# JMAP
# REGENTS BY TYPE

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

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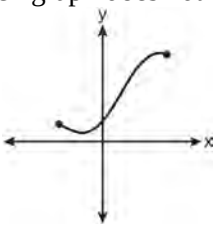
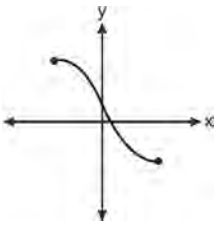
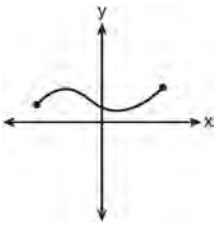
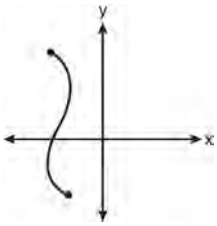
# Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

1 Which graph does *not* represent a function?

1) 


2) 

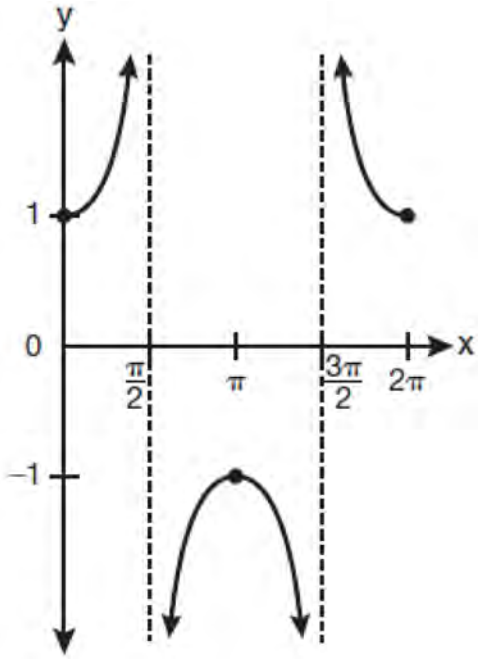

3) 


4) 


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

1) $-128\sqrt{5}$
2) $128\sqrt{10}$
3) $-16384\sqrt{5}$
4) $16384\sqrt{10}$

3 Which equation is represented by the graph below?




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

4 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

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

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

7 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) $\{x | 0 \le x \le \pi\}$

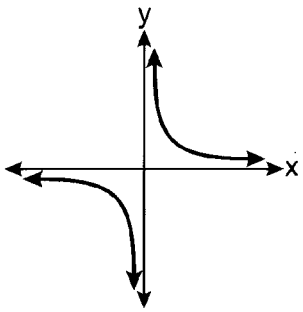
2) $\{x | 0 \le x \le 2\pi\}$

3) $\left\{x | -\frac{\pi}{2} < x < \frac{\pi}{2}\right\}$

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

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

1)

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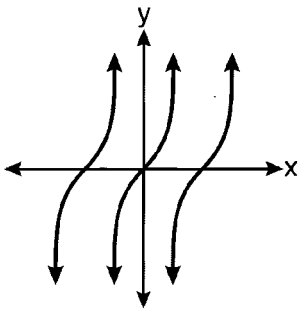


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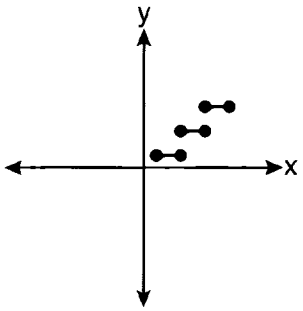


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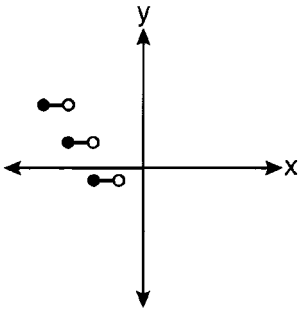


9 Which two functions are inverse functions of each other?

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

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

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

11 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) $(-6, -3)$

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

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

13 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

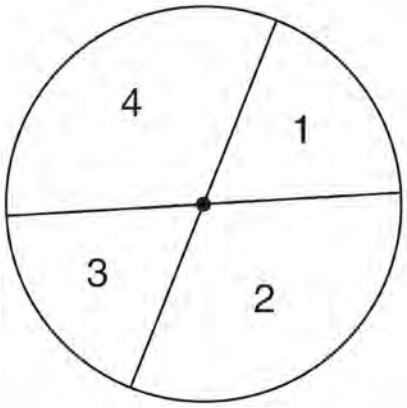
14 Mrs. Hill asked her students to express the sum $1 + 3 + 5 + 7 + 9 + \ldots + 39$ using sigma notation. Four different student answers were given. Which student answer is correct?

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

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

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

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

1) –38
2) –12
3) 26
4) 62

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

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

19 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) $4x^2 + 3x - 2 = 0$

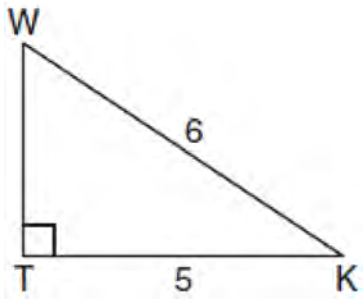
20 The expression $(3 - 7i)^2$ is equivalent to

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

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

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




What is the measure of $\angle K$, to the *nearest minute*?
1) 33°33'
2) 33°34'
3) 33°55'
4) 33°56'

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

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

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

26 What are the values of $\theta$ in the interval $0° \le \theta < 360°$ that satisfy the equation $\tan\theta - \sqrt{3} = 0$?
1) 60º, 240º
2) 72º, 252º
3) 72º, 108º, 252º, 288º
4) 60º, 120º, 240º, 300º

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

28 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) $2\sqrt{x+2}$

29 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.

30 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 |

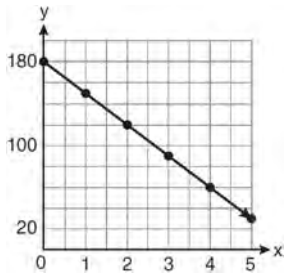
What is the population variance for this set of data?

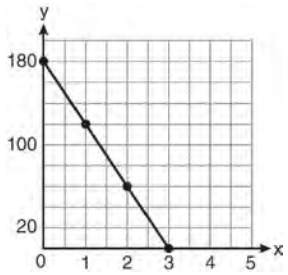
1) 8.2
2) 8.3
3) 67.3
4) 69.3

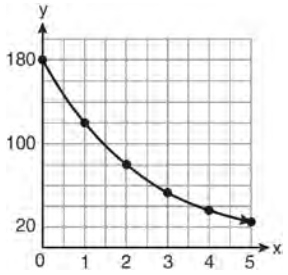
31 What is the formula for the *n*th term of the sequence $54, 18, 6, \ldots$?

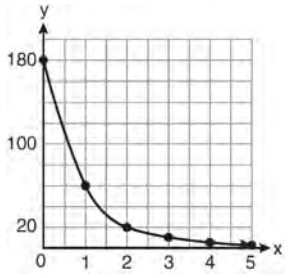
1) $a_n = 6\left(\frac{1}{3}\right)^n$
2) $a_n = 6\left(\frac{1}{3}\right)^{n-1}$
3) $a_n = 54\left(\frac{1}{3}\right)^n$
4) $a_n = 54\left(\frac{1}{3}\right)^{n-1}$

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

1) 


2) 


3) 


4) 

33 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

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

35 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

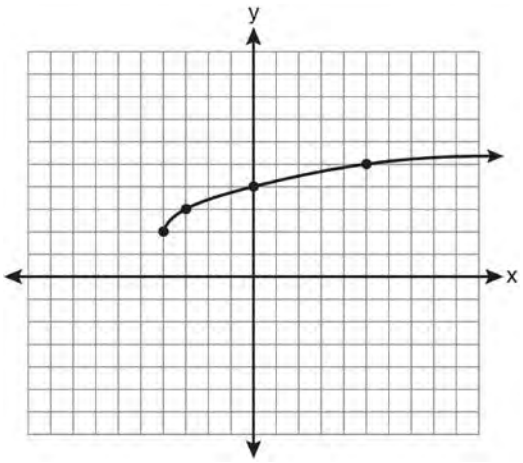
36 Which values of $x$ are in the solution set of the following system of equations?

$$y=3x-6$$
$$y=x^2-x-6$$

1) 0, – 4
2) 0, 4
3) 6, – 2
4) –6, 2

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

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

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

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

1) $b_n = 8 + 2n$
2) $b_n = 10 + 2n$
3) $b_n = 10(2)^n$
4) $b_n = 10(2)^{n-1}$

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

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

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

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

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

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

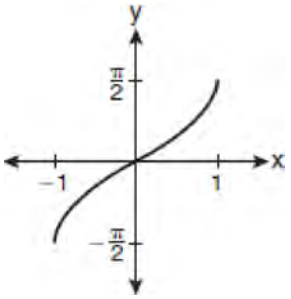
45 An auditorium has 21 rows of seats. The first row has 18 seats, and each succeeding row has two more seats than the previous row. How many seats are in the auditorium?

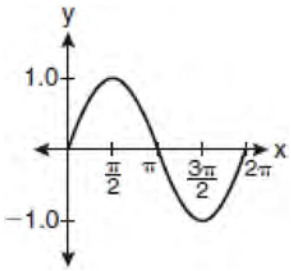
1) 540
2) 567
3) 760
4) 798

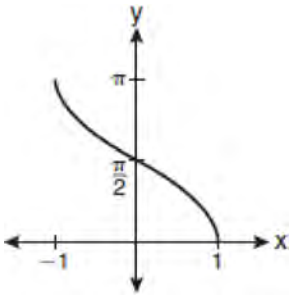
46 What is the fourth term in the expansion of $(3x - 2)^5$?

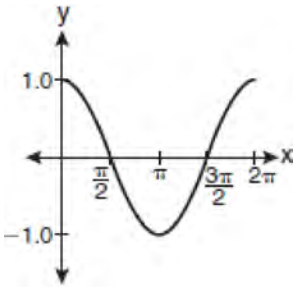
1) $-720x^2$
2) $-240x$
3) $720x^2$
4) $1,080x^3$

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

1) 


2) 

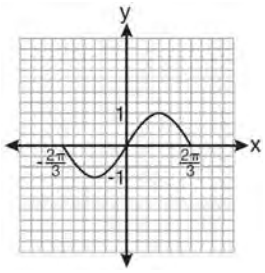

3) 

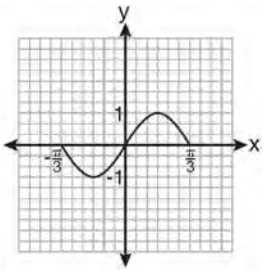

4) 

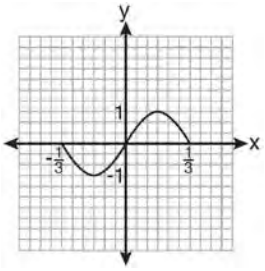

48 The expression $\log_8 64$ is equivalent to

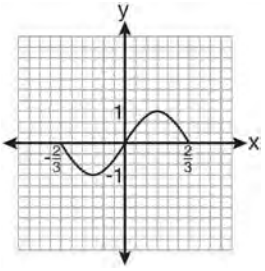
1) 8
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{8}$

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

1) 


2) 

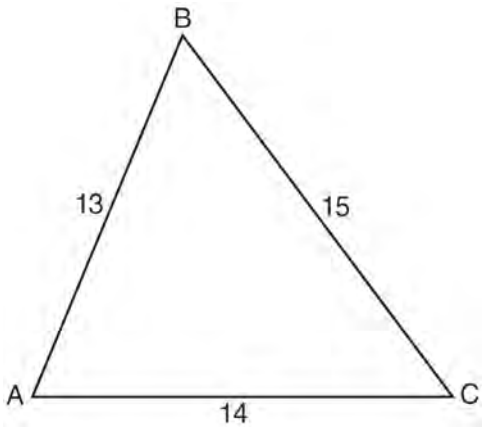

3) 


4) 


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

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

51 In $\Delta ABC$, $a = 15$, $b = 14$, 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

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

53 In $\Delta ABC$, $m\angle A = 74$, $a = 59.2$, 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

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

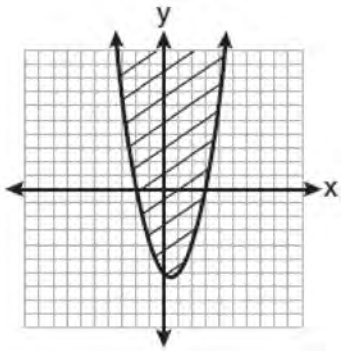
55 The expression $2i^2 + 3i^3$ is equivalent to

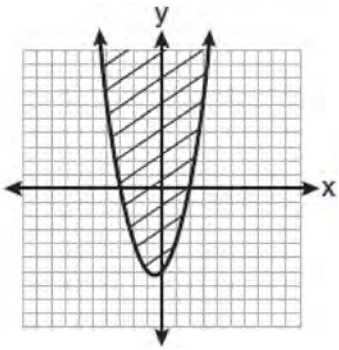
1) $-2 - 3i$
2) $2 - 3i$
3) $-2 + 3i$
4) $2 + 3i$

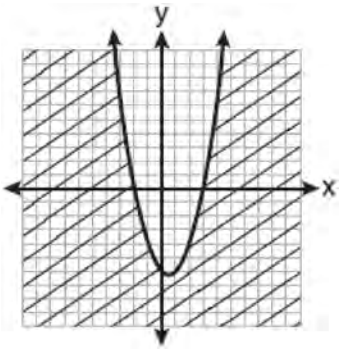
56 An amateur bowler calculated his bowling average for the season. If the data are normally distributed, about how many of his 50 games were within one standard deviation of the mean?

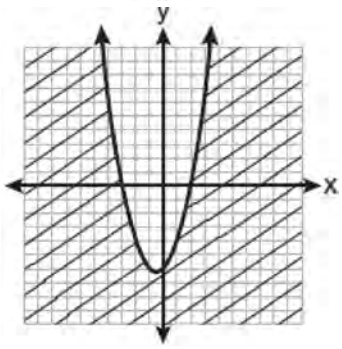
1) 14
2) 17
3) 34
4) 48

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

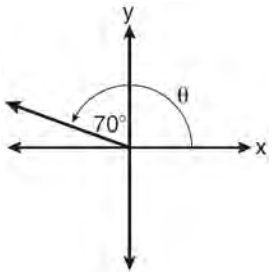
1) 

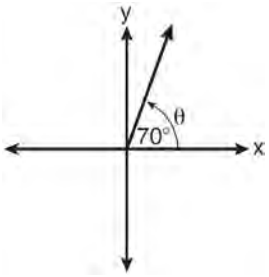

2) 

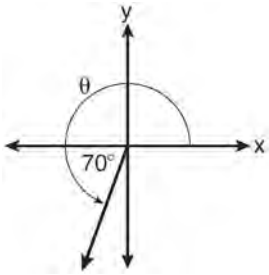

3) 

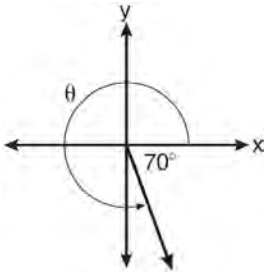

4) 


58 In which graph is $\theta$ coterminal with an angle of $-70°$?

1) 


2) 

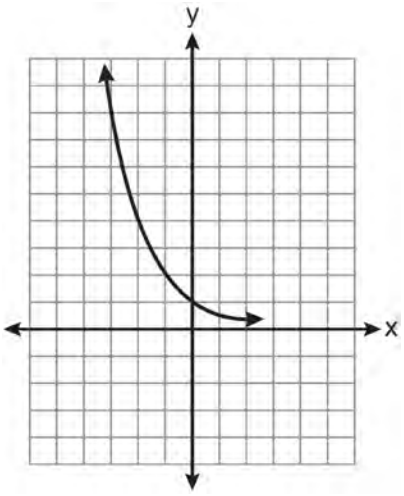

3) 


4) 

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

60 Which equation is represented by the graph below?




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

61 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) $0, -1, -2$

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

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

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

64 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

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

66 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) $2x^2(2x+3)(3x-2)$

67 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

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

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

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

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

70 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

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

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

72 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

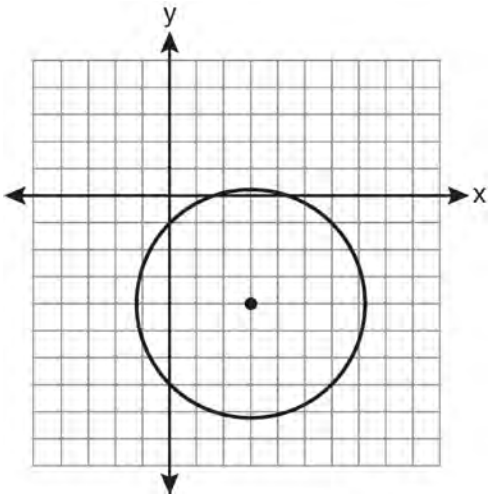
73 When simplified, the expression $\left(\frac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}}$ is equivalent to

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

74 Which function is *not* one-to-one?

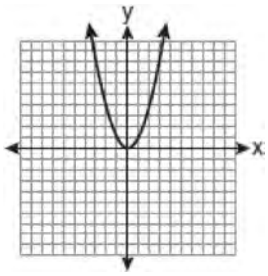
1) $\{(0,1),(1,2),(2,3),(3,4)\}$
2) $\{(0,0),(1,1),(2,2),(3,3)\}$
3) $\{(0,1),(1,0),(2,3),(3,2)\}$
4) $\{(0,1),(1,0),(2,0),(3,2)\}$

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

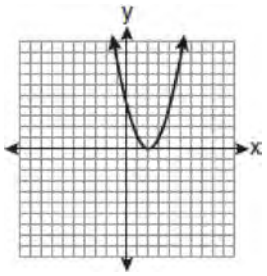


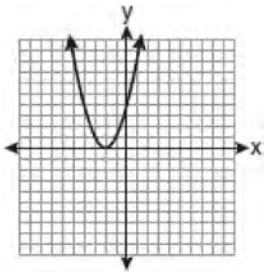

1) $(x-3)^2+(y+4)^2=16$
2) $(x-3)^2+(y+4)^2=18$
3) $(x+3)^2+(y-4)^2=16$
4) $(x+3)^2+(y-4)^2=18$

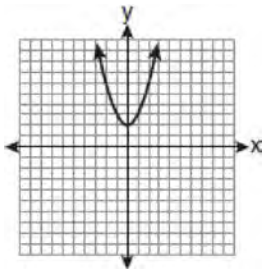
76 The graph below shows the function f($x$).

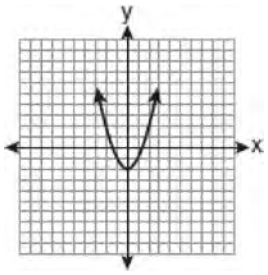



Which graph represents the function f($x+2$)?

1)



2)



3)



4)


77 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

78 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) $\frac{{}_{15}P_2 \cdot {}_5P_1}{{}_{30}P_3}$

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

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

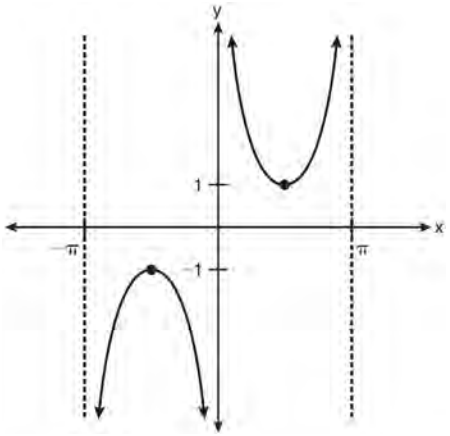
80 Expressed as a function of a positive acute angle, $\cos(-305°)$ is equal to

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

81 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?

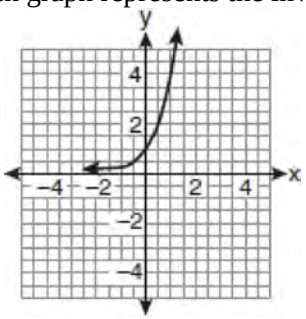
1) $2\pi$
2) 2
3) $8\pi$
4) 8

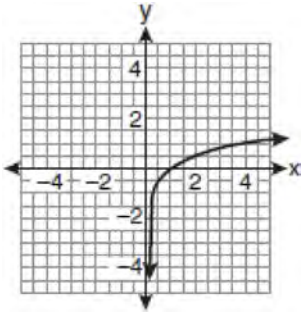
82 Which equation is sketched in the diagram below?

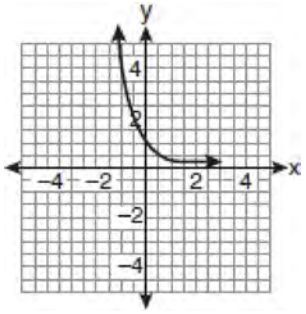


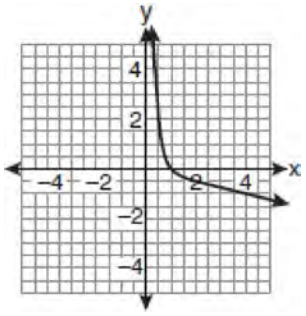

1) $y = \csc x$
2) $y = \sec x$
3) $y = \cot x$
4) $y = \tan x$

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

1) 


2) 


3) 


4) 

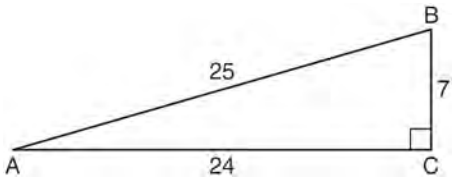

84 The expression $\frac{a^2b^{-3}}{a^{-4}b^2}$ is equivalent to

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

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

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

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




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

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

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

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

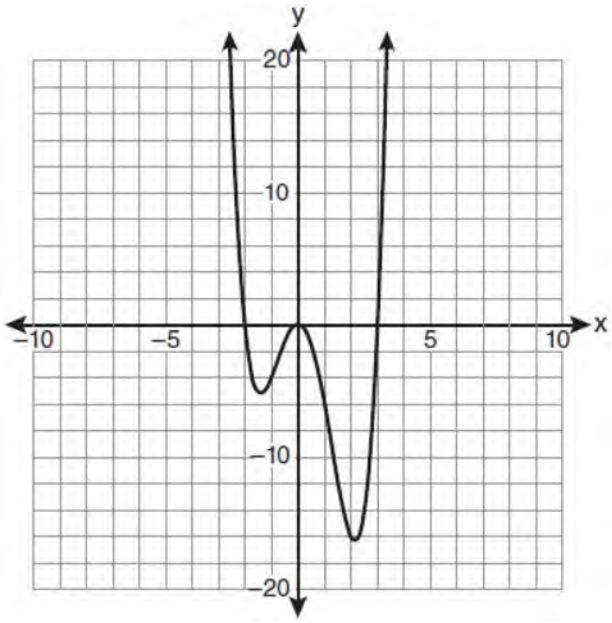
89 The solutions of the equation $y^2 - 3y = 9$ are

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) $\frac{3 \pm 3\sqrt{5}}{2}$

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

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

91 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) $\{-2, 0, 3\}$

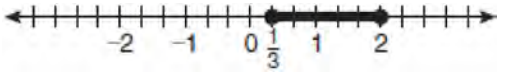
92 If $\sin^{-1}\left(\frac{5}{8}\right) = A$, then

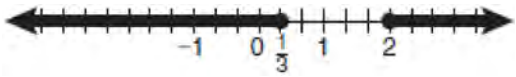
1) $\sin A = \frac{5}{8}$
2) $\sin A = \frac{8}{5}$
3) $\cos A = \frac{5}{8}$
4) $\cos A = \frac{8}{5}$

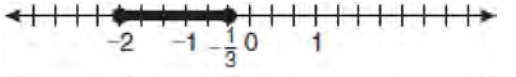
93 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

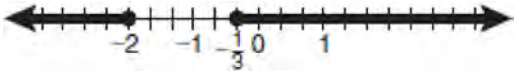
1) $\frac{\pi}{2}$
2) $\frac{2\pi}{3}$
3) $\frac{5\pi}{6}$
4) $\frac{7\pi}{6}$

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

1) 


2) 

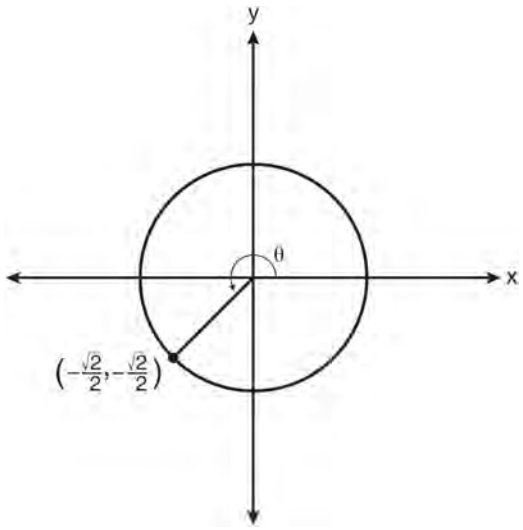

3) 


4) 


95 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

96 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 $\theta$ intersects the unit circle.




What is m$\angle\theta$?

1) 45
2) 135
3) 225
4) 240

97 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) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

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

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

99 The conjugate of $7 - 5i$ is

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

100 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

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

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

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

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

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

104 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) $17 = \frac{446 + 16x}{26 + x}$

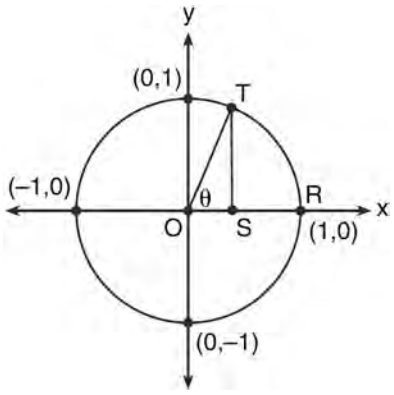
105 What is the value of $x$ in the equation $9^{3x+1} = 27^{x+2}$?

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

106 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

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




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

108 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) $2x^2 - 6x + 4 = 0$

109 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) $\csc^2\theta$

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

111 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

112 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

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

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

114 The roots of the equation $9x^2+3x-4=0$ are

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

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

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

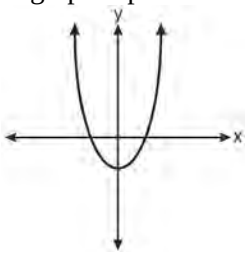
116 The principal would like to assemble a committee of 8 students from the 15-member student council. How many different committees can be chosen?

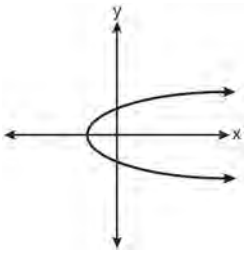
1) 120
2) 6,435
3) 32,432,400
4) 259,459,200

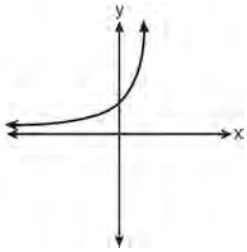
117 When $\frac{3}{2}x^2-\frac{1}{4}x-4$ is subtracted from $\frac{5}{2}x^2-\frac{3}{4}x+1$, the difference is

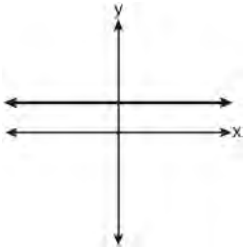
1) $-x^2+\frac{1}{2}x-5$
2) $x^2-\frac{1}{2}x+5$
3) $-x^2-x-3$
4) $x^2-x-3$

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

1) 


2) 

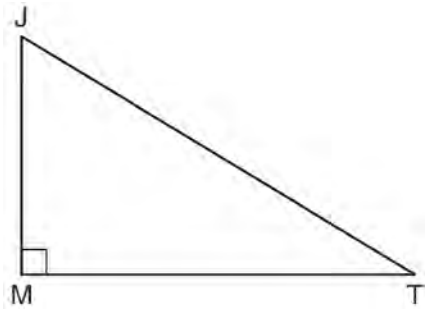

3) 


4) 

119 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

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

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

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

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

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

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

124 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) ${}_{20}P_3$

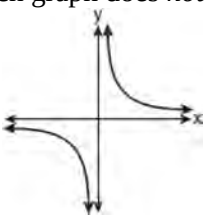
125 In $\Delta ABC$, $m\angle A = 120$, $b = 10$, and $c = 18$. What is the area of $\Delta ABC$ to the *nearest square inch*?

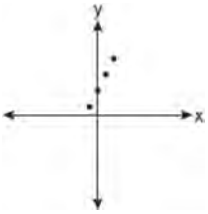
1) 52
2) 78
3) 90
4) 156

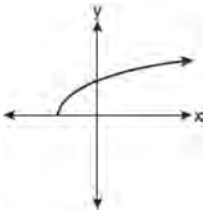
126 The solution set of $\sqrt{3x+16} = x+2$ is

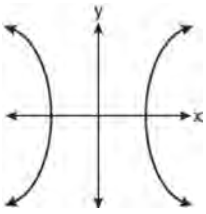
1) $\{-3, 4\}$
2) $\{-4, 3\}$
3) $\{3\}$
4) $\{-4\}$

127 Which graph does *not* represent a function?

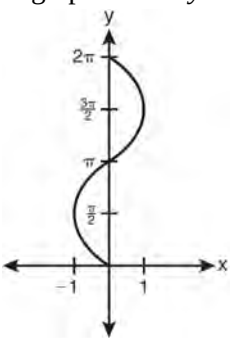
1) 

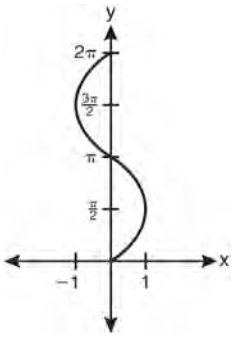

2) 

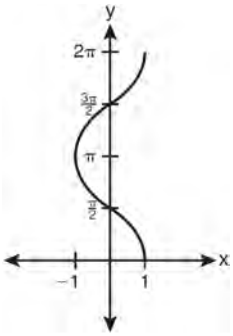

3) 

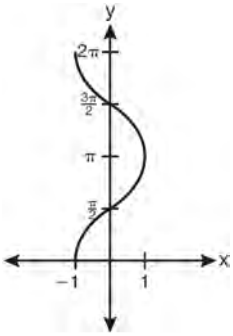

4) 


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

1) 


2) 


3) 


4) 

129 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) $4x^8y^{28}$

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

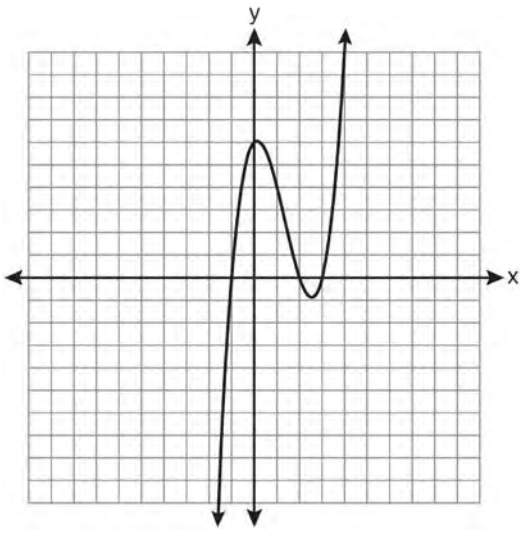
131 The value of $x$ in the equation $4^{2x+5} = 8^{3x}$ is

1) 1
2) 2
3) 5
4) −10

132 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) $6\pi$

133 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

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

# Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

135 What is the solution set for the equation $\sqrt{5x+29} = x+3$?

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

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

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

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

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

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

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

139 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) $\cos x + \sin x$

140 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

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

1) 680
2) 732
3) 740
4) 784

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

1) $\frac{-6y^2 + 36y - 54}{(2y-6)(6-2y)}$
2) $\frac{3y-9}{2y-6}$
3) $\frac{3}{2}$
4) $-\frac{3}{2}$

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

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

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

1) \$5190.33
2) \$5796.37
3) \$5805.92
4) \$5808.08

145 In $\Delta PQR$, $p$ equals

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

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

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

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

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

148 A math club has 30 boys and 20 girls. Which expression represents the total number of different 5-member teams, consisting of 3 boys and 2 girls, that can be formed?
1) ${}_{30}P_3 \cdot {}_{20}P_2$
2) ${}_{30}C_3 \cdot {}_{20}C_2$
3) ${}_{30}P_3 + {}_{20}P_2$
4) ${}_{30}C_3 + {}_{20}C_2$

149 How many different six-letter arrangements can be made using the letters of the word "TATTOO"?
1) 60
2) 90
3) 120
4) 720

150 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) $2x^4y^2$

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

152 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

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

154 The expression $\frac{x^2 + 9x - 22}{x^2 - 121} \div (2 - x)$ is equivalent to
1) $x - 11$
2) $\frac{1}{x - 11}$
3) $11 - x$
4) $\frac{1}{11 - x}$

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

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

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

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

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

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

158 Which value of $r$ represents data with a strong positive linear correlation between two variables?

1) 0.89
2) 0.34
3) 1.04
4) 0.01

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

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

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

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

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

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

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

163 Given $\Delta ABC$ 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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

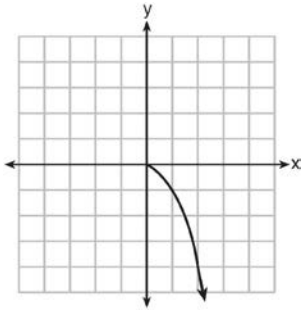
174 A study finds that 80% of the local high school students text while doing homework. Ten students are selected at random from the local high school. Which expression would be part of the process used to determine the probability that, *at most*, 7 of the 10 students text while doing homework?

1) ${}_{10}C_6\left(\frac{4}{5}\right)^6\left(\frac{1}{5}\right)^4$
2) ${}_{10}C_7\left(\frac{4}{5}\right)^{10}\left(\frac{1}{5}\right)^7$
3) ${}_{10}C_8\left(\frac{7}{10}\right)^{10}\left(\frac{3}{10}\right)^2$
4) ${}_{10}C_9\left(\frac{7}{10}\right)^9\left(\frac{3}{10}\right)^1$

175 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 $(e, 1)$.

176 What is the range of the function shown below?




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

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

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

178 In $\Delta KLM$, $KL = 20$, $LM = 13$, and $m\angle K = 40$. The measure of $\angle M$?

1) must be between 0° and 90°
2) must equal 90°
3) must be between 90° and 180°
4) is ambiguous

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

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

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

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

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

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

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

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

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

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

Which value represents the linear correlation coefficient, rounded to the *nearest thousandth*, between a person's age, in years, and that person's target heart rate, in beats per minute?

1) –0.999
2) –0.664
3) 0.998
4) 1.503

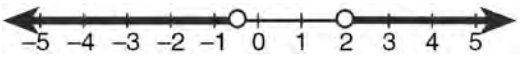
184 What is the solution set of the equation $-\sqrt{2}\sec x = 2$ when $0° \le x < 360°$?

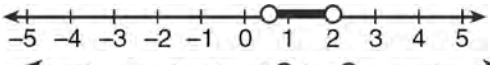
1) $\{45°, 135°, 225°, 315°\}$
2) $\{45°, 315°\}$
3) $\{135°, 225°\}$
4) $\{225°, 315°\}$

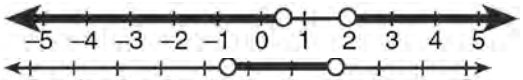
185 Which function is one-to-one?

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

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

1) 

2) 

3) 

4) 


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

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

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

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

189 The value of $\csc 138°23'$ rounded to four decimal places is

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

190 Approximately how many degrees does five radians equal?

1) 286
2) 900
3) $\frac{\pi}{36}$
4) $5\pi$

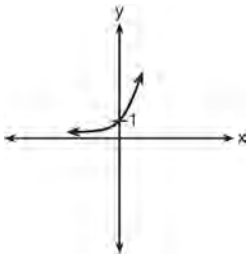
191 Which expression is equivalent to $\left(9x^2y^6\right)^{-\frac{1}{2}}$?

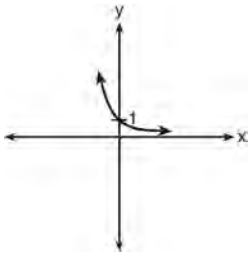
1) $\frac{1}{3xy^3}$
2) $3xy^3$
3) $\frac{3}{xy^3}$
4) $\frac{xy^3}{3}$

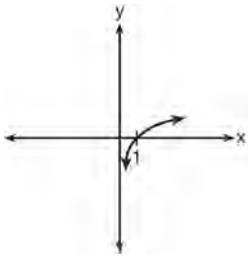
192 Which expression represents the total number of different 11-letter arrangements that can be made using the letters in the word "MATHEMATICS"?

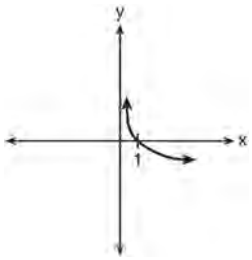
1) $\frac{11!}{3!}$
2) $\frac{11!}{2!+2!+2!}$
3) $\frac{11!}{8!}$
4) $\frac{11!}{2!\cdot 2!\cdot 2!}$

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

1) 


2) 

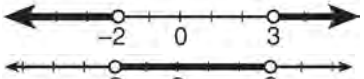

3) 

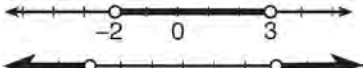

4) 


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

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

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

1) 


2) 


3) 


4) 


196 Which problem involves evaluating ${}_6P_4$?

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

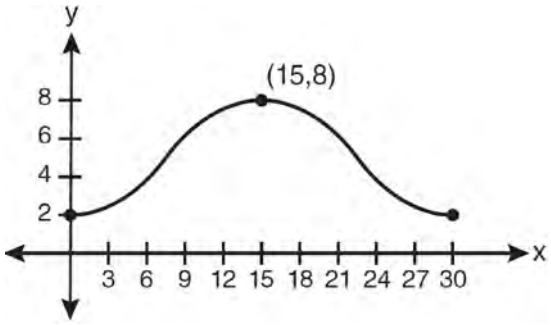
197 The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey

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

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

1) 8
2) 2
3) −8
4) −2

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

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

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

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

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

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

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

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

202 In $\Delta DEF$, $d = 5$, $e = 8$, and $m\angle D = 32$. How many distinct triangles can be drawn given these measurements?

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

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

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

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

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

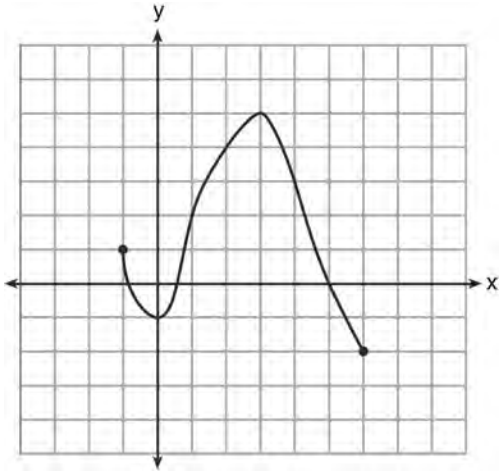
205 Given angle $A$ in Quadrant I with $\sin A = \frac{12}{13}$ and angle $B$ in Quadrant II with $\cos B = -\frac{3}{5}$, what is the value of $\cos(A - B)$?

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

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

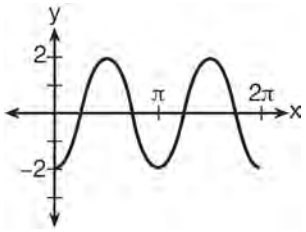
1) observation
2) controlled experiment
3) population survey
4) sample survey

207 What is the domain of the function shown below?




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

208 Which equation represents the graph below?




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

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

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

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

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

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

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

212 Which function is one-to-one?

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

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

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

214 In $\Delta MNP$, $m = 6$ and $n = 10$. Two distinct triangles can be constructed if the measure of angle $M$ is

1) 35
2) 40
3) 45
4) 50

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

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

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

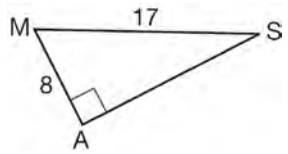
217 If $\tan\left(\text{Arc}\cos\frac{\sqrt{3}}{k}\right) = \frac{\sqrt{3}}{3}$, then $k$ is

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

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

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

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




1) 28°1'
2) 28°4'
3) 61°56'
4) 61°93'

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

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

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

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

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

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

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

224 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%

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

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

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

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

227 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

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

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

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

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

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

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

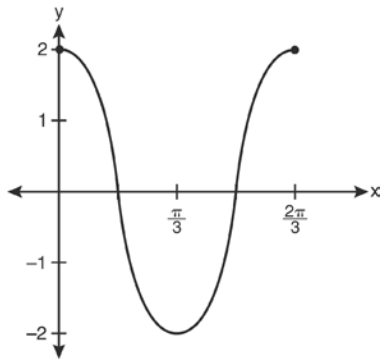
What are the solutions to his equation?

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

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

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

232 Which equation is represented by the graph below?




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

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

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

234 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

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

1) $\frac{7+\sqrt{11}}{38}$
2) $\frac{7-\sqrt{11}}{38}$
3) $\frac{7+\sqrt{11}}{60}$
4) $\frac{7-\sqrt{11}}{60}$

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

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

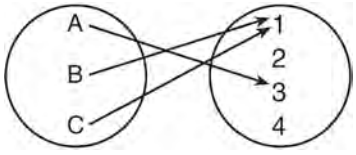
What is the value of $k$ for this table?
1) 9
2) 2
3) 8
4) 4

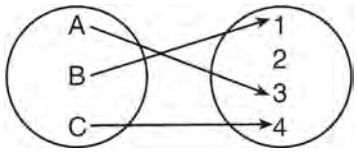
237 There are eight people in a tennis club. Which expression can be used to find the number of different ways they can place first, second, and third in a tournament?
1) ${}_8P_3$
2) ${}_8C_3$
3) ${}_8P_5$
4) ${}_8C_5$

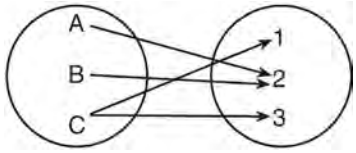
238 If $\log_b x = 3\log_b p - \left(2\log_b t + \frac{1}{2}\log_b r\right)$, then the value of $x$ is

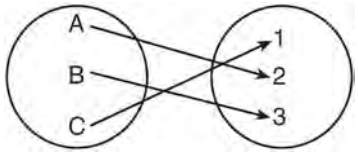
1) $\frac{p^3}{\sqrt{t^2 r}}$
2) $p^3 t^2 r^{\frac{1}{2}}$
3) $\frac{p^3 t^2}{\sqrt{r}}$
4) $\frac{p^3}{t^2\sqrt{r}}$

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

1) 

2) 

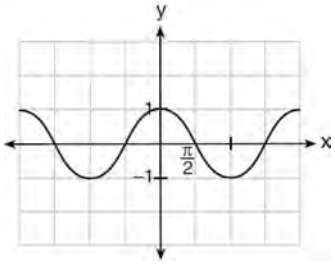
3) 

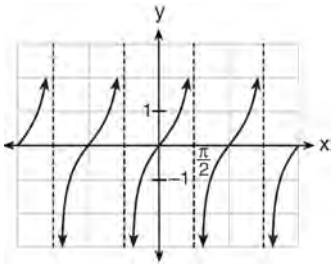
4) 

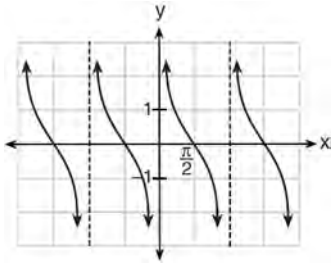
240 What is the product of the roots of $x^2 - 4x + k = 0$ if one of the roots is 7?

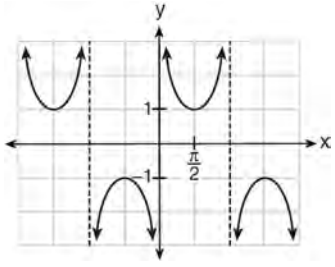
1) 21
2) −11
3) −21
4) −77

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

1) 


2) 


3) 


4) 


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

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

243 The quantities $p$ and $q$ vary inversely. If $p = 20$ when $q = -2$, and $p = x$ when $q = -2x + 2$, then $x$ equals

1) −4 and 5
2) $\frac{20}{19}$
3) −5 and 4
4) $-\frac{1}{4}$

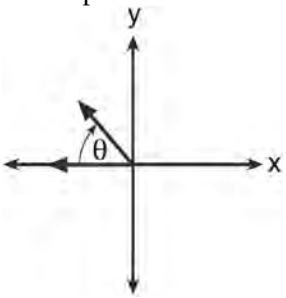
244 If $f(x) = \sqrt{9 - x^2}$, what are its domain and range?

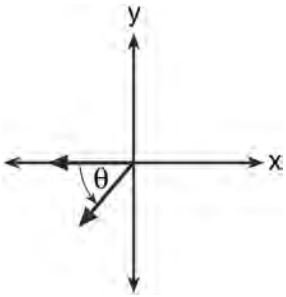
1) domain: $\{x \mid -3 \leq x \leq 3\}$; range: $\{y \mid 0 \leq y \leq 3\}$
2) domain: $\{x \mid x \neq \pm 3\}$; range: $\{y \mid 0 \leq y \leq 3\}$
3) domain: $\{x \mid x \leq -3 \text{ or } x \geq 3\}$; range: $\{y \mid y \neq 0\}$
4) domain: $\{x \mid x \neq 3\}$; range: $\{y \mid y \geq 0\}$

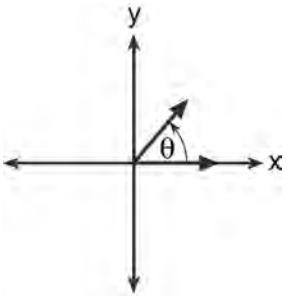
245 Which expression is equivalent to $\frac{2x^{-2}y^{-2}}{4y^{-5}}$?

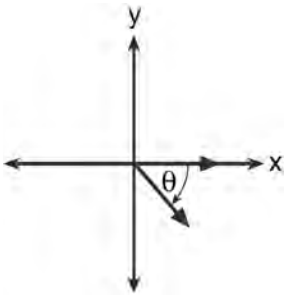
1) $\frac{y^3}{2x^2}$
2) $\frac{2y^3}{x^2}$
3) $\frac{2x^2}{y^3}$
4) $\frac{x^2}{2y^3}$

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

1) 


2) 

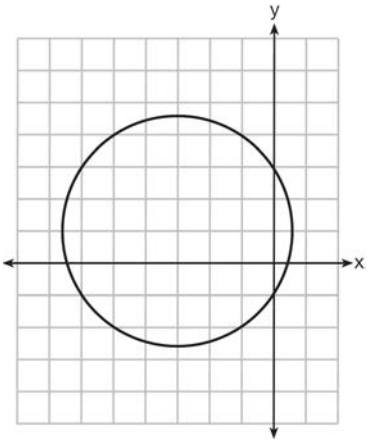

3) 


4) 


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

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

248 Which equation is represented by the graph below?




1) $(x-3)^2 + (y+1)^2 = 5$
2) $(x+3)^2 + (y-1)^2 = 5$
3) $(x-1)^2 + (y+3)^2 = 13$
4) $(x+3)^2 + (y-1)^2 = 13$

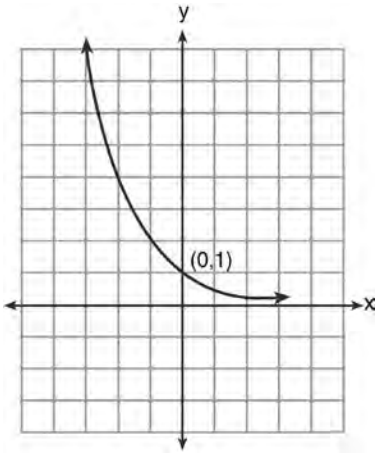
249 If $\sin A = -\frac{7}{25}$ and $\angle A$ terminates in Quadrant IV, $\tan A$ equals

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

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

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

251 What is the equation of the graph shown below?

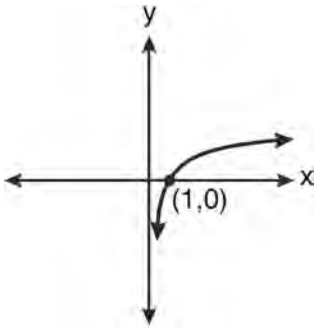


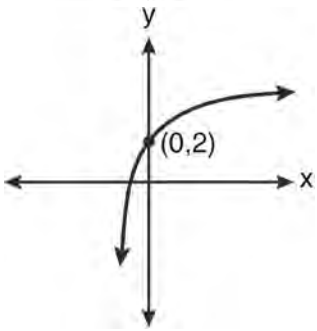

1) $y = 2^x$
2) $y = 2^{-x}$
3) $x = 2^y$
4) $x = 2^{-y}$

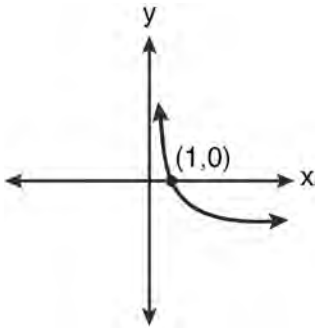
252 The expression $x^2(x + 2) - (x + 2)$ is equivalent to

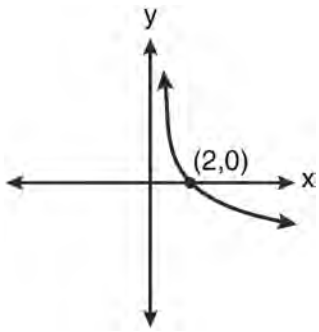
1) $x^2$
2) $x^2 - 1$
3) $x^3 + 2x^2 - x + 2$
4) $(x + 1)(x - 1)(x + 2)$

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

1)



2)



3)



4)


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

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

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

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

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

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

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

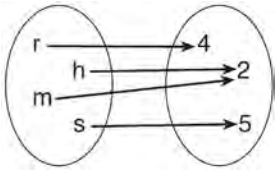
257 What is the common difference in the sequence $2a + 1, 4a + 4, 6a + 7, 8a + 10, \ldots$?

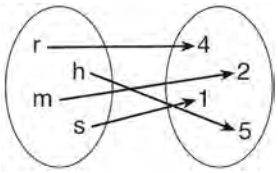
1) $2a + 3$
2) $-2a - 3$
3) $2a + 5$
4) $-2a + 5$

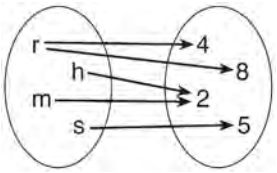
258 The expression $(x + i)^2 - (x - i)^2$ is equivalent to

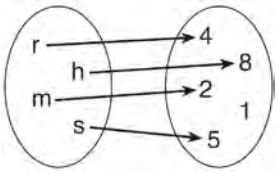
1) 0
2) $-2$
3) $-2 + 4xi$
4) $4xi$

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

1) 


2) 


3) 


4) 


260 The roots of the equation $2x^2 + 4 = 9x$ are

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

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

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

262 Which equation represents a graph that has a period of $4\pi$?

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

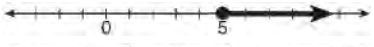
263 If order does *not* matter, which selection of students would produce the most possible committees?

1) 5 out of 15
2) 5 out of 25
3) 20 out of 25
4) 15 out of 25

264 In the interval $0° \le x < 360°$, $\tan x$ is undefined when $x$ equals

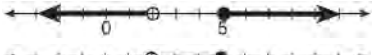
1) 0º and 90º
2) 90º and 180º
3) 180º and 270º
4) 90º and 270º

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

1)



2)



3)



4)



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

1) $\sin(3x)^2$
2) $3\sin x^2$
3) $\sin^2(3x)$
4) $3\sin^2 x$

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

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

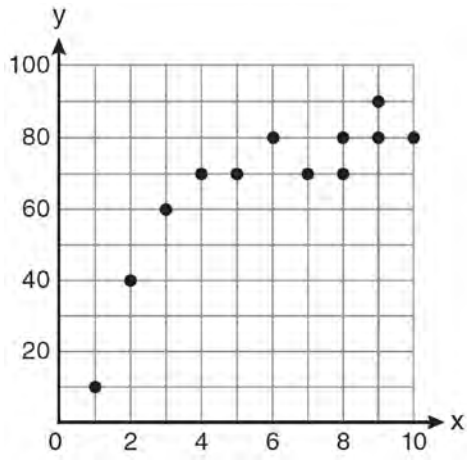
268 The expression $\sin(\theta + 90)°$ is equivalent to

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

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

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

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

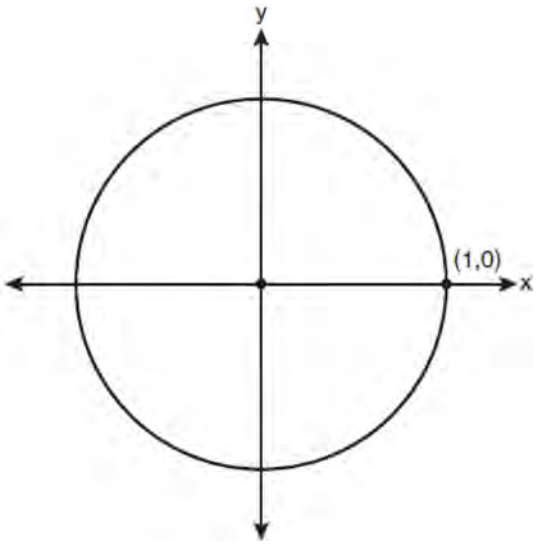



Based on her scatter plot, which regression model would be most appropriate?

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

# Algebra 2/Trigonometry 2 Point Regents Exam Questions

271 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 $\sin 240°$.

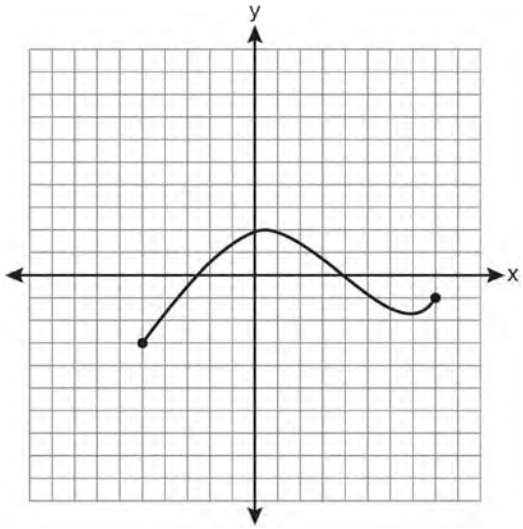



272 The formula for continuously compounded interest is $A = Pe^{rt}$, where $A$ is the amount of money in the account, $P$ is the initial investment, $r$ is the interest rate, and $t$ is the time in years. Using the formula, determine, to the *nearest dollar*, the amount in the account after 8 years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

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

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

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




State the domain and range of this function.

276 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

Find the interquartile range for this set of data.

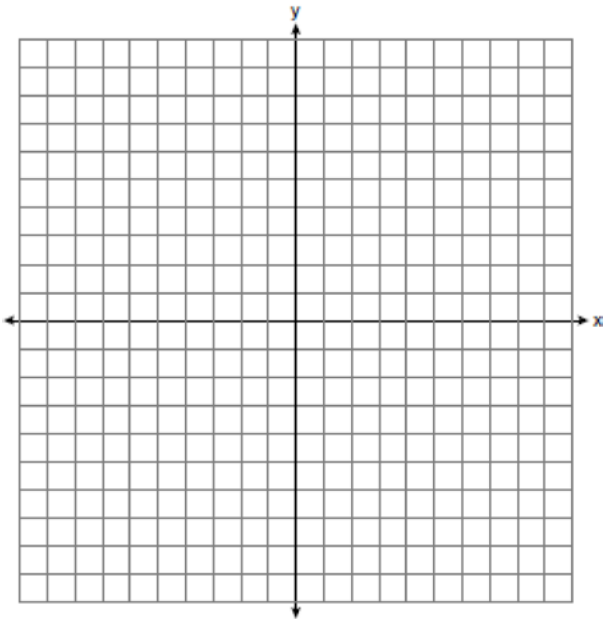
289 Solve the equation $2\tan C - 3 = 3\tan C - 4$ algebraically for all values of $C$ in the interval $0° \leq C < 360°$.

290 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.

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

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

293 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.




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

295 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.

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

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

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

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

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

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

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

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

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

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

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

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

306 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.

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

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

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

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

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

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

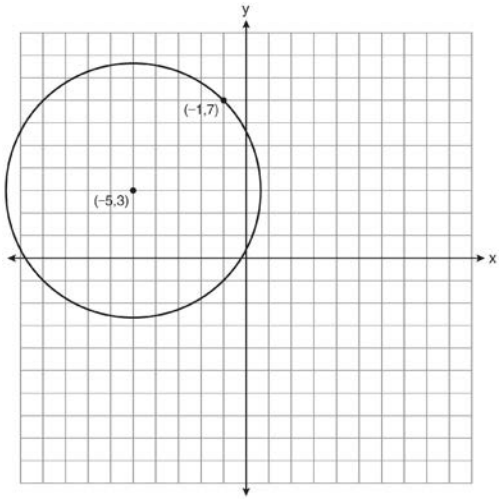
313 The number of bacteria present in a Petri dish can be modeled by the function $N = 50e^{3t}$, where $N$ is the number of bacteria present in the Petri dish after $t$ hours. Using this model, determine, to the *nearest hundredth*, the number of hours it will take for $N$ to reach 30,700.

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

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

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

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




Write an equation that represents the circle.

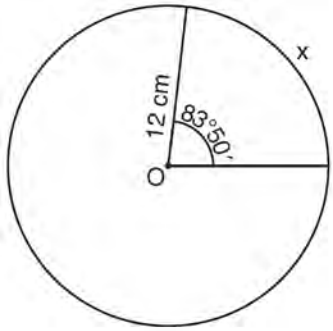
318 Determine algebraically the $x$-coordinate of all points where the graphs of $xy = 10$ and $y = x + 3$ intersect.

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

320 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.

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

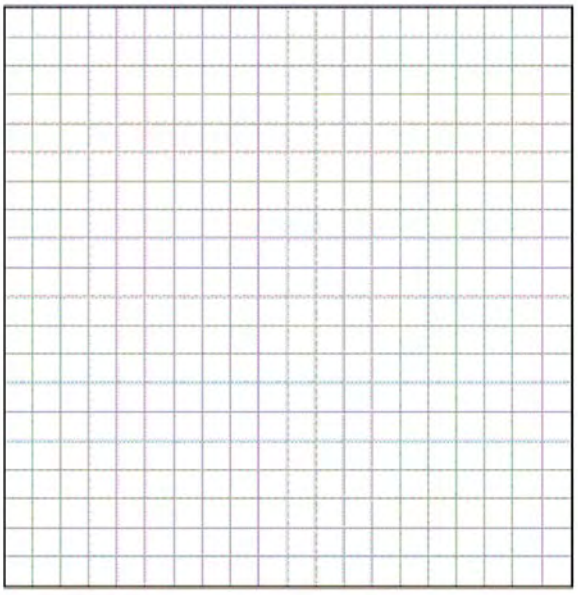
322 Circle $O$ shown below has a radius of 12 centimeters. To the *nearest tenth of a centimeter*, determine the length of the arc, $x$, subtended by an angle of 83°50'.




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

324 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.

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



326 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.

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

$$a_1 = -3$$

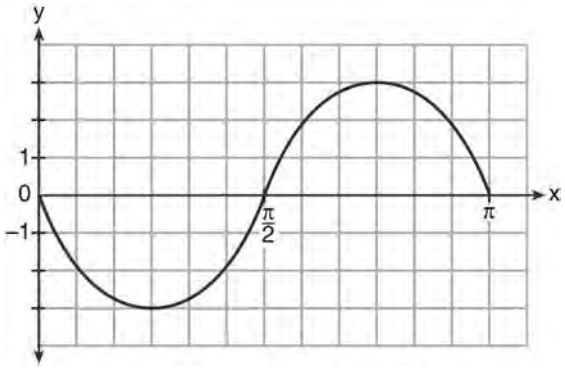
$$a_n = a_{(n-1)} - n$$

328 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.

329 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*.

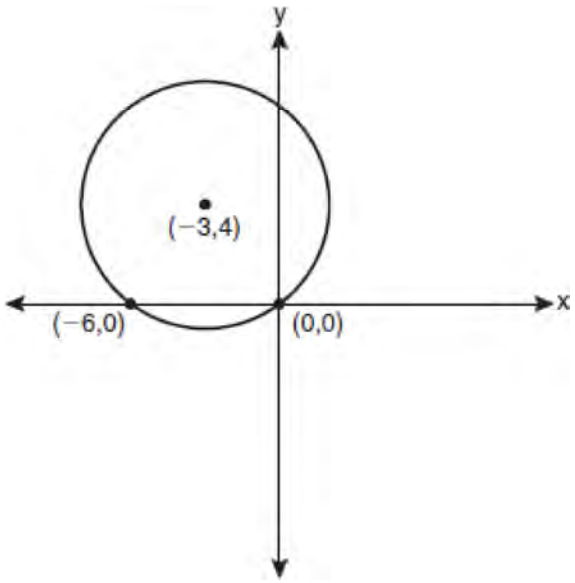
330 Find, algebraically, the measure of the obtuse angle, to the *nearest degree*, that satisfies the equation $5\csc\theta = 8$.

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



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

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




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

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

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

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

338 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 |

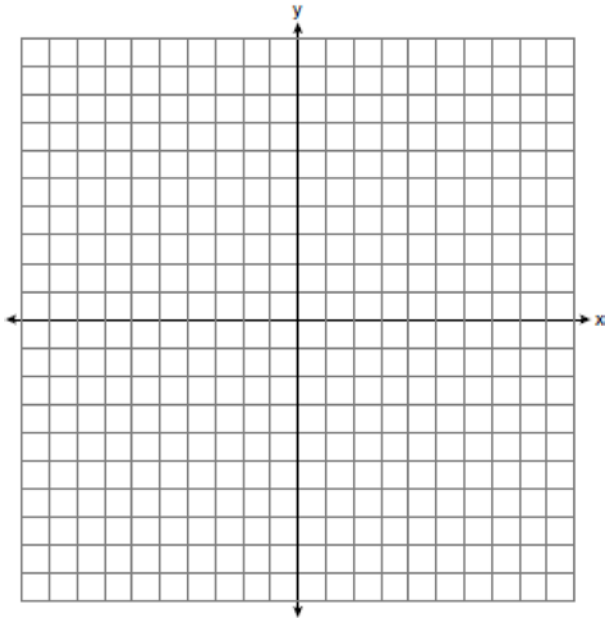
Find the population standard deviation of these scores, to the *nearest tenth*.

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

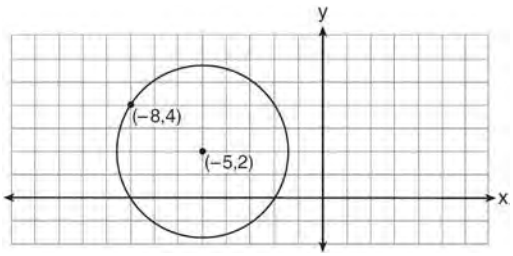
340 Evaluate $e^{x \ln y}$ when $x = 3$ and $y = 2$.

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

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




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




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

345 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.*

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

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

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

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

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

# Algebra 2/Trigonometry 4 Point Regents Exam Questions

351 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.

352 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.

353 The measures of the angles between the resultant and two applied forces are 60° and 45°, and the magnitude of the resultant is 27 pounds. Find, to the *nearest pound*, the magnitude of each applied force.

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

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

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

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

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

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

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

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

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

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

364 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 $\tan(A + B)$.

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



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

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

368 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?

369 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.

370 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.

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

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

373 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.

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

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

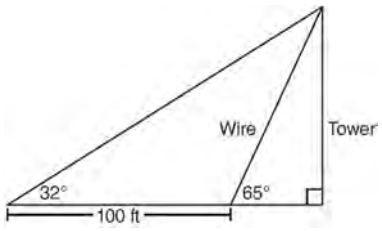
Determine the number of employees whose travel time is within one standard deviation of the mean.

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

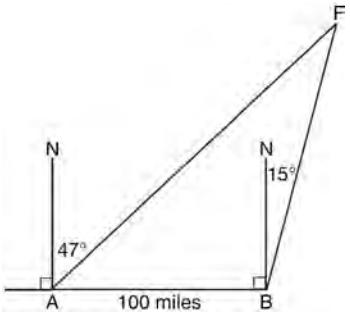
$$\frac{13}{x} = 10 - x$$

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

377 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*.




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



379 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.

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

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

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

# Algebra 2/Trigonometry 6 Point Regents Exam Questions

381 Solve algebraically for $x$:
$\sqrt{x^2 + x - 1} + 11x = 7x + 3$

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

383 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.

384 Solve algebraically for all values of $x$:
$81^{x^3 + 2x^2} = 27^{\frac{5x}{3}}$

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

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

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

388 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.

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

390 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.]

# Algebra 2/Trigonometry Multiple Choice Regents Exam Questions
## Answer Section

1 ANS: 4 PTS: 2 REF: 011101a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

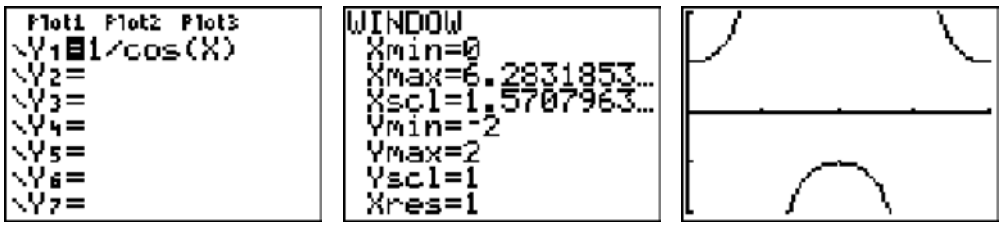
2 ANS: 1

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

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

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

3 ANS: 3




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

4 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

5 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

6 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

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

8 ANS: 3 PTS: 2 REF: 061114a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

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

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

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

12 ANS: 3
Cofunctions tangent and cotangent are complementary

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

13 ANS: 3

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

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

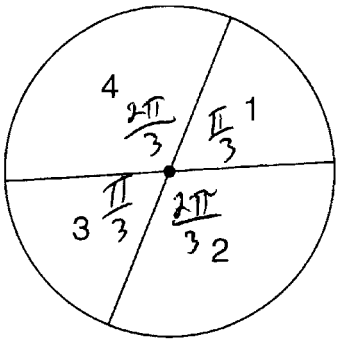
14 ANS: 1 PTS: 2 REF: 061025a2 STA: A2.A.34
TOP: Sigma Notation

15 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

16 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

17 ANS: 1

| $n$ | 3 | 4 | 5 | $\Sigma$ |
|---|---|---|---|---|
| $-r^2 + r$ | $-3^2 + 3 = -6$ | $-4^2 + 4 = -12$ | $-5^2 + 5 = -20$ | $-38$ |

PTS: 2 REF: 061118a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

18 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

19 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

20 ANS: 2

$(3 - 7i)(3 - 7i) = 9 - 21i - 21i + 49i^2 = 9 - 42i - 49 = -40 - 42i$

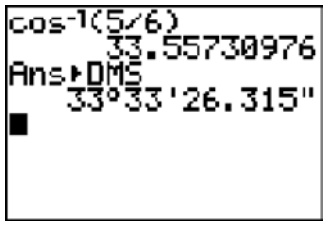
PTS: 2 REF: fall0901a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

21 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

22 ANS: 1




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

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

$K \approx 33°33'$

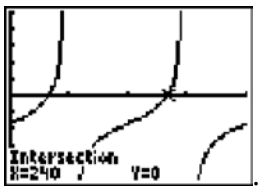
PTS: 2 REF: 061023a2 STA: A2.A.55 TOP: Trigonometric Ratios

23 ANS: 1 PTS: 2 REF: 061018a2 STA: A2.A.22
TOP: Solving Radicals KEY: extraneous solutions

24 ANS: 1 PTS: 2 REF: 061019a2 STA: A2.N.7
TOP: Imaginary Numbers

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

26 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

27 ANS: 3

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

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

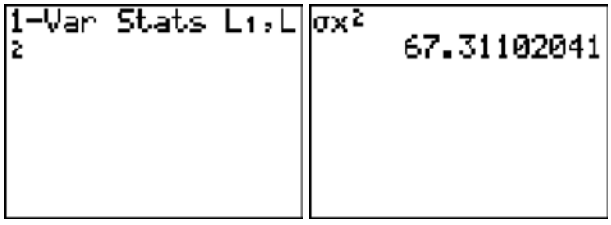
28 ANS: 4

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

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

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

30 ANS: 3

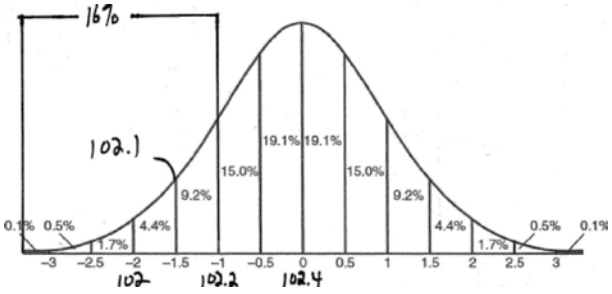



PTS: 2 REF: fall0924a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

31 ANS: 4 PTS: 2 REF: 061026a2 STA: A2.A.29
TOP: Sequences

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

33 ANS: 1




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

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

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

36 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

37 ANS: 3

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

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

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

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

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

39 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

40 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

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

42 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

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

44 ANS: 3

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

$(x-5)(x+2) > 0$ $x - 5 < 0$ and $x + 2 < 0$

$x - 5 > 0$ and $x + 2 > 0$ $x < 5$ and $x < -2$

$x > 5$ and $x > -2$ $x < -2$

$x > 5$

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

45 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

46 ANS: 1

$_5C_3(3x)^2(-2)^3 = 10 \cdot 9x^2 \cdot -8 = -720x^2$

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

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

48 ANS: 2

$8^2 = 64$

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

49 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

50 ANS: 4

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

$49 = 34 - 30\cos A$

$15 = -30\cos A$

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

$120 = A$

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

51 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

52 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

53 ANS: 3

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

$C \approx 78.3$

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

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

55 ANS: 1

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

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

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

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

57 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

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

59 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

60 ANS: 2 PTS: 2 REF: 061108a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

61 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

62 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

63 ANS: 1

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

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

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

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

64 ANS: 4

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

PTS: 2 REF: 081001a2 STA: A2.N.4 TOP: Operations with Irrational Expressions
KEY: without variables | index = 2

65 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

66 ANS: 4

$12x^4 + 10x^3 - 12x^2 = 2x^2(6x^2 + 5x - 6) = 2x^2(2x+3)(3x-2)$

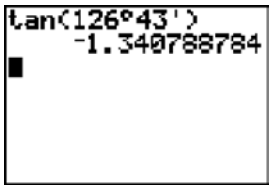
PTS: 2 REF: 061008a2 STA: A2.A.7 TOP: Factoring Polynomials
KEY: single variable

67 ANS: 2

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

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

68 ANS: 2




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

69 ANS: 3

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

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

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

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

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

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

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

70 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

71 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

72 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

73 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

74 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

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

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

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

78 ANS: 1 PTS: 2 REF: 011117a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

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

80 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

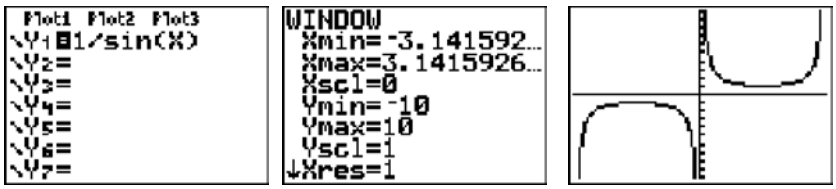
PTS: 2 REF: 061104a2 STA: A2.A.57 TOP: Reference Angles

81 ANS: 4

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

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

82 ANS: 1




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

83 ANS: 2

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

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

84 ANS: 1 PTS: 2 REF: fall0914a2 STA: A2.A.9
TOP: Negative and Fractional Exponents

85 ANS: 3

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

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

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

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

$x = -3 \; x = -1$

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

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

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

88 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

89 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

90 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

91 ANS: 4 PTS: 2 REF: 061005a2 STA: A2.A.50
TOP: Solving Polynomial Equations

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

93 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

94 ANS: 1

$6x - 7 \le 5 \quad 6x - 7 \ge -5$

$6x \le 12 \qquad 6x \ge 2$

$x \le 2 \qquad x \ge \frac{1}{3}$

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

95 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

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

97 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

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

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

100 ANS: 1

${}_{10}C_4 = 210$

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

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

102 ANS: 3

$x = 5^4 = 625$

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

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

104 ANS: 4 PTS: 2 REF: 061124a2 STA: A2.S.3
TOP: Average Known with Missing Data

105 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

106 ANS: 2

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

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

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

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

108 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

109 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

110 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

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

112 ANS: 1

$${}_9C_3a^6(-4b)^3 = -5376a^6b^3$$

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

113 ANS: 3

| $n$ | 0 | 1 | 2 | $\Sigma$ |
|---|---|---|---|---|
| $n^2+2^n$ | $0^2+2^0=1$ | $1^2+2^2=3$ | $2^2+2^2=8$ | 12 |

$2 \times 12 = 24$

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

114 ANS: 4

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

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

115 ANS: 1

$\cos^2\theta - \cos 2\theta = \cos^2\theta - (\cos^2\theta - \sin^2\theta) = \sin^2\theta$

PTS: 2 REF: 061024a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: simplifying

116 ANS: 2

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

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

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

118 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

119 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

120 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

121 ANS: 2

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

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

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

123 ANS: 3 PTS: 2 REF: 061001a2 STA: A2.A.30
TOP: Sequences

124 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

125 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

126 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

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

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

129 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

130 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

131 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

132 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

133 ANS: 2

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

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

134 ANS: 3

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

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

# Algebra 2/Trigonometry Multiple Choice Regents Exam Questions
# Answer Section

135 ANS: 1

$5x + 29 = (x + 3)^2$ . $(-5) + 3$ shows an extraneous solution.

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

$0 = x^2 + x - 20$

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

$x = -5, 4$

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

136 ANS: 3

$1000 = 500e^{.05t}$

$2 = e^{.05t}$

$\ln 2 = \ln e^{.05t}$

$\frac{\ln 2}{.05} = \frac{.05t \cdot \ln e}{.05}$

$13.9 \approx t$

PTS: 2 REF: 061313a2 STA: A2.A.6 TOP: Exponential Growth

137 ANS: 4

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

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

138 ANS: 4

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

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

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

140 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

141 ANS: 2

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

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

142 ANS: 3

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

PTS: 2 REF: 011325a2 STA: A2.A.16 TOP: Addition and Subtraction of Rationals

143 ANS: 2

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

PTS: 2 REF: 061305a2 STA: A2.A.17 TOP: Complex Fractions

144 ANS: 3

$$5000\left(1+\frac{.03}{4}\right)^{4 \cdot 5} = 5000(1.0075)^{20} \approx 5805.92$$

PTS: 2 REF: 011410a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

145 ANS: 2 PTS: 2 REF: 061322a2 STA: A2.A.73
TOP: Law of Sines KEY: modeling

146 ANS: 4

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

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

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

$$y^2 = 4$$

$$y = \pm 2$$

PTS: 2 REF: 061312a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

147 ANS: 3

If $\csc P > 0$, $\sin P > 0$. If $\cot P < 0$ and $\sin P > 0$, $\cos P < 0$

PTS: 2 REF: 061320a2 STA: A2.A.60 TOP: Finding the Terminal Side of an Angle

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

149 ANS: 1

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

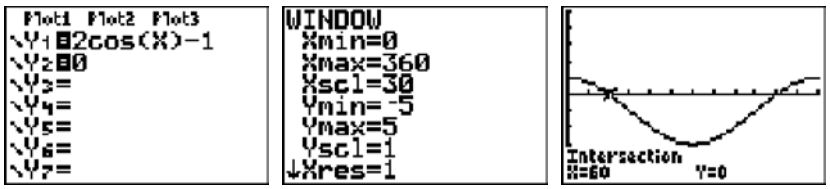
PTS: 2 REF: 011324a2 STA: A2.S.10 TOP: Permutations

150 ANS: 3

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

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

151 ANS: 4




$2\cos\theta = 1$

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

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

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

152 ANS: 4

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

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

153 ANS: 3

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

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

$6 > 4$

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

154 ANS: 4

$$\frac{x^2 + 9x - 22}{x^2 - 121} \div (2 - x) = \frac{(x + 11)(x - 2)}{(x + 11)(x - 11)} \cdot \frac{-1}{x - 2} = \frac{-1}{x - 11}$$

PTS: 2 REF: 011423a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: Division

155 ANS: 3

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

$42 \approx 3.5a$

$12 \approx a$

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

156 ANS: 2

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

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

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

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

157 ANS: 4

$4 + 3(2 - x) + 3(3 - x) + 3(4 - x) + 3(5 - x)$

$4 + 6 - 3x + 9 - 3x + 12 - 3x + 15 - 3x$

$46 - 12x$

PTS: 2 REF: 061315a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

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

159 ANS: 2

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

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

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

161 ANS: 2

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

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

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

163 ANS: 1

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

$A = 58$

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

164 ANS: 3

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

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

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

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

165 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

166 ANS: 2

$\log 9 - \log 20$

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

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

$2b - (1 + a)$

$2b - a - 1$

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

167 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

168 ANS: 3

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

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

169 ANS: 1

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

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

170 ANS: 2

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

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

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

172 ANS: 2

The binomials are conjugates, so use FL.

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

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

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

175 ANS: 4 PTS: 2 REF: 011219a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations

176 ANS: 3 PTS: 2 REF: 061308ge STA: A2.A.51
TOP: Domain and Range

177 ANS: 4

$8^{3k+4} = 4^{2k-1}$ .

$(2^3)^{3k+4} = (2^2)^{2k-1}$

$2^{9k+12} = 2^{4k-2}$

$9k + 12 = 4k - 2$

$5k = -14$

$k = -\frac{14}{5}$

PTS: 2 REF: 011309a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

178 ANS: 4

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

$M \approx 81$

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

179 ANS: 3

$s = \theta r = \frac{2\pi}{8} \cdot 6 = \frac{3\pi}{2}$

PTS: 2 REF: 061212a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

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

181 ANS: 2

$x^3 + 3x^2 - 4x - 12$

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

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

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

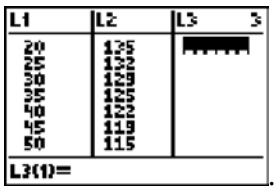
PTS: 2 REF: 061214a2 STA: A2.A.7 TOP: Factoring by Grouping

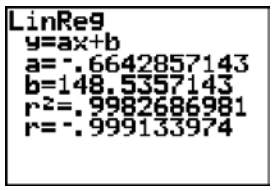
182 ANS: 3

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

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

183 ANS: 1




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

184 ANS: 3

$-\sqrt{2}\sec x = 2$

$$\sec x = -\frac{2}{\sqrt{2}}$$

$$\cos x = -\frac{\sqrt{2}}{2}$$

$$x = 135, 225$$

PTS: 2 REF: 011322a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

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

186 ANS: 3

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

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

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

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

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

187 ANS: 3

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

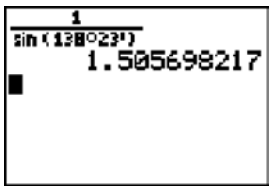
PTS: 2 REF: 011202a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

188 ANS: 3

${}_8C_3 \cdot x^{8-3} \cdot (-2)^3 = 56x^5 \cdot (-8) = -448x^5$

PTS: 2 REF: 011308a2 STA: A2.A.36 TOP: Binomial Expansions

189 ANS: 4




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

190 ANS: 1

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

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

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

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

193 ANS: 3 PTS: 2 REF: 011422a2 STA: A2.A.54
TOP: Graphing Logarithmic Functions

194 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

195 ANS: 1

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

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

$x > 3$ $x < -2$

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

196 ANS: 1 PTS: 2 REF: 061317a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

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

198 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

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

199 ANS: 4

$\frac{2\pi}{b} = 30$

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

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

200 ANS: 3

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

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

201 ANS: 1

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

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

202 ANS: 2

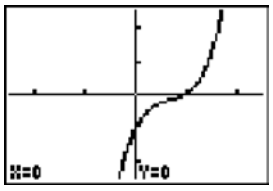
$\frac{5}{\sin 32} = \frac{8}{\sin E}$ $\quad 57.98 + 32 < 180$

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

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

203 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

204 ANS: 4




PTS: 2 REF: 061222a2 STA: A2.A.50 TOP: Solving Polynomial Equations

205 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

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

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

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

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

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

210 ANS: 4

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

$$(a^2 - 2a + 1) + (a^2 - 4a + 4) + (a^2 - 6a + 9) + (a^2 - 8a + 16)$$

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

PTS: 2 REF: 011414a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

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

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

213 ANS: 3

$$3x^3 - 5x^2 - 48x + 80$$

$$x^2(3x-5) - 16(3x-5)$$

$$(x^2 - 16)(3x-5)$$

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

PTS: 2 REF: 011317a2 STA: A2.A.7 TOP: Factoring by Grouping

214 ANS: 1

$$\frac{6}{\sin 35} = \frac{10}{\sin N}$$

$$N \approx 73$$

$$73 + 35 < 180$$

$$(180 - 73) + 35 < 180$$

PTS: 2 REF: 061226a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

215 ANS: 3

$$\sqrt[3]{6a^4b^2} + \sqrt[3]{(27 \cdot 6)a^4b^2}$$

$$a\sqrt[3]{6ab^2} + 3a\sqrt[3]{6ab^2}$$

$$4a\sqrt[3]{6ab^2}$$

PTS: 2 REF: 011319a2 STA: A2.N.2 TOP: Operations with Radicals

216 ANS: 4

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

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

217 ANS: 2

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

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

$k = 2$

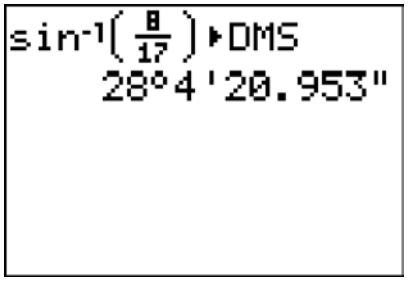
PTS: 2 REF: 061323a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced

218 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

219 ANS: 2




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

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

$S \approx 28°4'$

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

220 ANS: 3

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

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

221 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

222 ANS: 3

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

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

223 ANS: 3

$${}_6C_3\left(\frac{x}{2}\right)^3(-2y)^3 = 20 \cdot \frac{x^3}{8} \cdot -8y^3 = -20x^3y^3$$

PTS: 2 REF: 061215a2 STA: A2.A.36 TOP: Binomial Expansions

224 ANS: 3

34.1% + 19.1% = 53.2%

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

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

226 ANS: 3

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

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

227 ANS: 1

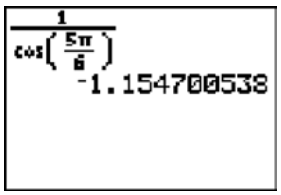
$$10 \cdot \frac{3}{2} = \frac{3}{5}p$$

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

$$25 = p$$

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

228 ANS: 1




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

229 ANS: 2 PTS: 2 REF: 061301a2 STA: A2.S.1
TOP: Analysis of Data

230 ANS: 2

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

$x+2 = \pm\sqrt{-9}$

$x = -2 \pm 3i$

PTS: 2 REF: 011408a2 STA: A2.A.24 TOP: Completing the Square

231 ANS: 3

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

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

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

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

$-12mi - 12i^2$

$-12mi + 12$

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

232 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

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

234 ANS: 1

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

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

235 ANS: 1

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

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

236 ANS: 4

$\frac{4 \cdot 0 + 6 \cdot 1 + 10 \cdot 2 + 0 \cdot 3 + 4k + 2 \cdot 5}{4+6+10+0+k+2} = 2$

$\frac{4k+36}{k+22} = 2$

$4k + 36 = 2k + 44$

$2k = 8$

$k = 4$

PTS: 2 REF: 061221a2 STA: A2.S.3 TOP: Average Known with Missing Data

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

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

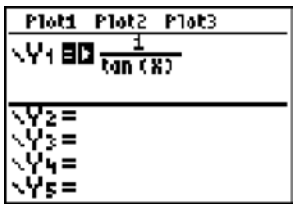
239 ANS: 4 PTS: 2 REF: 061303a2 STA: A2.A.43
TOP: Defining Functions

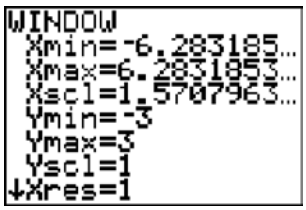
240 ANS: 3

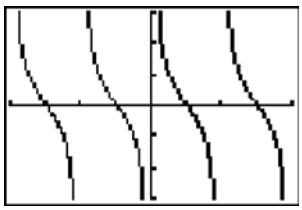
$\frac{-b}{a} = \frac{-(-4)}{1} = 4$. If the sum is 4, the roots must be 7 and –3.

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

241 ANS: 3







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

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

243 ANS: 1

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

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

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

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

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

$$x = -4, 5$$

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

244 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

245 ANS: 1 PTS: 2 REF: 061324a2 STA: A2.A.9
TOP: Negative Exponents

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

247 ANS: 1

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

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

248 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles

249 ANS: 2

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

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

250 ANS: 3

$S_8 = \frac{3(1-(-4)^8)}{1-(-4)} = \frac{196,605}{5} = -39,321$

PTS: 2 REF: 061304a2 STA: A2.A.35 TOP: Summations
KEY: geometric

251 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.53
TOP: Graphing Exponential Functions

252 ANS: 4

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

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

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

PTS: 2 REF: 011426a2 STA: A2.A.7 TOP: Factoring by Grouping

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

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

255 ANS: 4

$\left(\sqrt[3]{27x^2}\right)\left(\sqrt[3]{16x^4}\right) = \sqrt[3]{3^3 \cdot 2^4 \cdot x^6} = 3 \cdot 2 \cdot x^2 \sqrt[3]{2} = 6x^2\sqrt[3]{2}$

PTS: 2 REF: 011421a2 STA: A2.N.2 TOP: Operations with Radicals

256 ANS: 3

$$x + y = 5 \quad . \quad -5 + y = 5$$
$$y = -x + 5 \qquad y = 10$$
$$(x + 3)^2 + (-x + 5 - 3)^2 = 53$$
$$x^2 + 6x + 9 + x^2 - 4x + 4 = 53$$
$$2x^2 + 2x - 40 = 0$$
$$x^2 + x - 20 = 0$$
$$(x + 5)(x - 4) = 0$$
$$x = -5, 4$$

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

257 ANS: 1

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

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

258 ANS: 4

$(x + i)^2 - (x - i)^2 = x^2 + 2xi + i^2 - (x^2 - 2xi + i^2) = 4xi$

PTS: 2 REF: 011327a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

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

260 ANS: 2

$b^2 - 4ac = (-9)^2 - 4(2)(4) = 81 - 32 = 49$

PTS: 2 REF: 011411a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

261 ANS: 1

The binomials are conjugates, so use FL.

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

262 ANS: 1

$$\frac{2\pi}{b} = 4\pi$$
$$b = \frac{1}{2}$$

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

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

PTS: 2 REF: 061227a2 STA: A2.S.11 TOP: Combinations
264 ANS: 4 PTS: 1 REF: 011312a2 STA: A2.A.56
TOP: Determining Trigonometric Functions KEY: degrees, common angles
265 ANS: 3
$\frac{x+16}{x-2} - \frac{7(x-2)}{x-2} \le 0$ $-6x + 30 = 0$ $x - 2 = 0$. Check points such that $x < 2$, $2 < x < 5$, and $x > 5$. If $x = 1$,

$\frac{-6x+30}{x-2} \le 0$ $-6x = -30$ $x = 2$
$x = 5$

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

PTS: 2 REF: 011424a2 STA: A2.A.23 TOP: Rational Inequalities
266 ANS: 2 PTS: 2 REF: 061216a2 STA: A2.A.42
TOP: Compositions of Functions KEY: variables
267 ANS: 2
$\bar{x} \pm \sigma$

$153 \pm 22$

131 – 175

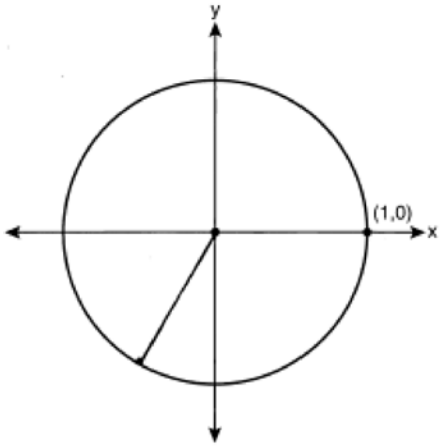
PTS: 2 REF: 011307a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval
268 ANS: 4
$\sin(\theta + 90) = \sin\theta \cdot \cos 90 + \cos\theta \cdot \sin 90 = \sin\theta \cdot (0) + \cos\theta \cdot (1) = \cos\theta$

PTS: 2 REF: 061309a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: identities
269 ANS: 2
$\frac{x^{-1}-1}{x-1} = \frac{\frac{1}{x}-1}{x-1} = \frac{\frac{1-x}{x}}{x-1} = \frac{\frac{-(x-1)}{x}}{x-1} = -\frac{1}{x}$

PTS: 2 REF: 081018a2 STA: A2.A.9 TOP: Negative Exponents
270 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
TOP: Regression

# Algebra 2/Trigonometry 2 Point Regents Exam Questions
## Answer Section

271 ANS:




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

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

272 ANS:

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

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

273 ANS:

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

PTS: 2 REF: 081028a2 STA: A2.A.7 TOP: Factoring Polynomials
KEY: multiple variables

274 ANS:

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

$x + 12 = 19$

$x = 7$

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

275 ANS:

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

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

276 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

277 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

278 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

279 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

280 ANS:

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

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

281 ANS:

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

$x = y^2 - 6$

$x + 6 = y^2$

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

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

282 ANS:

$2x - 1 = 27^{\frac{4}{3}}$

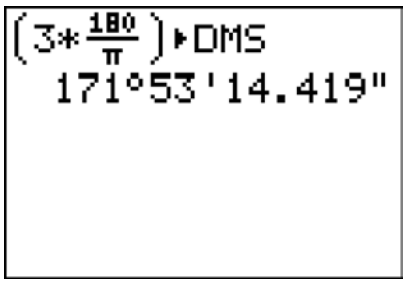
$2x - 1 = 81$

$2x = 82$

$x = 41$

PTS: 2 REF: 061329a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

283 ANS:




$3 \times \frac{180}{\pi} \approx 171.89° \approx 171°53'$.

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

284 ANS:

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

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

285 ANS:

$${}_7C_3\left(\frac{1}{4}\right)^3\left(\frac{3}{4}\right)^4 = 35\left(\frac{1}{64}\right)\left(\frac{81}{256}\right) = \frac{2835}{16384} \approx 0.173$$

PTS: 2 REF: 061335a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

286 ANS:

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

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

287 ANS:

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

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

288 ANS:

$Q_1 = 3.5$ and $Q_3 = 10.5$. $10.5 - 3.5 = 7$.

PTS: 2 REF: 011430a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

289 ANS:

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

$$1 = \tan C$$

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

$$C = 45, 225$$

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

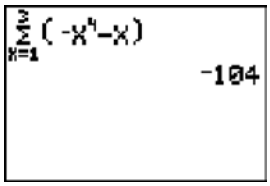
290 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

291 ANS:




−104.

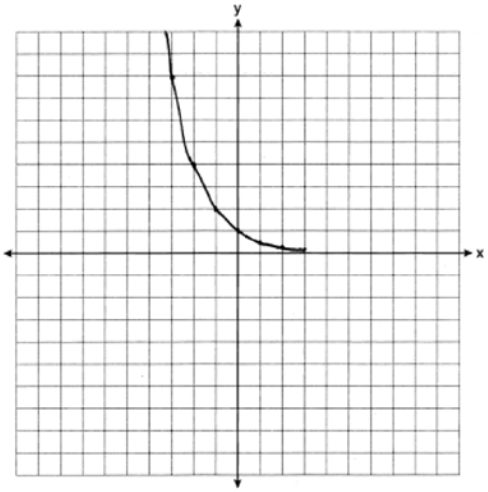
PTS: 2 REF: 011230a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

292 ANS:

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

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

293 ANS:




$y = 0$

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

294 ANS:

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

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

295 ANS:

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

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

296 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

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

297 ANS:

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

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

298 ANS:

Ordered, the heights are 71, 71, 72, 74, 74, 75, 78, 79, 79, 83. $Q_1 = 72$ and $Q_3 = 79$. $79 - 72 = 7$.

PTS: 2 REF: 011331a2 STA: A2.S.4 TOP: Dispersion

KEY: range, quartiles, interquartile range, variance

299 ANS:

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

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

300 ANS:

$y = 180.377(0.954)^x$

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

301 ANS:

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

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

KEY: radians

302 ANS:

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

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

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

PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

303 ANS:

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

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

304 ANS:

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

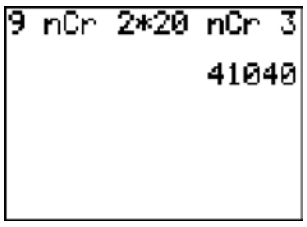
PTS: 2 REF: 011329a2 STA: A2.A.20 TOP: Roots of Quadratics

305 ANS:

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

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

306 ANS:

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

307 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

308 ANS:

$\sec\theta \sin\theta \cot\theta = \frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta} = 1$

PTS: 2 REF: 011428a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

309 ANS:

$$\frac{{}_{10}P_{10}}{3!\cdot 3!\cdot 2!} = \frac{3,628,800}{72} = 50,400$$

PTS: 2 REF: 061330a2 STA: A2.S.10 TOP: Permutations

310 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

311 ANS:

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

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

312 ANS:

$$\frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} = \frac{\sqrt{6}}{4}$$

PTS: 2 REF: 061331a2 STA: A2.A.56 TOP: Determining Trigonometric Functions
KEY: degrees, common angles

313 ANS:

$$30700 = 50e^{3t}$$
$$614 = e^{3t}$$
$$\ln 614 = \ln e^{3t}$$
$$\ln 614 = 3t \ln e$$
$$\ln 614 = 3t$$
$$2.14 \approx t$$

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

314 ANS:

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

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

315 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

316 ANS:

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

PTS: 2 REF: 061234a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

317 ANS:

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

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

318 ANS:

$x(x+3) = 10$

$x^2 + 3x - 10 = 0$

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

$x = -5, 2$

PTS: 2 REF: 011431a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

319 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

320 ANS:

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

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

321 ANS:

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

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

322 ANS:

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

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

323 ANS:

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

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

324 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

325 ANS:

$3 - 2x \geq 7$ or $3 - 2x \leq -7$

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

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

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

326 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.

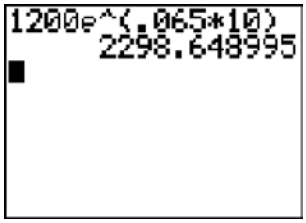
PTS: 2 REF: 011134a2 STA: A2.S.5 TOP: Normal Distributions
KEY: percent

327 ANS:

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

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

328 ANS:




2,298.65.

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

329 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

330 ANS:
$5 \csc \theta = 8$

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

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

$$\theta \approx 141$$

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

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

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

332 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

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

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

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

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

335 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

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

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

337 ANS:

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

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

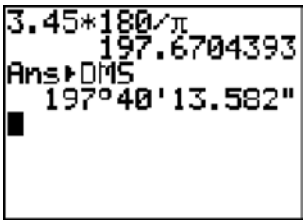
338 ANS:

7.4

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

339 ANS:

197°40'. $3.45 \times \frac{180}{\pi} \approx 197°40'$.




PTS: 2 REF: fall0931a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

340 ANS:

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

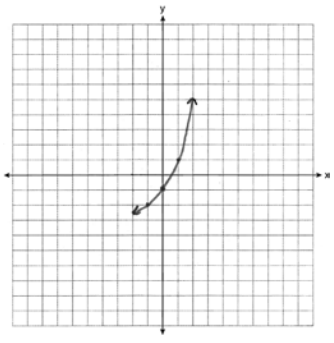
PTS: 2 REF: 061131a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

341 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

342 ANS:



PTS: 2 REF: 011234a2 STA: A2.A.53 TOP: Graphing Exponential Functions

343 ANS:

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

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

344 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

345 ANS:

$y = 10.596(1.586)^x$

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

346 ANS:

$-4x + 5 < 13$ $-4x + 5 > -13$ $-2 < x < 4.5$

$-4x < 8$ $-4x > -18$

$x > -2$ $x < 4.5$

PTS: 2 REF: 011432a2 STA: A2.A.1 TOP: Absolute Value Inequalities

347 ANS:

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

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

348 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

349 ANS:

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

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

$x > 5$ $x < -1$

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

350 ANS:

$$i^{13} + i^{18} + i^{31} + n = 0$$
$$i + (-1) - i + n = 0$$
$$-1 + n = 0$$
$$n = 1$$

PTS: 2 REF: 061228a2 STA: A2.N.7 TOP: Imaginary Numbers

379 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.

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

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

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

# Algebra 2/Trigonometry 4 Point Regents Exam Questions
## Answer Section

351 ANS:

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

PTS: 4 REF: 011238a2 STA: A2.S.7 TOP: Exponential Regression

352 ANS:

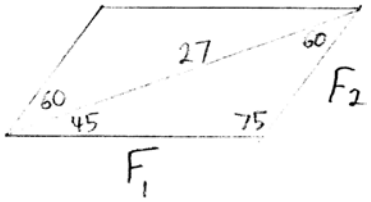
$\frac{51}{243} \cdot {}_5C_3\left(\frac{1}{3}\right)^3\left(\frac{2}{3}\right)^2 = \frac{40}{243}$

${}_5C_4\left(\frac{1}{3}\right)^4\left(\frac{2}{3}\right)^1 = \frac{10}{243}$

${}_5C_3\left(\frac{1}{3}\right)^5\left(\frac{2}{3}\right)^0 = \frac{1}{243}$

PTS: 4 REF: 061138a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

353 ANS:




$\frac{27}{\sin 75} = \frac{F_1}{\sin 60} \cdot \quad \frac{27}{\sin 75} = \frac{F_2}{\sin 45} \cdot$

$F_1 \approx 24$ $F_1 \approx 20$

PTS: 4 REF: 061238a2 STA: A2.A.73 TOP: Vectors

354 ANS:

$\frac{15}{\sin 103} = \frac{a}{\sin 42} \cdot \quad \frac{1}{2}(15)(10.3)\sin 35 \approx 44$

$a \approx 10.3$

PTS: 4 REF: 061337a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: advanced

355 ANS:

$32x^5 - 80x^4 + 80x^3 - 40x^2 + 10x - 1$. ${}_5C_0(2x)^5(-1)^0 = 32x^5$. ${}_5C_1(2x)^4(-1)^1 = -80x^4$. ${}_5C_2(2x)^3(-1)^2 = 80x^3$.
${}_5C_3(2x)^2(-1)^3 = -40x^2$. ${}_5C_4(2x)^1(-1)^4 = 10x$. ${}_5C_5(2x)^0(-1)^5 = -1$

PTS: 4 REF: 011136a2 STA: A2.A.36 TOP: Binomial Expansions

356 ANS:

$$(x+4)^2 = 17x - 4$$
$$x^2 + 8x + 16 = 17x - 4$$
$$x^2 - 9x + 20 = 0$$
$$(x-4)(x-5) = 0$$
$$x = 4, 5$$

PTS: 4 REF: 011336a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

357 ANS:

$3 \pm \sqrt{7}$. $2x^2 - 12x + 4 = 0$

$$x^2 - 6x + 2 = 0$$
$$x^2 - 6x = -2$$
$$x^2 - 6x + 9 = -2 + 9$$
$$(x-3)^2 = 7$$
$$x - 3 = \pm\sqrt{7}$$
$$x = 3 \pm \sqrt{7}$$

PTS: 4 REF: fall0936a2 STA: A2.A.24 TOP: Completing the Square

358 ANS:

$\pm\frac{3}{2}, -\frac{1}{2}$. $8x^3 + 4x^2 - 18x - 9 = 0$

$$4x^2(2x+1) - 9(2x+1) = 0$$
$$(4x^2 - 9)(2x+1) = 0$$
$$4x^2 - 9 = 0 \text{ or } 2x + 1 = 0$$
$(2x+3)(2x-3) = 0$ $x = -\frac{1}{2}$
$$x = \pm\frac{3}{2}$$

PTS: 4 REF: fall0937a2 STA: A2.A.26 TOP: Solving Polynomial Equations

359 ANS:

$\frac{12}{\sin 32} = \frac{10}{\sin B}$ . $C \approx 180 - (32 + 26.2) \approx 121.8$. $\frac{12}{\sin 32} = \frac{c}{\sin 121.8}$

$B = \sin^{-1}\frac{10\sin 32}{12} \approx 26.2$ $c = \frac{12\sin 121.8}{\sin 32} \approx 19.2$

PTS: 4 REF: 011137a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

360 ANS:

800. $x = 4^{2.5} = 32.\ y^{-\frac{3}{2}} = 125 \quad . \ \frac{x}{y} = \frac{32}{\frac{1}{25}} = 800$

$y = 125^{-\frac{2}{3}} = \frac{1}{25}$

PTS: 4 REF: 011237a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

361 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

362 ANS:

$2\sin^2 x + 5\sin x - 3 = 0$

$(2\sin x - 1)(\sin x + 3) = 0$

$$\sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

PTS: 4 REF: 011436a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: quadratics

363 ANS:

$$\frac{-(x^2 - 4)}{(x + 4)(x + 3)} \times \frac{x + 3}{2(x - 2)} = \frac{-(x + 2)(x - 2)}{x + 4} \times \frac{1}{2(x - 2)} = \frac{-(x + 2)}{2(x + 4)}$$

PTS: 4 REF: 061236a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: division

364 ANS:

$\frac{23}{2}$ $\qquad \cos^2 B + \sin^2 B = 1 \qquad \tan B = \frac{\sin B}{\cos B} = \frac{\frac{5}{\sqrt{41}}}{\frac{4}{\sqrt{41}}} = \frac{5}{4}$

$$\cos^2 B + \left(\frac{5}{\sqrt{41}}\right)^2 = 1$$

$$\cos^2 B + \frac{25}{41} = \frac{41}{41}$$

$$\cos^2 B = \frac{16}{41}$$

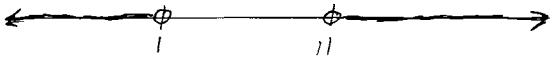
$$\cos B = \frac{4}{\sqrt{41}}$$

$$\tan(A+B) = \frac{\frac{2}{3} + \frac{5}{4}}{1 - \left(\frac{2}{3}\right)\left(\frac{5}{4}\right)} = \frac{\frac{8+15}{12}}{\frac{12}{12} - \frac{10}{12}} = \frac{\frac{23}{12}}{\frac{2}{12}} = \frac{23}{2}$$

PTS: 4 REF: 081037a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: evaluating

365 ANS:

$-3|6 - x| < -15$ .




$|6 - x| > 5$

$6 - x > 5$ or $6 - x < -5$

$1 > x$ or $11 < x$

PTS: 2 REF: 061137a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

366 ANS:

$\sqrt{27^2 + 32^2 - 2(27)(32)\cos 132} \approx 54$

PTS: 4 REF: 011438a2 STA: A2.A.73 TOP: Law of Cosines
KEY: applied

367 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

368 ANS:

0.167. ${}_{10}C_8 \cdot 0.6^8 \cdot 0.4^2 + {}_{10}C_9 \cdot 0.6^9 \cdot 0.4^1 + {}_{10}C_{10} \cdot 0.6^{10} \cdot 0.4^0 \approx 0.167$

PTS: 4 REF: 061036a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

369 ANS:

26.2%. ${}_{10}C_8 \cdot 0.65^8 \cdot 0.35^2 + {}_{10}C_9 \cdot 0.65^9 \cdot 0.35^1 + {}_{10}C_{10} \cdot 0.65^{10} \cdot 0.35^0 \approx 0.262$

PTS: 4 REF: 081038a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

370 ANS:

No. TENNESSEE: $\frac{{}_9P_9}{4! \cdot 2! \cdot 2!} = \frac{362,880}{96} = 3,780$. VERMONT: ${}_7P_7 = 5,040$

PTS: 4 REF: 061038a2 STA: A2.S.10 TOP: Permutations

371 ANS:

${}_5C_4 \cdot 0.28^4 \cdot 0.72^1 + {}_5C_5 \cdot 0.28^5 \cdot 0.72^0 \approx 0.024$

PTS: 4 REF: 011437a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

372 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

373 ANS:

0.468. ${}_8C_6\left(\frac{2}{3}\right)^6\left(\frac{1}{3}\right)^2 \approx 0.27313$. ${}_8C_7\left(\frac{2}{3}\right)^7\left(\frac{1}{3}\right)^1 \approx 0.15607$. ${}_8C_8\left(\frac{2}{3}\right)^8\left(\frac{1}{3}\right)^0 \approx 0.03902$.

PTS: 4 REF: 011138a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

374 ANS:

$\sigma_x = 14.9$. $\bar{x} = 40$. There are 8 scores between 25.1 and 54.9.

PTS: 4 REF: 061237a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced

375 ANS:

$\frac{13}{x} = 10 - x$ . $x = \frac{10 \pm \sqrt{100-4(1)(13)}}{2(1)} = \frac{10 \pm \sqrt{48}}{2} = \frac{10 \pm 4\sqrt{3}}{2} = 5 \pm 2\sqrt{3}$

$13 = 10x - x^2$

$x^2 - 10x + 13 = 0$

PTS: 4 REF: 061336a2 STA: A2.A.23 TOP: Solving Rationals
KEY: irrational and complex solutions

376 ANS:

$\sigma_x \approx 6.2$. 6 scores are within a population standard deviation of the mean. $Q_3 - Q_1 = 41 - 37 = 4$

$\bar{x} \approx 38.2$

PTS: 4 REF: 061338a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced

377 ANS:

88. $\frac{100}{\sin 33} = \frac{x}{\sin 32}$. $\sin 66 \approx \frac{T}{97.3}$

$x \approx 97.3$ $t \approx 88$

PTS: 4 REF: 011236a2 STA: A2.A.73 TOP: Law of Sines
KEY: advanced

378 ANS:

$\frac{100}{\sin 32} = \frac{b}{\sin 105}$. $\frac{100}{\sin 32} = \frac{a}{\sin 43}$

$b \approx 182.3$ $a \approx 128.7$

PTS: 4 REF: 011338a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

379 ANS:

$y = 2.001x^{2.298}$, 1,009. $y = 2.001(15)^{2.298} \approx 1009$

PTS: 4 REF: fall0938a2 STA: A2.S.7 TOP: Power Regression

380 ANS:

$y = 215.983(1.652)^x$. $215.983(1.652)^7 \approx 7250$

PTS: 4 REF: 011337a2 STA: A2.S.7 TOP: Exponential Regression

# Algebra 2/Trigonometry 6 Point Regents Exam Questions
## Answer Section

381 ANS:

$\sqrt{x^2+x-1} = -4x+3$

$x^2+x-1 = 16x^2-24x+9$

$0 = 15x^2-25x+10$

$0 = 3x^2-5x+2$

$0 = (3x-2)(x-1)$

$x = \frac{2}{3},\ x \neq 1$

$-4\left(\frac{2}{3}\right)+3 \geq 0$

$\frac{1}{3} \geq 0$

$-4(1)+3 < 0$

1 is extraneous

PTS: 6 REF: 011339a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

382 ANS:

$x = -\frac{1}{3}, -1$ $\log_{x+3}\frac{x^3+x-2}{x} = 2$

$\frac{x^3+x-2}{x} = (x+3)^2$

$\frac{x^3+x-2}{x} = x^2+6x+9$

$x^3+x-2 = x^3+6x^2+9x$

$0 = 6x^2+8x+2$

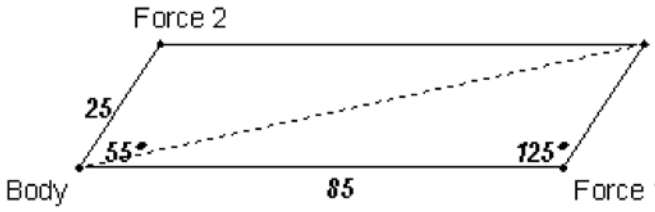
$0 = 3x^2+4x+1$

$0 = (3x+1)(x+1)$

$x = -\frac{1}{3}, -1$

PTS: 6 REF: 081039a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

383 ANS:




101.43, 12.

$$r^2 = 25^2 + 85^2 - 2(25)(85)\cos 125.$$

$$r^2 \approx 10287.7$$

$$r \approx 101.43$$

$$\frac{2.5}{\sin x} = \frac{101.43}{\sin 125}$$

$$x \approx 12$$

PTS: 6 REF: fall0939a2 STA: A2.A.73 TOP: Vectors

384 ANS:

$$81^{x^3 + 2x^2} = 27^{\frac{5x}{3}}$$

$$\left(3^4\right)^{x^3 + 2x^2} = \left(3^3\right)^{\frac{5x}{3}}$$

$$3^{4x^3 + 8x^2} = 3^{5x}$$

$$4x^3 + 8x^2 - 5x = 0$$

$$x(4x^2 + 8x - 5) = 0$$

$$x(2x - 1)(2x + 5) = 0$$

$$x = 0, \frac{1}{2}, -\frac{5}{2}$$

PTS: 6 REF: 061239a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base not shown

385 ANS:

$$\frac{-2(x^2 + 6)}{x^4} \cdot \frac{x^2(x - 3) + 6(x - 3)}{x^2 - 4x} \cdot \frac{2x - 4}{x^4 - 3x^3} \div \frac{x^2 + 2x - 8}{16 - x^2}$$

$$\frac{(x^2 + 6)(x - 3)}{x(x - 4)} \cdot \frac{2(x - 2)}{x^3(x - 3)} \cdot \frac{(4 + x)(4 - x)}{(x + 4)(x - 2)}$$

$$\frac{-2(x^2 + 6)}{x^4}$$

PTS: 6 REF: 011239a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: division

386 ANS:

$\left(-\frac{9}{2}, \frac{1}{2}\right)$ and $\left(\frac{1}{2}, \frac{11}{2}\right)$. $y = x + 5$ . $4x^2 + 17x - 4 = x + 5$

$y = 4x^2 + 17x - 4$ $4x^2 + 16x - 9 = 0$

$(2x + 9)(2x - 1) = 0$

$x = -\frac{9}{2}$ and $x = \frac{1}{2}$

$y = -\frac{9}{2} + 5 = \frac{1}{2}$ and $y = \frac{1}{2} + 5 = \frac{11}{2}$

PTS: 6 REF: 061139a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

387 ANS:

$\log_{(x+3)}(2x + 3)(x + 5) = 2$ $-6$ is extraneous

$(x + 3)^2 = (2x + 3)(x + 5)$

$x^2 + 6x + 9 = 2x^2 + 13x + 15$

$x^2 + 7x + 6 = 0$

$(x + 6)(x + 1) = 0$

$x = -1$

PTS: 6 REF: 011439a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: applying properties of logarithms

388 ANS:

33. $a = \sqrt{10^2 + 6^2 - 2(10)(6)\cos 80} \approx 10.7$. $\angle C$ is opposite the shortest side. $\frac{6}{\sin C} = \frac{10.7}{\sin 80}$

$C \approx 33$

PTS: 6 REF: 061039a2 STA: A2.A.73 TOP: Law of Cosines
KEY: advanced

389 ANS:

$x^4 + 4x^3 + 4x^2 + 16x = 0$

$x(x^3 + 4x^2 + 4x + 16) = 0$

$x(x^2(x + 4) + 4(x + 4)) = 0$

$x(x^2 + 4)(x + 4) = 0$

$x = 0, \pm 2i, -4$

PTS: 6 REF: 061339a2 STA: A2.A.26 TOP: Solving Polynomial Equations

390 ANS:

$\ln(T - T_0) = -kt + 4.718$ . $\ln(T - 68) = -0.104(10) + 4.718.$

$\ln(150 - 68) = -k(3) + 4.718$ $\ln(T - 68) = 3.678$

$4.407 \approx -3k + 4.718$ $T - 68 \approx 39.6$

$k \approx 0.104$ $T \approx 108$

PTS: 6 REF: 011139a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced