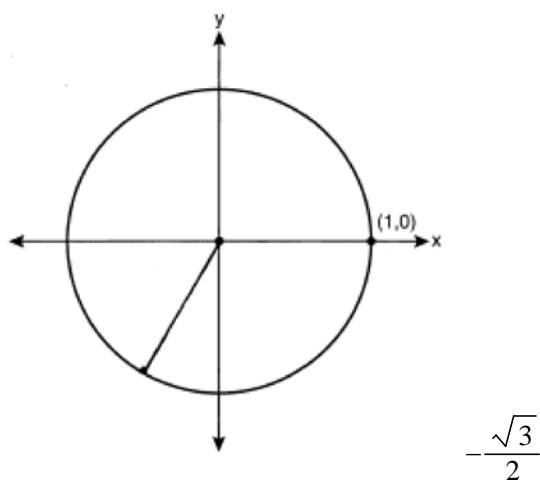
TOP: Equations of Circles

376 ANS:

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

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

377 ANS:



PTS: 2 REF: 061033a2 STA: A2.A.60 TOP: Unit Circle

378 ANS: 3 PTS: 2 REF: 081007a2 STA: A2.A.64

TOP: Using Inverse Trigonometric Functions KEY: basic

379 ANS: 2 PTS: 2 REF: 061011a2 STA: A2.A.10

TOP: Fractional Exponents as Radicals

380 ANS: 2

$$f^{-1}(x) = \log_4 x$$

PTS: 2 REF: fall0916a2 STA: A2.A.54 TOP: Graphing Logarithmic Functions

381 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

382 ANS: 2

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

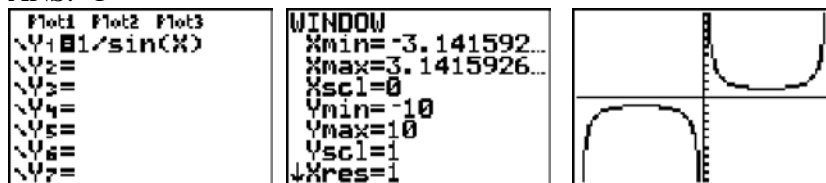
PTS: 2 REF: 061002a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

383 ANS: 1

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

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

384 ANS: 1



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

385 ANS: 2

$$\cos(-305^\circ + 360^\circ) = \cos(55^\circ)$$

PTS: 2 REF: 061104a2 STA: A2.A.57 TOP: Reference Angles

386 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

387 ANS: 4 PTS: 2 REF: 061101a2 STA: A2.S.1

TOP: Analysis of Data

388 ANS: 3

n	0	1	2	Σ
$n^2 + 2^n$	$0^2 + 2^0 = 1$	$1^2 + 2^1 = 3$	$2^2 + 2^2 = 8$	12

$$2 \times 12 = 24$$

PTS: 2 REF: fall0911a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

389 ANS: 3 PTS: 2 REF: 061114a2 STA: A2.A.38

TOP: Defining Functions KEY: graphs

390 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