

JEFFERSON MATH PROJECT

REGENTS BY TYPE

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

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Dear Sir

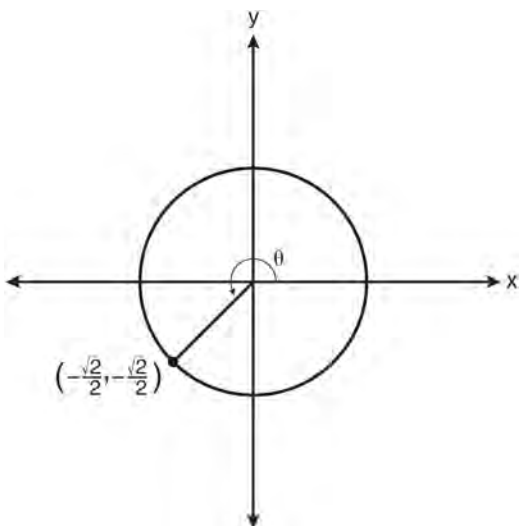
I have to acknowledge the receipt of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter 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 Multiple Choice Regents Exam Questions

- 1 The expression $2i^2 + 3i^3$ is equivalent to
- 1) $-2 - 3i$
 - 2) $2 - 3i$
 - 3) $-2 + 3i$
 - 4) $2 + 3i$
- 2 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%
- 3 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) $-x(x + 3)(x - 2)$
- 4 In simplest form, $\sqrt{-300}$ is equivalent to
- 1) $3i\sqrt{10}$
 - 2) $5i\sqrt{12}$
 - 3) $10i\sqrt{3}$
 - 4) $12i\sqrt{5}$
- 5 The value of x in the equation $4^{2x+5} = 8^{3x}$ is
- 1) 1
 - 2) 2
 - 3) 5
 - 4) -10
- 6 What is the solution of the equation $2\log_4(5x) = 3$?
- 1) 6.4
 - 2) 2.56
 - 3) $\frac{9}{5}$
 - 4) $\frac{8}{5}$
- 7 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) $\log 6 + 2 \log a$
- 8 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

- 9 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

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

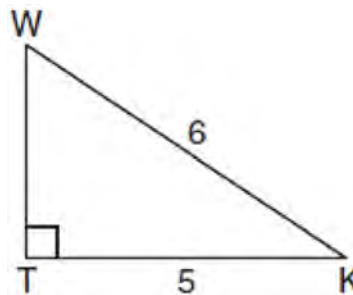
equivalent to

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

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

- 12 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) $33^\circ 56'$

- 13 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

14 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) $\frac{2}{3} \log A + \frac{1}{3} \log B - \frac{1}{3} \log C$

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

16 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

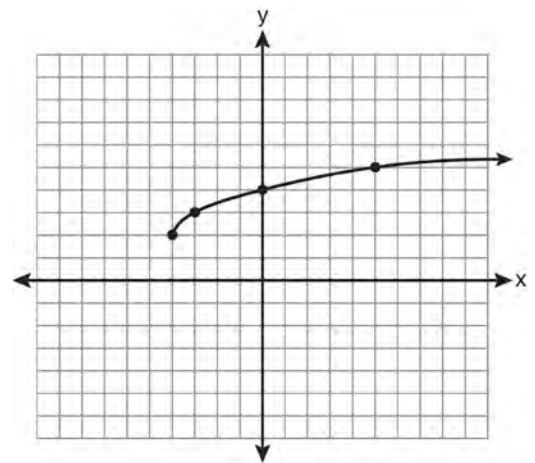
17 The value of the expression $2 \sum_{n=0}^2 (n^2 + 2^n)$ is

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

18 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) $2\sqrt{x+2}$

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

20 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

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

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21 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

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

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

23 What is the domain of the function

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

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

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

25 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) $r = -.8924$

26 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

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

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

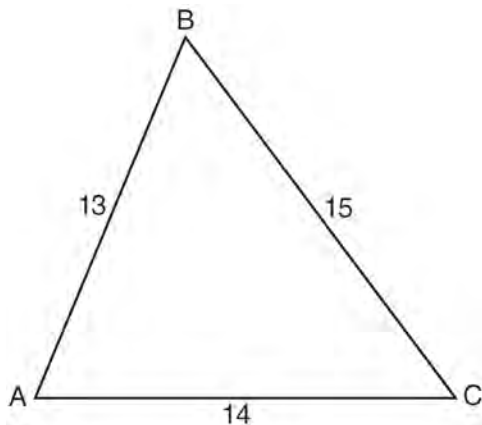
28 Which expression, when rounded to three decimal places, is equal to -1.155 ?

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

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

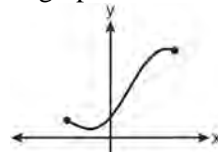
- 1) $-40 + 0i$
- 2) $-40 - 42i$
- 3) $58 + 0i$
- 4) $58 - 42i$

30 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?

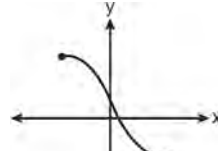


- 1) 53
- 2) 59
- 3) 67
- 4) 127

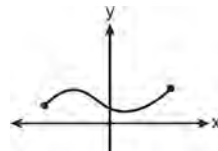
31 Which graph does *not* represent a function?



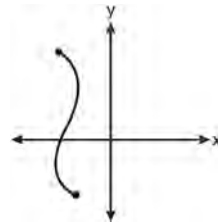
1)



2)



3)

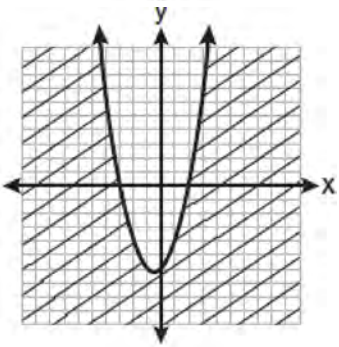
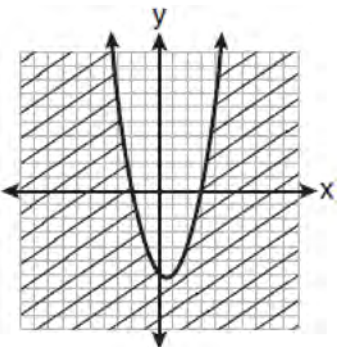
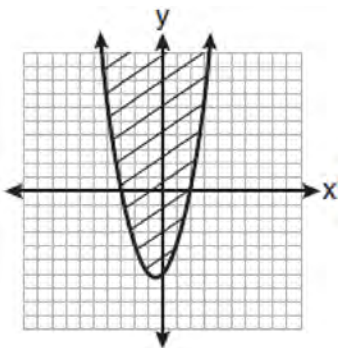
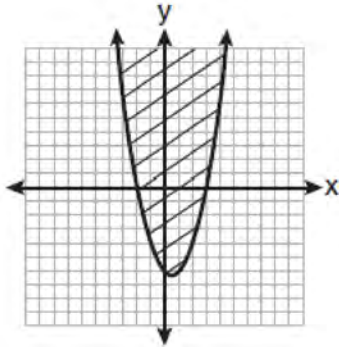


4)

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

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

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



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

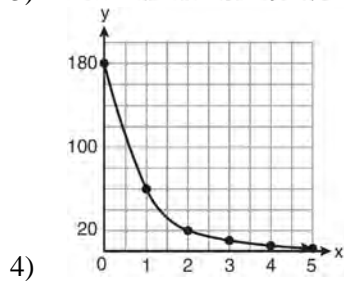
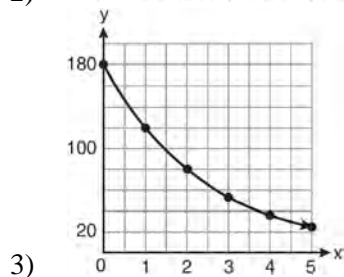
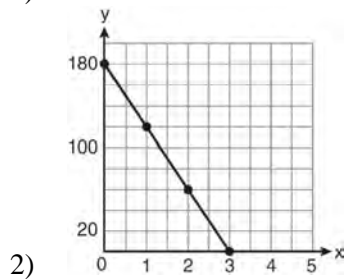
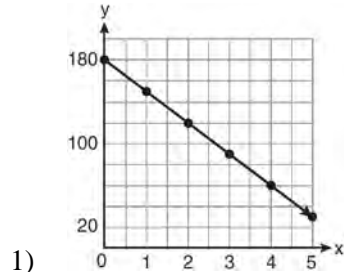
35 The expression $\frac{a^2 b^{-3}}{a^{-4} b^2}$ is equivalent to

- 1) $\frac{a^6}{b^5}$
- 2) $\frac{b^5}{a^6}$
- 3) $\frac{a^2}{b}$
- 4) $a^{-2} b^{-1}$

36 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) $\frac{37}{3}$

- 37 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?



- 38 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}

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

- 40 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

41 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

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

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

43 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

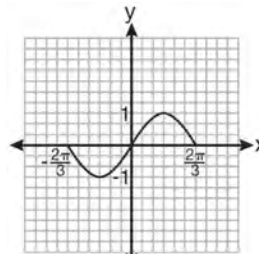
If the mean number of minutes was 17, which equation could be used to calculate the value of x ?

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

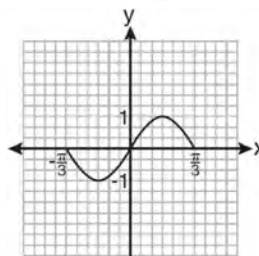
44 Given $\triangle ABC$ with $a = 9$, $b = 10$, and $m\angle B = 70$, what type of triangle can be drawn?

- 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

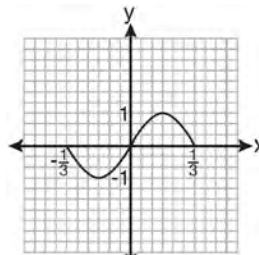
45 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?



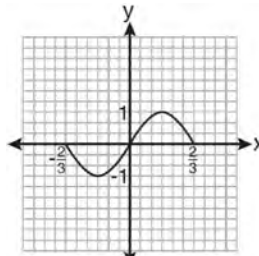
1)



2)



3)

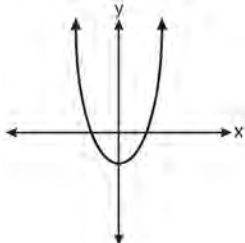
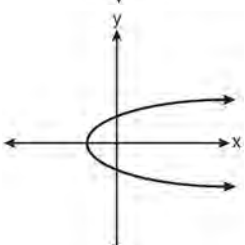
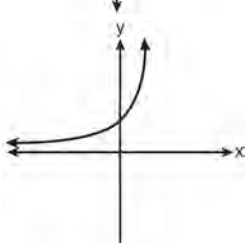
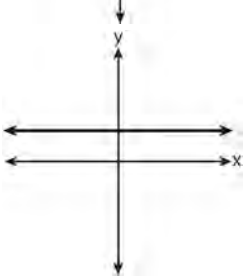


4)

46 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

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

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

48 Which statement about the graph of the equation

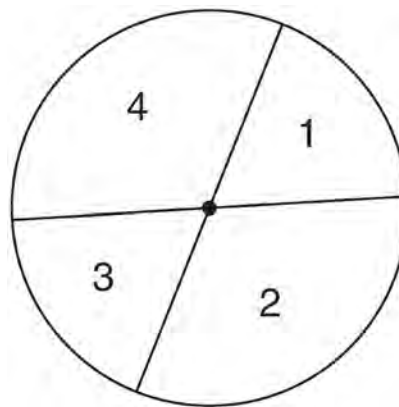
$y = e^x$ is *not* true?

- 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 $(e, 1)$.

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

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

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

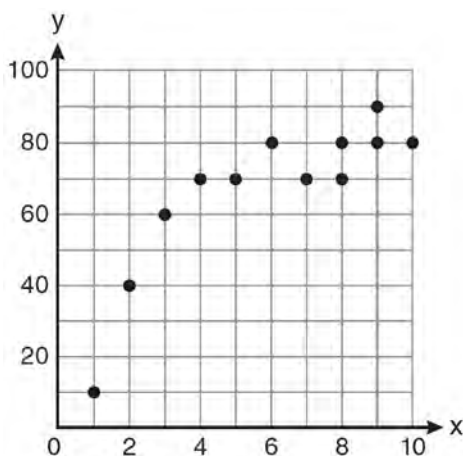


If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

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

- 51 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

- 52 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

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

- 54 The expression $\log_8 64$ is equivalent to

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

- 55 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) $\frac{7 \pm \sqrt{73}}{4}$

- 56 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) $(-6, -3)$

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57 Which relation is *not* a function?

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

58 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.

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

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

60 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) $\{(0, 1), (1, 0), (2, 0), (3, 2)\}$

61 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) $4x^2 + 3x - 2 = 0$

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

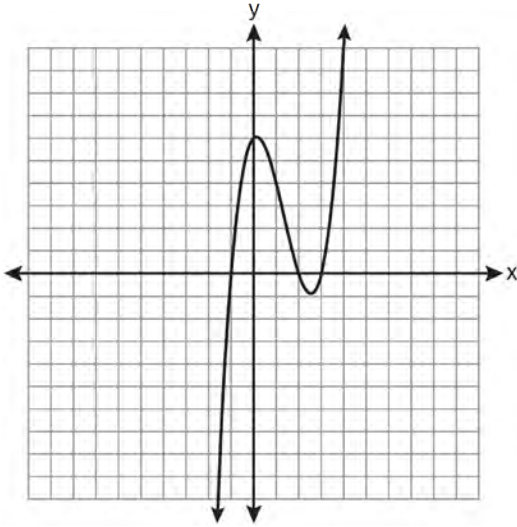
- 1) $\frac{2\sqrt{5}}{3}$
- 2) $\frac{2\sqrt{5}}{9}$
- 3) $\frac{4\sqrt{5}}{9}$
- 4) $-\frac{4\sqrt{5}}{9}$

63 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) $x^2 - x - 3$

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



What is the product of the roots of the equation

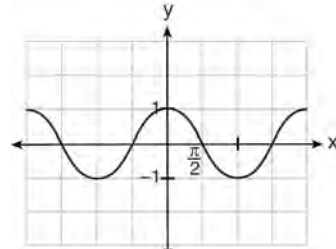
$$x^3 - 4x^2 + x + 6 = 0?$$

- 1) -36
- 2) -6
- 3) 6
- 4) 4

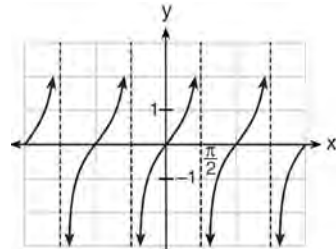
65 The fraction $\frac{3}{\sqrt{3a^2b}}$ is equivalent to

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

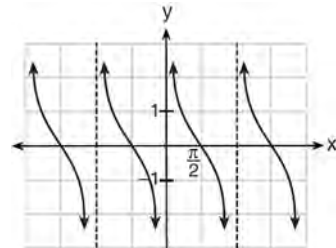
66 Which is a graph of $y = \cot x$?



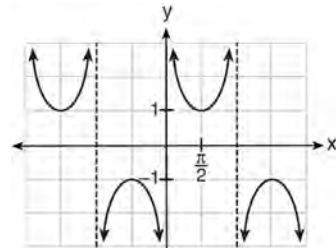
1)



2)



3)



4)

67 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) $2x^2 - 6x + 4 = 0$

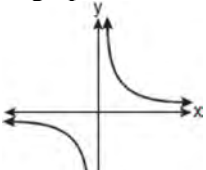
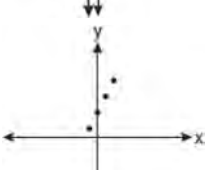
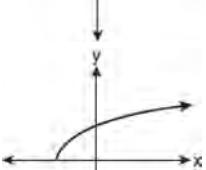
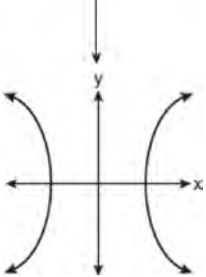
Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

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68 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

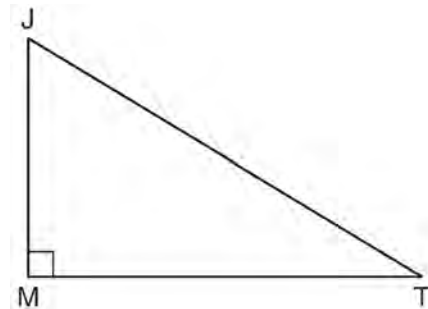
69 Which graph does *not* represent a function?

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

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

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

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

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

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

73 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) $16384\sqrt{10}$

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74 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

75 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) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

76 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

77 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

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

79 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) $\frac{8!}{2! \cdot 2!}$

80 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

- 81 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) $-6, 2$

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

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

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

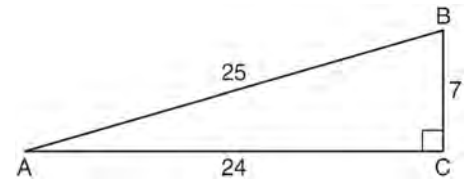
- 1) $\log \frac{x^2}{y^3 z}$

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

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

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

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



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

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

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

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

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

- 1) $y \geq -4$

- 2) $y \geq 4$

- 3) $y = 7$

- 4) $y \geq 7$

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

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

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

89 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

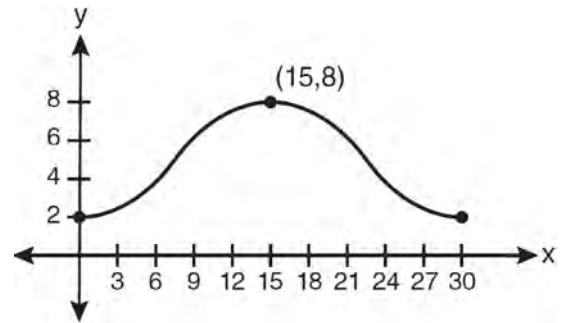
90 The expression $\cos^2 \theta - \cos 2\theta$ is equivalent to

- 1) $\sin^2 \theta$
- 2) $-\sin^2 \theta$
- 3) $\cos^2 \theta + 1$
- 4) $-\cos^2 \theta - 1$

91 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) $\sin 55^\circ$

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

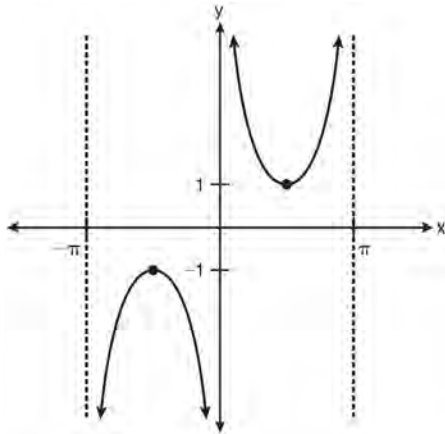
93 What is the fourth term in the expansion of $(3x - 2)^5$?

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

94 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) $\frac{225}{512}$

95 Which equation is sketched in the diagram below?

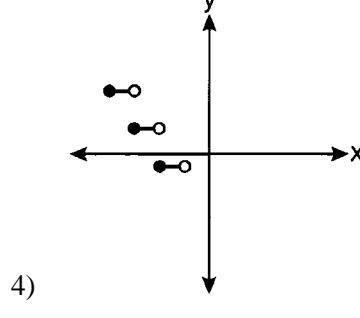
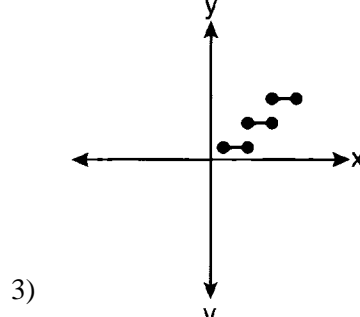
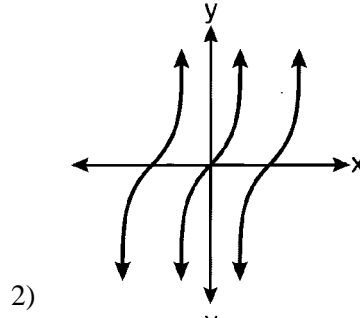
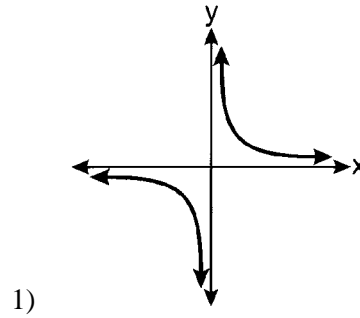


- 1) $y = \csc x$
- 2) $y = \sec x$
- 3) $y = \cot x$
- 4) $y = \tan x$

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

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

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



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98 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

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

100 What is the solution set of the equation

$$|4a + 6| - 4a = -10?$$

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

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 value of x in the equation

$$9^{3x+1} = 27^{x+2}?$$

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

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

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

104 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) $2x^2(2x + 3)(3x - 2)$

105 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

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

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

108 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) $\frac{7\pi}{6}$

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

110 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

111 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

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

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

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

114 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

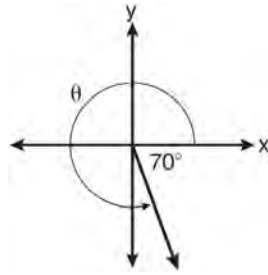
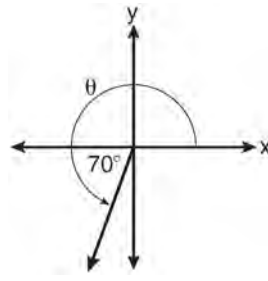
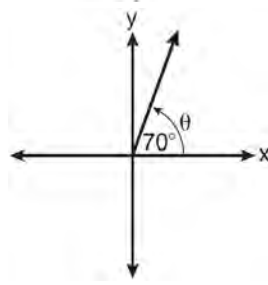
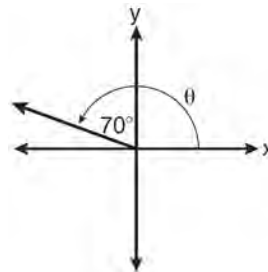
- 1) below the 16th percentile
- 2) between the 50th and 84th percentiles
- 3) between the 16th and 50th percentiles
- 4) above the 84th percentile

115 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) $60^\circ, 120^\circ, 240^\circ, 300^\circ$

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



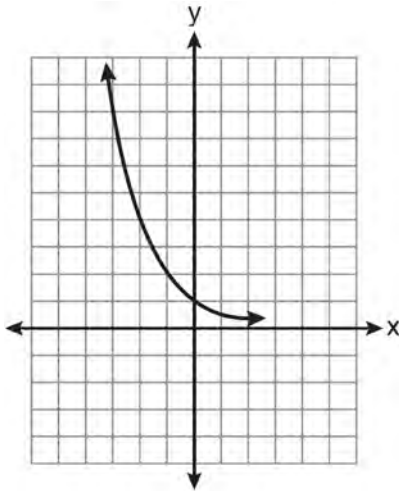
117 In parallelogram $BFLO$, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal BL is drawn, what is the area of $\triangle BLF$?

- 1) 11.4
- 2) 14.1
- 3) 22.7
- 4) 28.1

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

119 Which equation is represented by the graph below?



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

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

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

121 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

122 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

123 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

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- 124 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 $g(x) = -\frac{1}{2}x + 4$
- 125 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) $\csc^2 \theta$
- 126 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) $\{y | y \in \text{real numbers}\}$
- 127 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) $-\frac{63}{65}$
- 128 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) $\frac{3 \pm 3\sqrt{5}}{2}$
- 129 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) $\left\{x \mid -\frac{\pi}{2} < x < \frac{3\pi}{2}\right\}$
- 130 When $x^{-1} + 1$ is divided by $x + 1$, the quotient equals
- 1) 1
 - 2) $\frac{1}{x}$
 - 3) x
 - 4) $-\frac{1}{x}$
- 131 What is the conjugate of $-2 + 3i$?
- 1) $-3 + 2i$
 - 2) $-2 - 3i$
 - 3) $2 - 3i$
 - 4) $3 + 2i$

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

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

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

134 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

135 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) $\frac{8}{9}$

136 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) $\cos x + \sin x$

137 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

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138 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) ${}_{20}P_3$

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

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

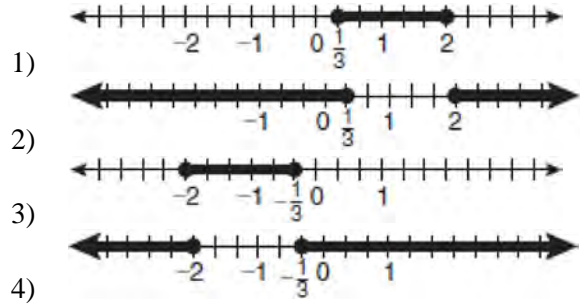
140 The product of $(3 + \sqrt{5})$ and $(3 - \sqrt{5})$ is

- 1) $4 - 6\sqrt{5}$
- 2) $14 - 6\sqrt{5}$
- 3) 14
- 4) 4

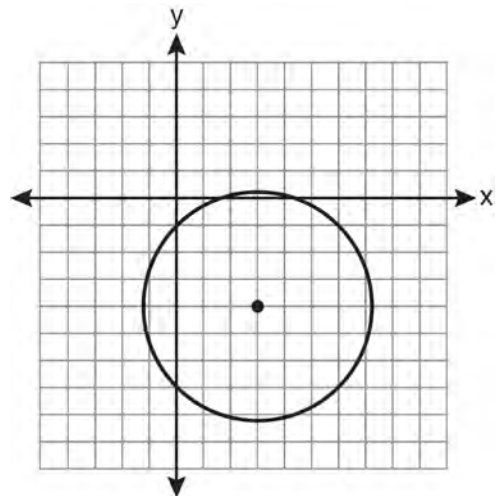
141 Which expression represents the third term in the expansion of $(2x^4 - y)^3$?

- 1) $-y^3$
- 2) $-6x^4y^2$
- 3) $6x^4y^2$
- 4) $2x^4y^2$

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

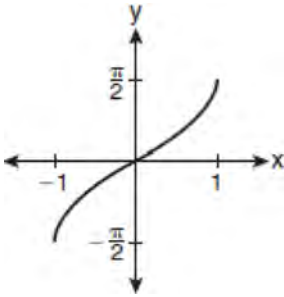


143 Which equation represents the circle shown in the graph below that passes through the point $(0, -1)$?

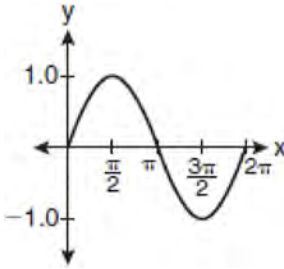


- 1) $(x-3)^2 + (y+4)^2 = 16$
- 2) $(x-3)^2 + (y+4)^2 = 18$
- 3) $(x+3)^2 + (y-4)^2 = 16$
- 4) $(x+3)^2 + (y-4)^2 = 18$

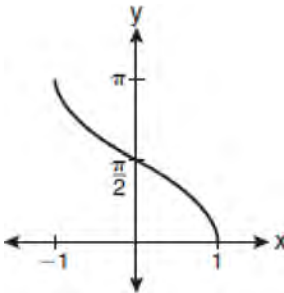
144 Which graph represents the equation $y = \cos^{-1}x$?



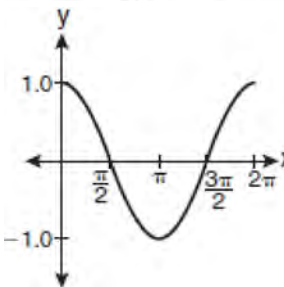
1)



2)



3)



4)

145 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) $\{n + 4, n + 16, n + 64, n + 256, \dots\}$

146 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

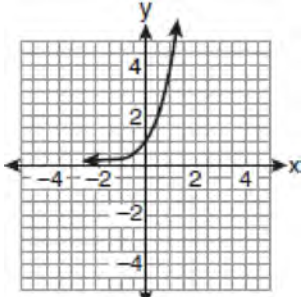
147 If $\sin^{-1}\left(\frac{5}{8}\right) = A$, then

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

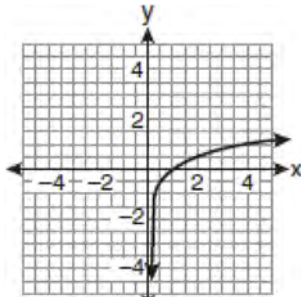
148 What is the radian measure of an angle whose measure is -420° ?

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

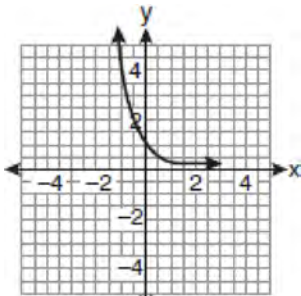
149 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?



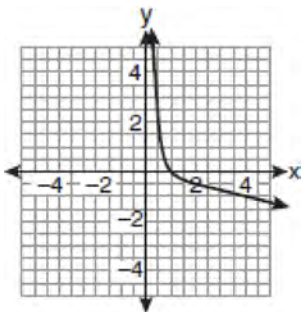
1)



2)



3)



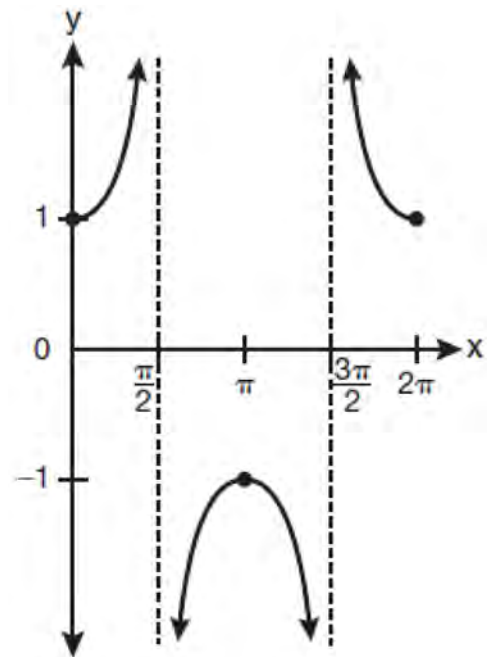
4)

150 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

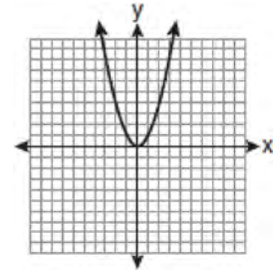
151 Which equation is represented by the graph below?



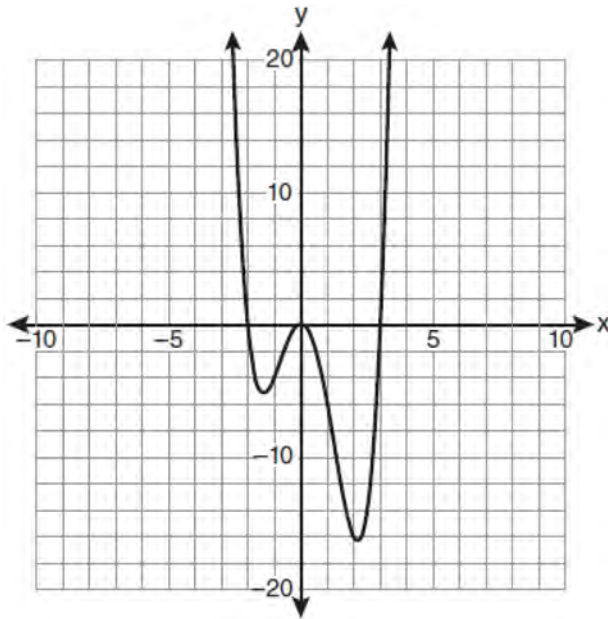
- 1) $y = \cot x$
- 2) $y = \csc x$
- 3) $y = \sec x$
- 4) $y = \tan x$

152 Which function is one-to-one?

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



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



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

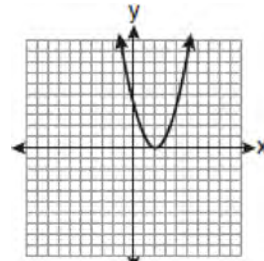
- 1) $\{-3, 2\}$
- 2) $\{-2, 3\}$
- 3) $\{-3, 0, 2\}$
- 4) $\{-2, 0, 3\}$

154 What is the sum of the first 19 terms of the sequence $3, 10, 17, 24, 31, \dots$?

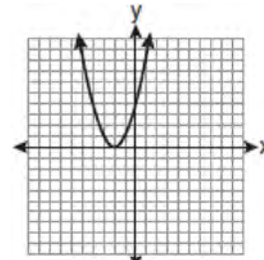
- 1) 1188
- 2) 1197
- 3) 1254
- 4) 1292

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

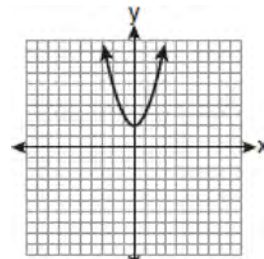
Which graph represents the function $f(x + 2)$?



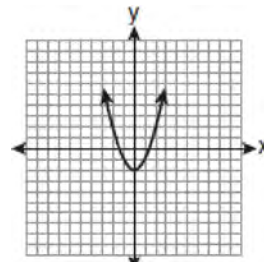
1)



2)



3)



4)

156 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

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

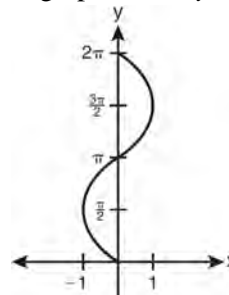
158 The conjugate of $7 - 5i$ is

- 1) $-7 - 5i$
- 2) $-7 + 5i$
- 3) $7 - 5i$
- 4) $7 + 5i$

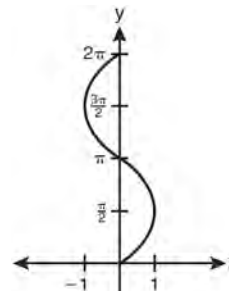
159 The equation $x^2 + y^2 - 2x + 6y + 3 = 0$ is equivalent to

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

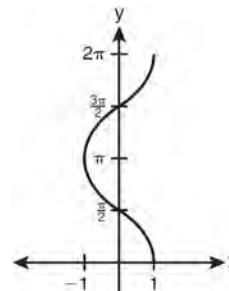
160 Which graph shows $y = \cos^{-1} x$?



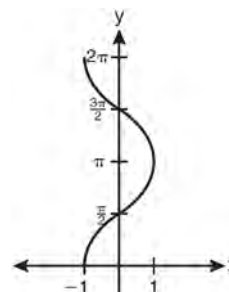
1)



2)



3)



4)

161 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) $4x^8y^{28}$

162 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

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions Answer Section

1 ANS: 1

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

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

2 ANS: 3

$$34.1\% + 19.1\% = 53.2\%$$

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

3 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

4 ANS: 3

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

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

5 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

6 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

7 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

8 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

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

10 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

11 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

12 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

13 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

14 ANS: 4

PTS: 2

REF: 061120a2

STA: A2.A.19

TOP: Properties of Logarithms

KEY: splitting logs

15 ANS: 2

The binomials are conjugates, so use FL.

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

16 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

17 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

18 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

19 ANS: 2

PTS: 2

REF: 081003a2

STA: A2.A.51

TOP: Domain and Range

20 ANS: 2

$${}_{15}C_8 = 6,435$$

PTS: 2

REF: 081012a2

STA: A2.S.11

TOP: Combinations

21 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

22 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

23 ANS: 3

PTS: 2

REF: fall0923a2

STA: A2.A.39

TOP: Domain and Range

KEY: real domain

24 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

25 ANS: 1

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

PTS: 2

REF: 011223a2

STA: A2.S.8

TOP: Correlation Coefficient

26 ANS: 2

PTS: 2

REF: 061021a2

STA: A2.S.8

TOP: Correlation Coefficient

27 ANS: 3

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

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

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

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

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

PTS: 2

REF: 061121a2

STA: A2.A.22

TOP: Solving Radicals

KEY: extraneous solutions

28 ANS: 1

The image shows a calculator screen with the expression $\cos\left(\frac{5\pi}{6}\right)$ entered and the result -1.154700538 displayed.

PTS: 2

REF: 011203a2

STA: A2.A.66

TOP: Determining Trigonometric Functions

29 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

30 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

31 ANS: 4

PTS: 2

REF: 011101a2

STA: A2.A.38

TOP: Defining Functions

KEY: graphs

32 ANS: 4

PTS: 2

REF: 011124a2

STA: A2.A.18

TOP: Evaluating Logarithmic Expressions

33 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

34 ANS: 2

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

PTS: 2

REF: 011109a2

STA: A2.A.42

TOP: Compositions of Functions

KEY: variables

35 ANS: 1

PTS: 2

REF: fall0914a2

STA: A2.A.8

TOP: Negative and Fractional Exponents

36 ANS: 3

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

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

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

PTS: 2

REF: 081025a2

STA: A2.A.31

TOP: Conjugates of Complex Numbers

37 ANS: 3

PTS: 2

REF: 011119a2

STA: A2.A.52

TOP: Families of Functions

38 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

39 ANS: 2

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

PTS: 2

REF: 011209a2

STA: A2.A.20

TOP: Roots of Quadratics

40 ANS: 4

PTS: 2

REF: 061101a2

STA: A2.S.1

TOP: Analysis of Data

41 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

42 ANS: 3

$$x = 5^4 = 625$$

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

43 ANS: 4 PTS: 2 REF: 061124a2 STA: A2.S.3

TOP: Central Tendency

44 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

45 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

46 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

47 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

48 ANS: 4 PTS: 2 REF: 011219a2 STA: A2.A.52

TOP: Properties of Graphs of Functions and Relations

49 ANS: 3

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

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

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

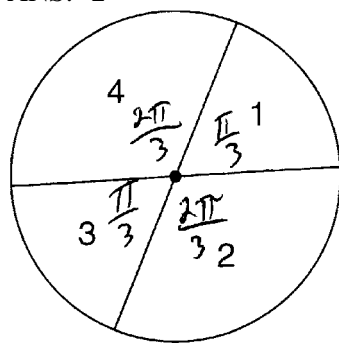
$$x > 5 \text{ and } x > -2 \quad x < -2$$

$$x > 5$$

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

KEY: one variable

50 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

51 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

52 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
TOP: Regression53 ANS: 2 PTS: 2 REF: 011213a2 STA: A2.N.8
TOP: Conjugates of Complex Numbers

54 ANS: 2

$$8^2 = 64$$

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

55 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

56 ANS: 1 PTS: 2 REF: 081022a2 STA: A2.A.46
TOP: Transformations with Functions and Relations57 ANS: 1 PTS: 2 REF: 061013a2 STA: A2.A.38
TOP: Defining Functions58 ANS: 4 PTS: 2 REF: 011127a2 STA: A2.S.1
TOP: Analysis of Data59 ANS: 3 PTS: 2 REF: fall0910a2 STA: A2.A.76
TOP: Angle Sum and Difference Identities KEY: simplifying

60 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

61 ANS: 3

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

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

62 ANS: 3

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

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

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

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

63 ANS: 2 PTS: 2 REF: 011114a2 STA: A2.N.3

TOP: Operations with Polynomials

64 ANS: 2

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

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

65 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

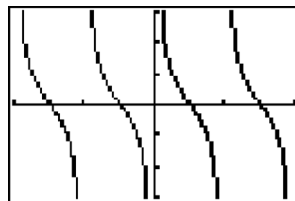
66 ANS: 3

Plot1	Plot2	Plot3
\Y1 = $\frac{1}{\tan(X)}$		
\Y2 =		
\Y3 =		
\Y4 =		
\Y5 =		

```

WINDOW
Xmin=-6.283185...
Xmax=6.2831853...
Xscl=1.5707963...
Ymin=-3
Ymax=3
Yscl=1
Xres=1

```



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

67 ANS: 3

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

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

68 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

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

70 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

71 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

72 ANS: 4

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

$$49 = 34 - 30\cos A$$

$$15 = -30\cos A$$

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

$$120 = \cos A$$

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

73 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

74 ANS: 3

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

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

75 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

76 ANS: 4

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

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

77 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

78 ANS: 2

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

79 ANS: 4

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

80 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

81 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

82 ANS: 1

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

83 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

84 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

85 ANS: 2 PTS: 2 REF: 081010a2 STA: A2.A.55
TOP: Trigonometric Ratios86 ANS: 4 PTS: 2 REF: 061112a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain87 ANS: 4
$$\frac{10}{4} = 2.5$$

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

88 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7
TOP: Imaginary Numbers89 ANS: 1
$$2 \cdot \frac{180}{\pi} = \frac{360}{\pi}$$
PTS: 2 REF: 011220a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees90 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: simplifying91 ANS: 2
$$\cos(-305^\circ + 360^\circ) = \cos(55^\circ)$$

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

92 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 Graph93 ANS: 1
$${}_5 C_3 (3x)^2 (-2)^3 = 10 \cdot 9x^2 \cdot -8 = -720x^2$$

PTS: 2 REF: fall0919a2 STA: A2.A.36 TOP: Binomial Expansions

94 ANS: 4

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

PTS: 2

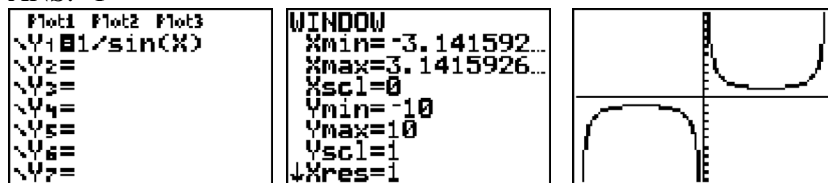
REF: 011221a2

STA: A2.S.15

TOP: Binomial Probability

KEY: spinner

95 ANS: 1



PTS: 2

REF: 011123a2

STA: A2.A.71

TOP: Graphing Trigonometric Functions

96 ANS: 1

PTS: 2

REF: 061018a2

STA: A2.A.22

TOP: Solving Radicals

KEY: extraneous solutions

97 ANS: 3

PTS: 2

REF: 061114a2

STA: A2.A.38

TOP: Defining Functions

KEY: graphs

98 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

99 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

100 ANS: 1

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

$$6 \neq -10$$

$$8a = 4$$

$$8 - 2 \neq -10$$

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

PTS: 2

REF: 011106a2

STA: A2.A.1

TOP: Absolute Value Equations

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: 4

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

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

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

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

$$3x = 4$$

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

PTS: 2

REF: 081008a2

STA: A2.A.27

TOP: Exponential Equations

KEY: common base not shown

103 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

104 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

105 ANS: 1

$${}_{10}C_4 = 210$$

PTS: 2

REF: 061113a2

STA: A2.S.11

TOP: Combinations

106 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

107 ANS: 4

PTS: 2

REF: 061026a2

STA: A2.A.29

TOP: Sequences

108 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

109 ANS: 1

PTS: 2

REF: 011117a2

STA: A2.S.9

TOP: Differentiating Permutations and Combinations

110 ANS: 3

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

PTS: 2

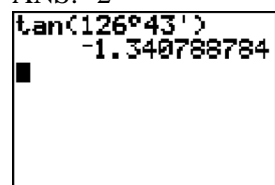
REF: fall0902a2

STA: A2.A.42

TOP: Compositions of Functions

KEY: numbers

111 ANS: 2



PTS: 2

REF: 061115a2

STA: A2.A.66

TOP: Determining Trigonometric Functions

112 ANS: 3

PTS: 2

REF: 061001a2

STA: A2.A.30

TOP: Sequences

113 ANS: 2

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

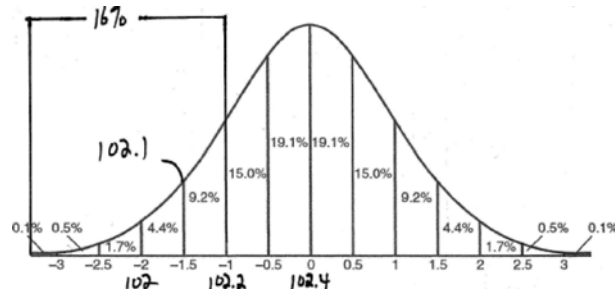
PTS: 2

REF: 061102a2

STA: A2.A.41

TOP: Functional Notation

114 ANS: 1



PTS: 2

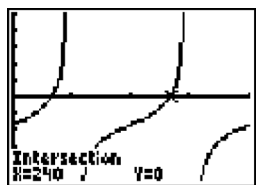
REF: fall0915a2

STA: A2.S.5

TOP: Normal Distributions

KEY: interval

115 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

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

117 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

118 ANS: 3
Cofunctions tangent and cotangent are complementary

PTS: 2 REF: 061014a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships
119 ANS: 2 PTS: 2 REF: 061108a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

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

121 ANS: 2

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

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

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

123 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

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

125 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

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

127 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

128 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
129 ANS: 3 PTS: 2 REF: 061022a2 STA: A2.A.63
TOP: Domain and Range

130 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
131 ANS: 2 PTS: 2 REF: 081024a2 STA: A2.N.8
TOP: Conjugates of Complex Numbers

132 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
133 ANS: 1

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

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

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

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

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

135 ANS: 3

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

PTS: 2 REF: 061003a2 STA: A2.A.8 TOP: Negative and Fractional Exponents

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

TOP: Proving Trigonometric Identities

137 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: variance

138 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9

TOP: Differentiating Permutations and Combinations

139 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

140 ANS: 4

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

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

141 ANS: 3

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

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

142 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

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

TOP: Equations of Circles

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

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

146 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

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

148 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

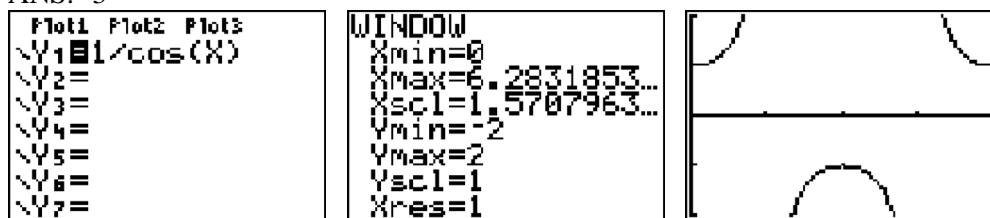
149 ANS: 2
 $f^{-1}(x) = \log_4 x$

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

150 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

151 ANS: 3



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

152 ANS: 2 PTS: 2 REF: 011225a2 STA: A2.A.43
TOP: Defining Functions153 ANS: 4 PTS: 2 REF: 061005a2 STA: A2.A.50
TOP: Solving Polynomial Equations

154 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

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

156 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

157 ANS: 1 PTS: 2 REF: 061004a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph158 ANS: 4 PTS: 2 REF: 011111a2 STA: A2.N.8
TOP: Conjugates of Complex Numbers

159 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

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

161 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

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

Algebra 2/Trigonometry 2 Point Regents Exam Questions

163 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.

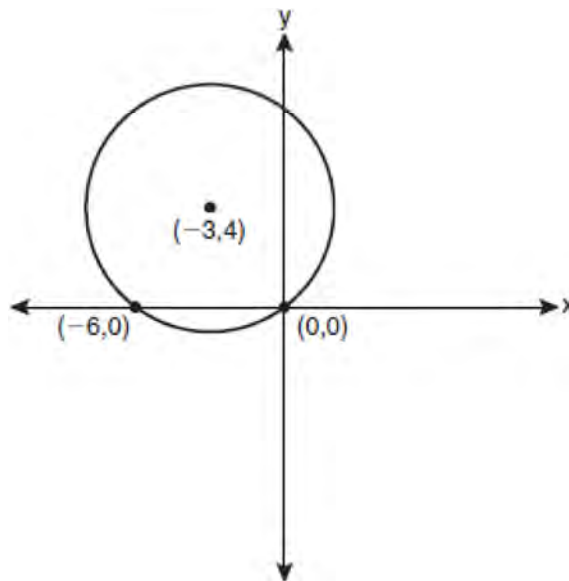
166 Write a quadratic equation such that the sum of its roots is 6 and the product of its roots is -27 .

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

164 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*.

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

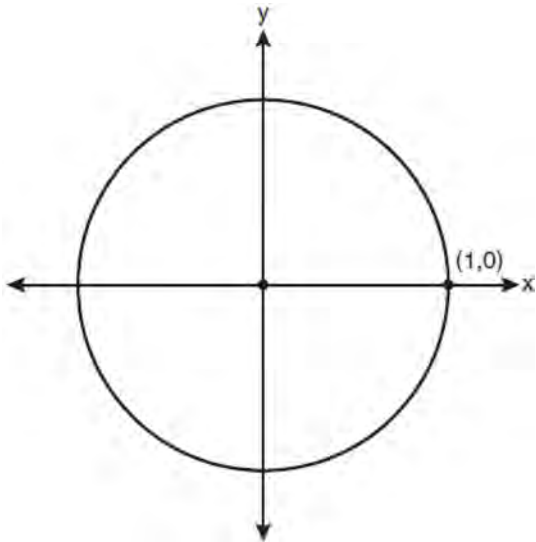
165 Find the first four terms of the recursive sequence defined below.

$$a_1 = -3$$

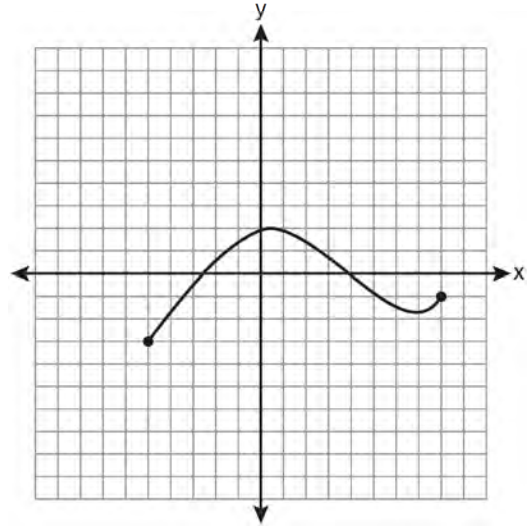
$$a_n = a_{(n-1)} - n$$

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

- 170 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 $\sin 240^\circ$.



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



State the domain and range of this function.

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

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

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

- 177 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.

- 173 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.

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

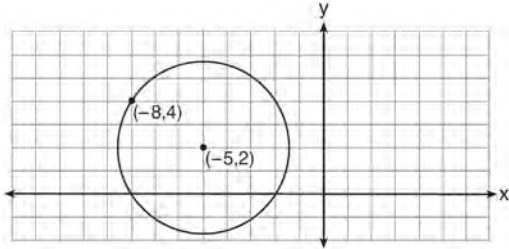
- 174 Evaluate: $\sum_{n=1}^3 (-n^4 - n)$

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

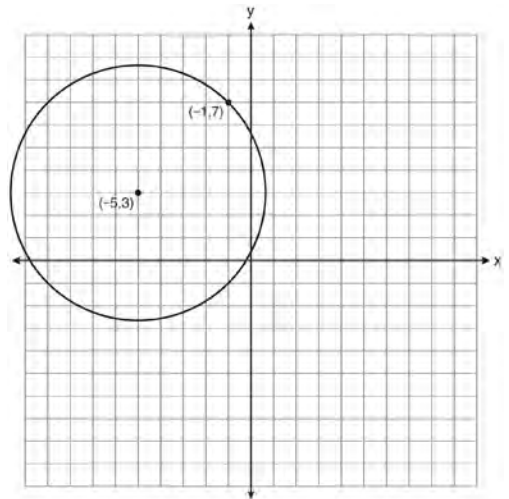
180 Factor completely: $10ax^2 - 23ax - 5a$

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

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



184 A circle shown in the diagram below has a center of $(-5, 3)$ and passes through point $(-1, 7)$.



182 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*.

Write an equation that represents the circle.

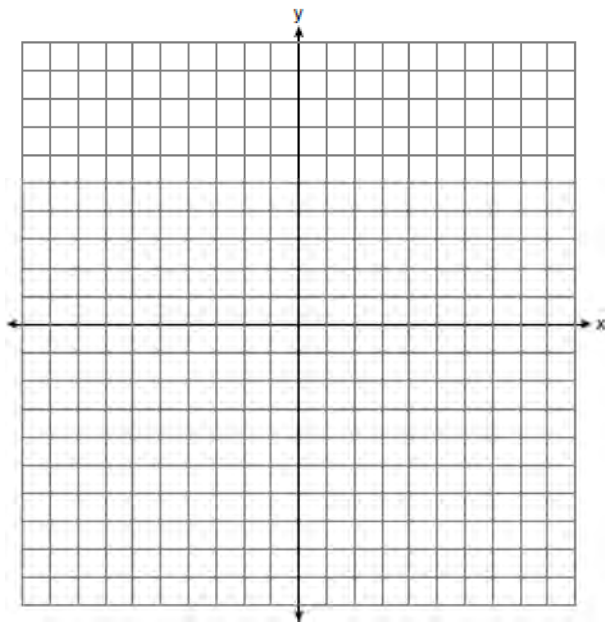
185 Express the sum $7 + 14 + 21 + 28 + \dots + 105$ using sigma notation.

186 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.

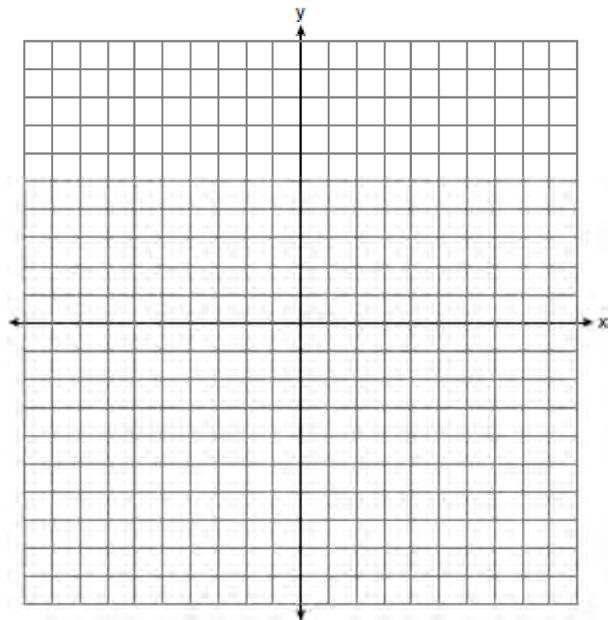
187 Howard collected fish eggs from a pond behind his house so he could determine whether sunlight had an effect on how many of the eggs hatched. After he collected the eggs, he divided them into two tanks. He put both tanks outside near the pond, and he covered one of the tanks with a box to block out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

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

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



190 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.



191 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.

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

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

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

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

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

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

198 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.

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

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

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

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

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

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

205 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.

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

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

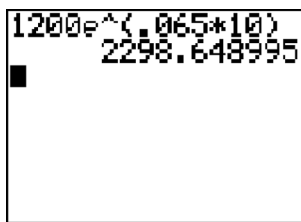
208 Express in simplest form: $\frac{\frac{1}{2} - \frac{4}{d}}{\frac{1}{d} + \frac{3}{2d}}$

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

210 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.

Algebra 2/Trigonometry 2 Point Regents Exam Questions Answer Section

163 ANS:



A calculator screen showing the calculation $1200e^{(0.065*10)}$ resulting in the value 2298.648995.

2,298.65.

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

164 ANS:

7.4

PTS: 2 REF: 061029a2 STA: A2.S.4 TOP: Dispersion

KEY: basic, group frequency distributions

165 ANS:

 $-3, -5, -8, -12$

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

166 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

167 ANS:

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

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

168 ANS:

$$\text{Sum } \frac{-b}{a} = -\frac{11}{5}, \text{ Product } \frac{c}{a} = -\frac{3}{5}$$

PTS: 2 REF: 061030a2 STA: A2.A.20 TOP: Roots of Quadratics

169 ANS:

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

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

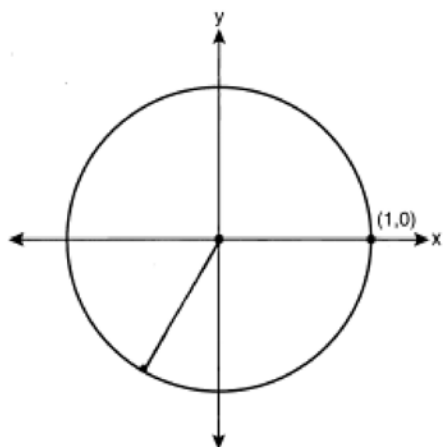
$$x > 5$$

$$x < -1$$

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

KEY: one variable

170 ANS:



$$-\frac{\sqrt{3}}{2}$$

PTS: 2

REF: 061033a2

STA: A2.A.60

TOP: Unit Circle

171 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

172 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

173 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

174 ANS:

$$\sum_{x=1}^3 (-x^4 - x) = -104$$

-104.

PTS: 2

REF: 011230a2

STA: A2.N.10

TOP: Sigma Notation

KEY: basic

175 ANS:

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

PTS: 2

REF: 011132a2

STA: A2.A.51

TOP: Domain and Range

176 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

177 ANS:

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

PTS: 2

REF: 011232a2

STA: A2.S.11

TOP: Combinations

178 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

179 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

180 ANS:

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

PTS: 2

REF: 081028a2

STA: A2.A.7

KEY: multiple variables

TOP: Factoring Polynomials

181 ANS:

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

PTS: 2

REF: 011234a2

STA: A2.A.49

TOP: Writing Equations of Circles

182 ANS:

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

PTS: 2

REF: 081031a2

STA: A2.S.7

TOP: Exponential Regression

183 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

184 ANS:

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

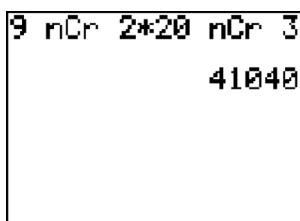
PTS: 2 REF: 081033a2 STA: A2.A.49 TOP: Writing Equations of Circles

185 ANS:

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

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

186 ANS:



41,040.

PTS: 2 REF: fall0935a2 STA: A2.S.12 TOP: Sample Space

187 ANS:

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

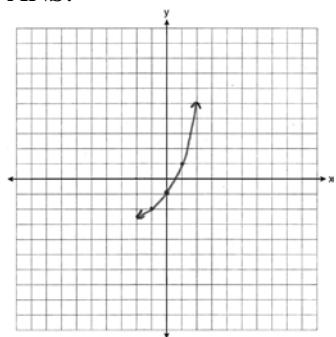
PTS: 2 REF: 081030a2 STA: A2.S.1 TOP: Analysis of Data

188 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

189 ANS:



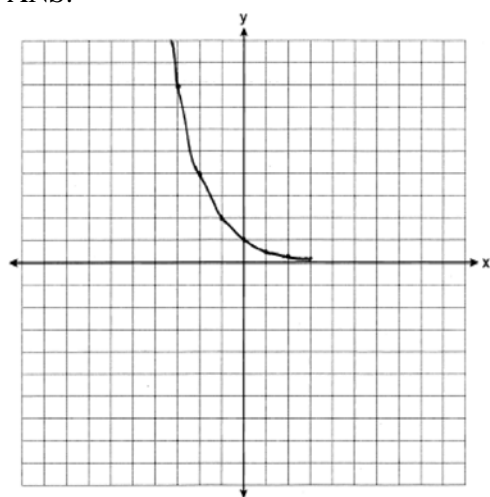
PTS: 2

REF: 011234a2

STA: A2.A.53

TOP: Graphing Exponential Functions

190 ANS:

 $y = 0$

PTS: 2

REF: 061031a2

STA: A2.A.53

TOP: Graphing Exponential Functions

191 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

192 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

193 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

194 ANS:

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

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

195 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

196 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

197 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

198 ANS:

$$12 \cdot 6 = 9w$$

$$8 = w$$

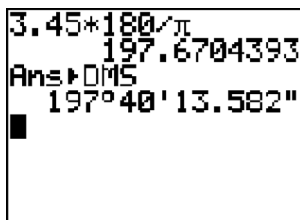
PTS: 2 REF: 011130a2 STA: A2.A.5 TOP: Inverse Variation

199 ANS:

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

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

200 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

201 ANS:

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

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

202 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

203 ANS:

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

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

204 ANS:

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

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

205 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

206 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

207 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

208 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

209 ANS:

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

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

$$2x - 5 = 9$$

$$2x = 14$$

$$x = 7$$

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

KEY: basic

210 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

Algebra 2/Trigonometry 4 Point Regents Exam Questions

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

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

213 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.

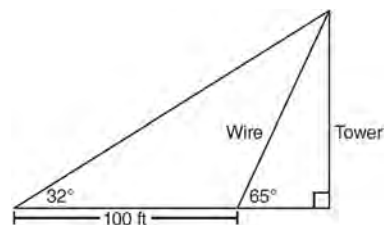
214 A study shows that 35% of the fish caught in a local lake had high levels of mercury. Suppose that 10 fish were caught from this lake. Find, to the *nearest tenth of a percent*, the probability that *at least* 8 of the 10 fish caught did *not* contain high levels of mercury.

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

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

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

218 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*.



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

220 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.

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

222 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?

223 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.

224 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 $\tan(A + B)$.

225 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*.

226 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.

227 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.

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



Algebra 2/Trigonometry 4 Point Regents Exam Questions

Answer Section

211 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

212 ANS:

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

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

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

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

$$3x=1$$

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

PTS: 4

REF: 081036a2

STA: A2.A.23

TOP: Solving Rationals

KEY: rational solutions

213 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

214 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

215 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

216 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

217 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

218 ANS:

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

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

PTS: 4

REF: 011236a2

STA: A2.A.73

TOP: Law of Sines

KEY: advanced

219 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

220 ANS:

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

PTS: 4

REF: 011138a2

STA: A2.S.15

TOP: Binomial Probability

KEY: at least or at most

221 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

222 ANS:

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

PTS: 4 REF: 061036a2 STA: A2.S.15 TOP: Binomial Probability

KEY: at least or at most

223 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

224 ANS:

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

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

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

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

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

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

KEY: evaluating

225 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

226 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

227 ANS:

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

PTS: 4

REF: 061038a2

STA: A2.S.10

TOP: Permutations

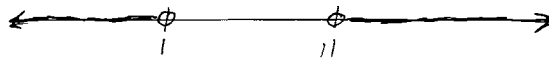
228 ANS:

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

$$|6-x| > 5$$

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

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



PTS: 2

REF: 061137a2

STA: A2.A.1

TOP: Absolute Value Inequalities

KEY: graph

Algebra 2/Trigonometry 6 Point Regents Exam Questions

- 229 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.

- 230 Perform the indicated operations and simplify completely:

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

- 231 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.]

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

- 233 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.

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

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

Algebra 2/Trigonometry 6 Point Regents Exam Questions Answer Section

229 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

230 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

231 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

232 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

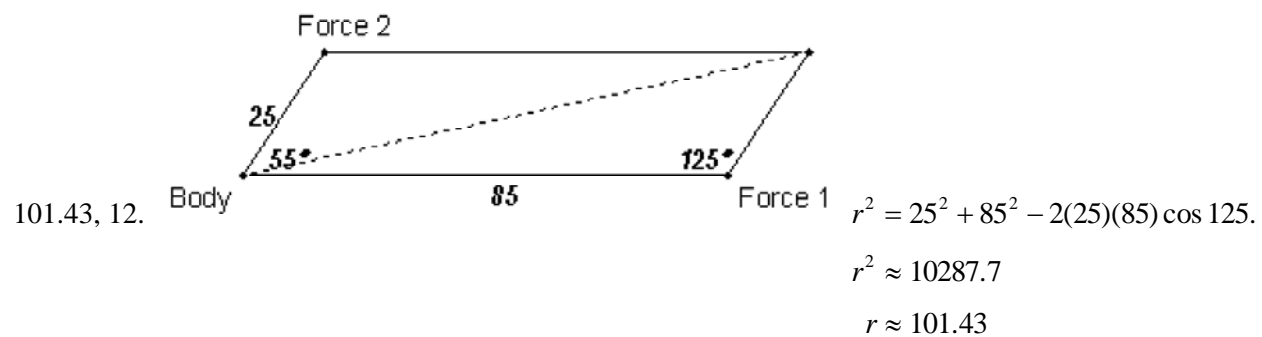
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STA: A2.A.28

TOP: Logarithmic Equations

KEY: basic

233 ANS:



$$\frac{2.5}{\sin x} = \frac{101.43}{\sin 125}$$

$$x \approx 12$$

PTS: 6

REF: fall0939a2

STA: A2.A.73

TOP: Vectors

234 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