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REGENTS BY TYPE

The NY Algebra 2/Trigonometry Regents Exam Questions
from Fall 2009 to August 2015

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Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

1 What is the value of $\sum_{x=0}^{2}(3-2a)^x$?

1) $4a^2-2a+12$
2) $4a^2-2a+13$
3) $4a^2-14a+12$
4) $4a^2-14a+13$

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

3 A study compared the number of years of education a person received and that person's average yearly salary. It was determined that the relationship between these two quantities was linear and the correlation coefficient was 0.91. Which conclusion can be made based on the findings of this study?

1) There was a weak relationship.
2) There was a strong relationship.
3) There was no relationship.
4) There was an unpredictable relationship.

4 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) $-5ab\sqrt{2b}+7ab\sqrt{6b}$

5 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) = $\log_2 x$

6 Which expression is equivalent to $\frac{x^{-1}y^2}{x^2y^{-4}}$?

1) $\frac{x}{y^2}$
2) $\frac{x^3}{y^6}$
3) $\frac{y^2}{x}$
4) $\frac{y^6}{x^3}$

7 The expression $\frac{3-\sqrt{8}}{\sqrt{3}}$ is equivalent to

1) $\frac{\sqrt{3}-2\sqrt{6}}{\sqrt{3}}$
2) $-\sqrt{3}+\frac{2}{3}\sqrt{6}$
3) $\frac{3-\sqrt{24}}{3}$
4) $\sqrt{3}-\frac{2}{3}\sqrt{6}$

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

1) 1
2) 2
3) 5
4) –10

9 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

10 The ninth term of the expansion of $(3x+2y)^{15}$ is

1) ${}_{15}C_9(3x)^6(2y)^9$
2) ${}_{15}C_9(3x)^9(2y)^6$
3) ${}_{15}C_8(3x)^7(2y)^8$
4) ${}_{15}C_8(3x)^8(2y)^7$

11 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?

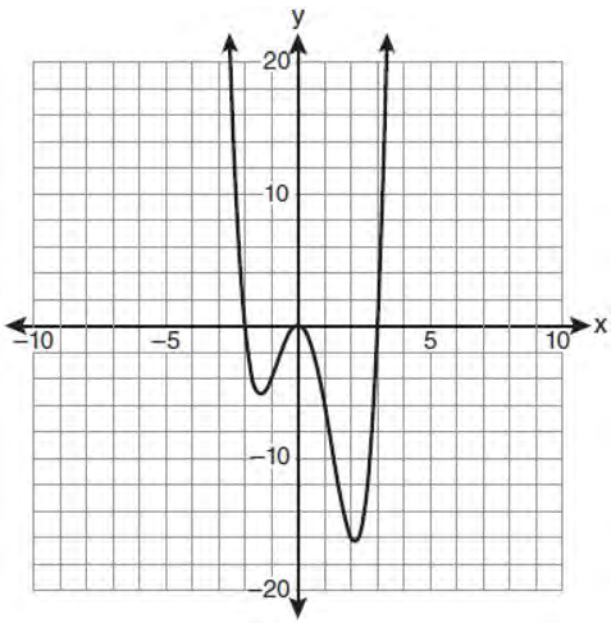
1) 8.2
2) 8.3
3) 67.3
4) 69.3

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

13 A customer will select three different toppings for a supreme pizza. If there are nine different toppings to choose from, how many different supreme pizzas can be made?
1) 12
2) 27
3) 84
4) 504

14 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) $\{-2, 0, 3\}$

15 How many distinct ways can the eleven letters in the word "TALLAHASSEE" be arranged?
1) 831,600
2) 1,663,200
3) 3,326,400
4) 5,702,400

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

17 If $x^2 = 12x - 7$ is solved by completing the square, one of the steps in the process is
1) $(x - 6)^2 = -43$
2) $(x + 6)^2 = -43$
3) $(x - 6)^2 = 29$
4) $(x + 6)^2 = 29$

18 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

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

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

21 Given y varies inversely as x, when y is multiplied by $\frac{1}{2}$, then x is multiplied by
1) $\frac{1}{2}$
2) 2
3) $-\frac{1}{2}$
4) -2

22 When factored completely, the expression $x^3 - 2x^2 - 9x + 18$ is equivalent to
1) $(x^2 - 9)(x - 2)$
2) $(x - 2)(x - 3)(x + 3)$
3) $(x - 2)^2(x - 3)(x + 3)$
4) $(x - 3)^2(x - 2)$

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

24 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

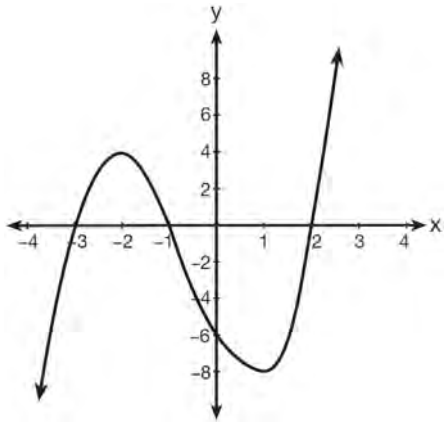
25 What is the period of the graph of the equation $y = \frac{1}{3}\sin 2x$?
1) $\frac{1}{3}$
2) 2
3) π
4) 6π

26 What is the period of the function $f(\theta) = -2\cos 3\theta$?
1) π
2) $\frac{2\pi}{3}$
3) $\frac{3\pi}{2}$
4) 2π

27 By law, a wheelchair service ramp may be inclined no more than 4.76°. If the base of a ramp begins 15 feet from the base of a public building, which equation could be used to determine the maximum height, *h*, of the ramp where it reaches the building's entrance?

1) $\sin 4.76° = \frac{h}{15}$
2) $\sin 4.76° = \frac{15}{h}$
3) $\tan 4.76° = \frac{h}{15}$
4) $\tan 4.76° = \frac{15}{h}$

28 What are the zeros of the polynomial function graphed below?

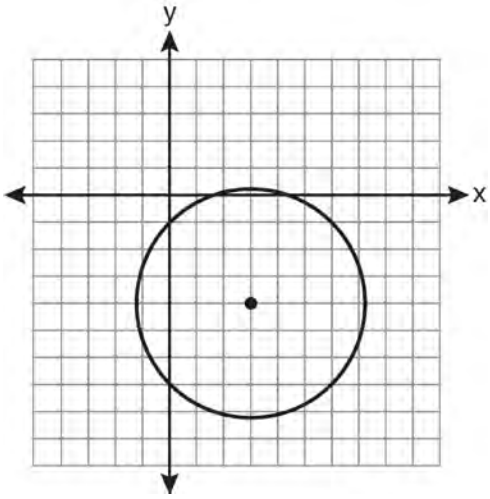


1) $\{-3,-1,2\}$
2) $\{3,1,-2\}$
3) $\{4,-8\}$
4) $\{-6\}$

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

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

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

31 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

32 Which relation is *not* a function?

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

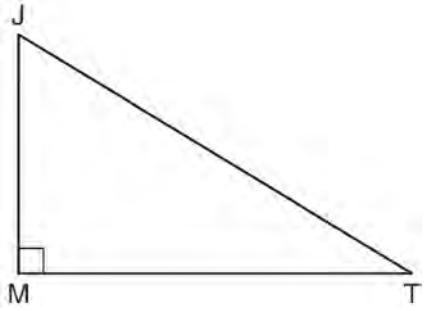
33 What is the product of $\sqrt[3]{4a^2b^4}$ and $\sqrt[3]{16a^3b^2}$?

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

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

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

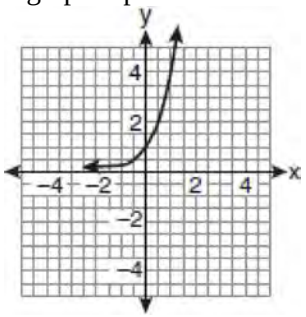
35 In the diagram below of right triangle JTM, $JT = 12$, $JM = 6$, and $m\angle JMT = 90$.

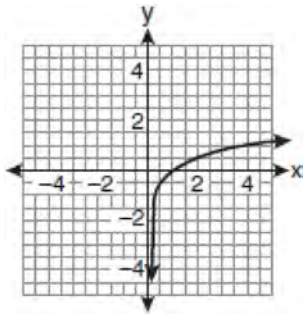


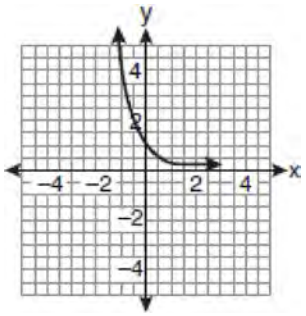
What is the value of $\cot J$?

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

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

1)


2)


3)


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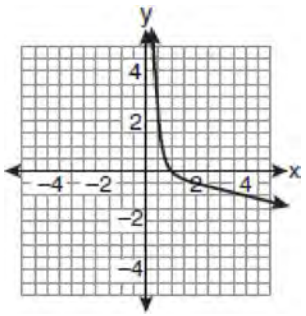
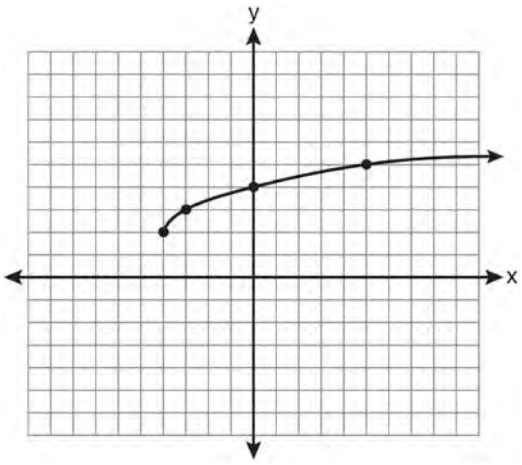


37 What are the domain and the range of the function shown in the graph below?



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

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

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

39 How many distinct triangles can be constructed if $m\angle A = 30$, side $a = \sqrt{34}$, and side $b = 12$?

1) one acute triangle
2) one obtuse triangle
3) two triangles
4) none

40 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

41 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

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

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

43 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

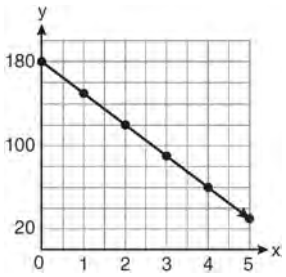
44 What is the domain of the function $g(x) = 3^x - 1$?
1) $(-\infty, 3]$
2) $(-\infty, 3)$
3) $(-\infty, \infty)$
4) $(-1, \infty)$

45 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

46 Yusef deposits \$50 into a savings account that pays 3.25% interest compounded quarterly. The amount, *A*, in his account can be determined by the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where *P* is the initial amount invested, *r* is the interest rate, *n* is the number of times per year the money is compounded, and *t* is the number of years for which the money is invested. What will his investment be worth in 12 years if he makes no other deposits or withdrawals?
1) \$55.10
2) \$73.73
3) \$232.11
4) \$619.74

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

48 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)


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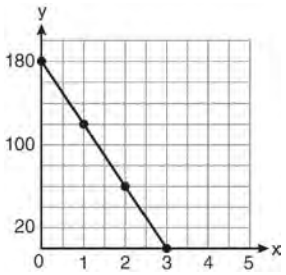

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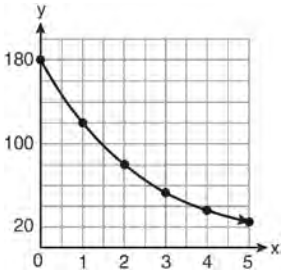

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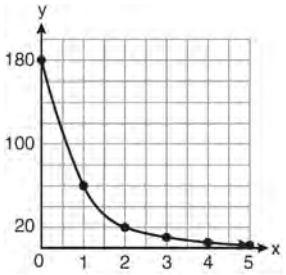


49 The table of values below can be modeled by which equation?

x	y
–2	5
–1	4
0	3
1	4
2	5

1) $f(x) = |x + 3|$
2) $f(x) = |x| + 3$
3) $f(y) = |y + 3|$
4) $f(y) = |y| + 3$

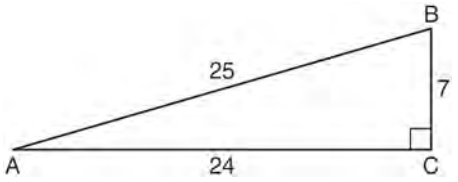
50 The expression $\frac{2x+4}{\sqrt{x+2}}$ is equivalent to

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

51 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?

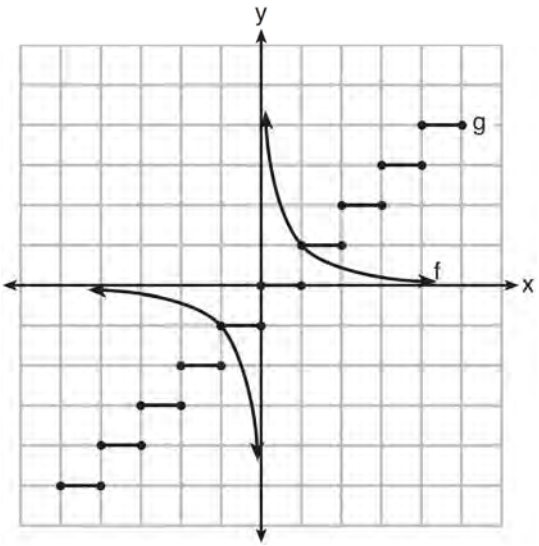
1) $\frac{7}{2}$
2) $\frac{49}{4}$
3) $\frac{49}{2}$
4) 49

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



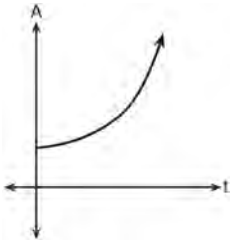
1) $\frac{25}{24}$
2) $\frac{25}{7}$
3) $\frac{24}{7}$
4) $\frac{7}{24}$

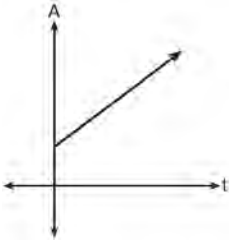
53 Which statement is true about the graphs of f and g shown below?

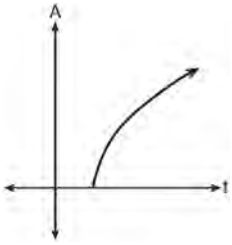


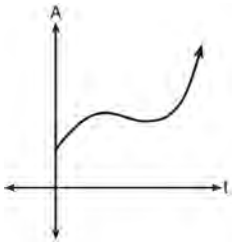
1) f is a relation and g is a function.
2) f is a function and g is a relation.
3) Both f and g are functions.
4) Neither f nor g is a function.

54 An investment is earning 5% interest compounded quarterly. The equation represents the total amount of money, *A*, where *P* is the original investment, *r* is the interest rate, *t* is the number of years, and *n* represents the number of times per year the money earns interest. Which graph could represent this investment over at least 50 years?

1) 

2) 

3) 

4) 

55 How many different 11-letter arrangements are possible using the letters in the word "ARRANGEMENT"?

1) 2,494,800
2) 4,989,600
3) 19,958,400
4) 39,916,800

56 What is the value of $\tan\left(\text{Arc}\cos\frac{15}{17}\right)$?

1) $\frac{8}{15}$
2) $\frac{8}{17}$
3) $\frac{15}{8}$
4) $\frac{17}{8}$

57 When $\frac{7}{8}x^2 - \frac{3}{4}x$ is subtracted from $\frac{5}{8}x^2 - \frac{1}{4}x + 2$, the difference is

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

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

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

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

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

61 The exact value of $\csc 120°$ is
1) $\frac{2\sqrt{3}}{3}$
2) 2
3) $-\frac{2\sqrt{3}}{3}$
4) -2

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

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

64 What is the solution of the inequality $9 - x^2 < 0$?
1) $\{x \mid -3 < x < 3\}$
2) $\{x \mid x > 3 \text{ or } x < -3\}$
3) $\{x \mid x > 3\}$
4) $\{x \mid x < -3\}$

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

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

67 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) $\{n+4, n+16, n+64, n+256, \ldots\}$

68 Angle θ is in standard position and $(-4, 0)$ is a point on the terminal side of θ. What is the value of sec θ?
1) -4
2) -1
3) 0
4) undefined

69 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) $\frac{4}{3}$

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

71 A scholarship committee rewards the school's top math students. The amount of money each winner receives is inversely proportional to the number of scholarship recipients. If there are three winners, they each receive \$400. If there are eight winners, how much money will each winner receive?
1) \$1067
2) \$400
3) \$240
4) \$150

72 The expression $\log_5\left(\frac{1}{25}\right)$ is equivalent to
1) $\frac{1}{2}$
2) 2
3) $-\frac{1}{2}$
4) -2

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

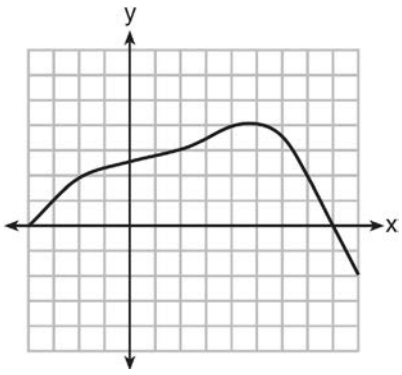
$$y = 3x - 6$$

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

1) $0, -4$
2) $0, 4$
3) $6, -2$
4) $-6, 2$

74 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) $2x^2 - 6x + 4 = 0$

75 Which value is in the domain of the function graphed below, but is *not* in its range?



1) 0
2) 2
3) 3
4) 7

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

77 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) $2x^2(2x+3)(3x-2)$

78 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) $-\frac{4\sqrt{5}}{9}$

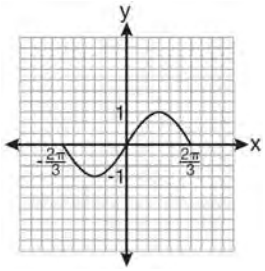
79 A wheel has a radius of 18 inches. Which distance, to the *nearest inch*, does the wheel travel when it rotates through an angle of $\frac{2\pi}{5}$ radians?

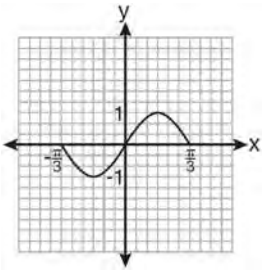
1) 45
2) 23
3) 13
4) 11

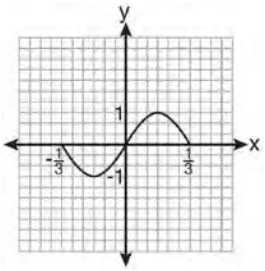
80 The expression $x^{-\frac{2}{5}}$ is equivalent to

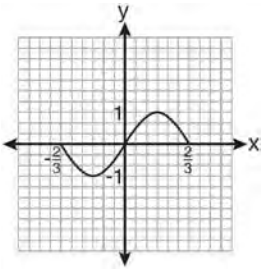
1) $-\sqrt[2]{x^5}$
2) $-\sqrt[5]{x^2}$
3) $\frac{1}{\sqrt[2]{x^5}}$
4) $\frac{1}{\sqrt[5]{x^2}}$

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

1) 

2) 

3) 

4) 

82 Which trigonometric expression does *not* simplify to 1?

1) $\sin^2 x(1+\cot^2 x)$
2) $\sec^2 x(1-\sin^2 x)$
3) $\cos^2 x(\tan^2 x-1)$
4) $\cot^2 x(\sec^2 x-1)$

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

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

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

85 The expression $\log_8 64$ is equivalent to

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

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

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

88 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) $16384\sqrt{10}$

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

90 Expressed as a function of a positive acute angle, $\sin 230°$ is equal to
1) $-\sin 40°$
2) $-\sin 50°$
3) $\sin 40°$
4) $\sin 50°$

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

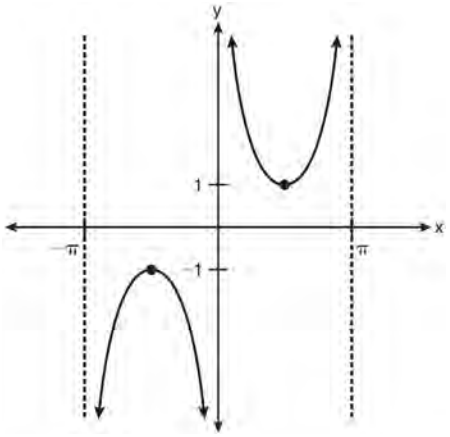
92 The value of the expression $2\sum_{n=0}^{2}(n^2 + 2^n)$ is
1) 12
2) 22
3) 24
4) 26

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

94 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) ${}_{20}P_3$

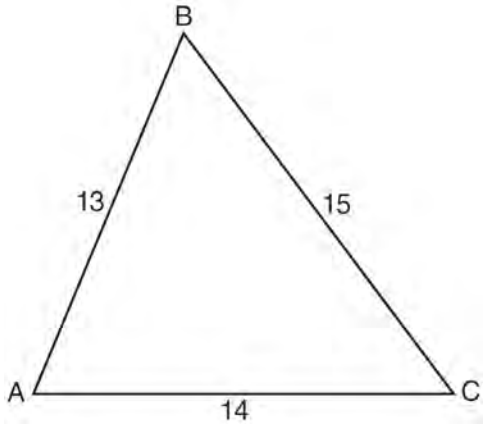
95 What are the values of θ in the interval $0° \leq \theta < 360°$ that satisfy the equation $\tan\theta - \sqrt{3} = 0$?
1) 60º, 240º
2) 72º, 252º
3) 72º, 108º, 252º, 288º
4) 60º, 120º, 240º, 300º

96 Which equation is sketched in the diagram below?



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

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

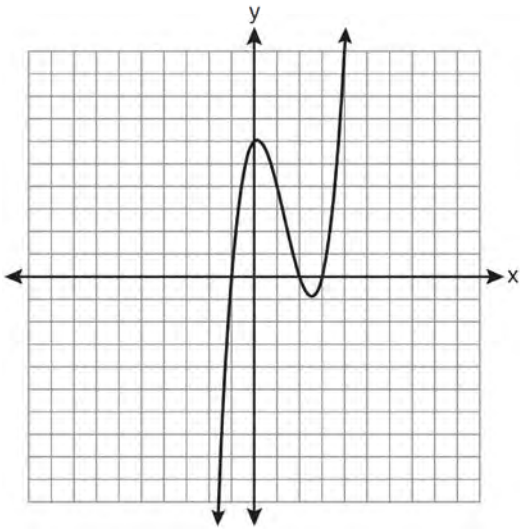


1) 53
2) 59
3) 67
4) 127

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

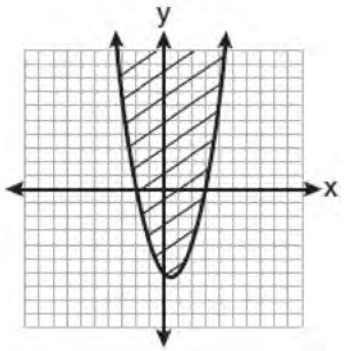
99 The graph of $y = x^3 - 4x^2 + x + 6$ is shown below.

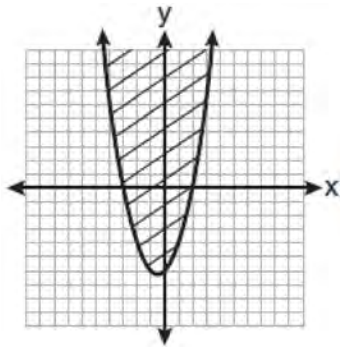


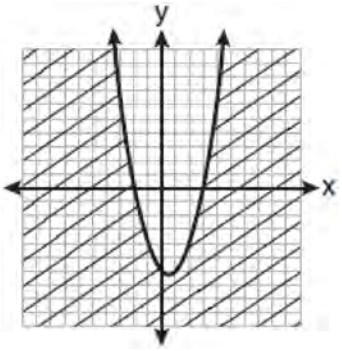
What is the product of the roots of the equation $x^3 - 4x^2 + x + 6 = 0$?

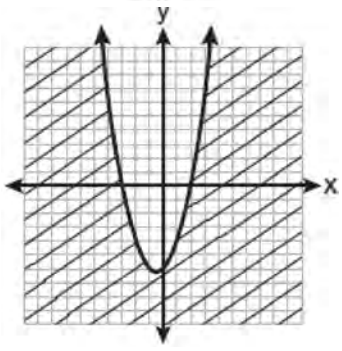
1) –36
2) –6
3) 6
4) 4

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

1) 

2) 

3) 

4) 

101 The expression $\sqrt[3]{27a^3} \cdot \sqrt[4]{16b^8}$ is equivalent to

1) $6ab^2$
2) $6ab^4$
3) $12ab^2$
4) $12ab^4$

102 The domain of $f(x) = -\frac{3}{\sqrt{2-x}}$ is the set of all real numbers

1) greater than 2
2) less than 2
3) except 2
4) between –2 and 2

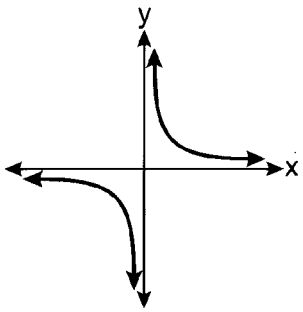
103 The common ratio of the sequence $-\frac{1}{2}, \frac{3}{4}, -\frac{9}{8}$ is

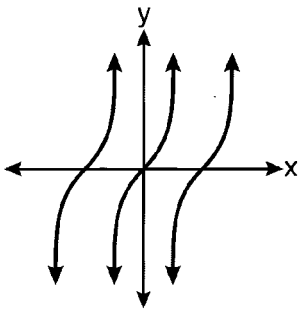
1) $-\frac{3}{2}$
2) $-\frac{2}{3}$
3) $-\frac{1}{2}$
4) $-\frac{1}{4}$

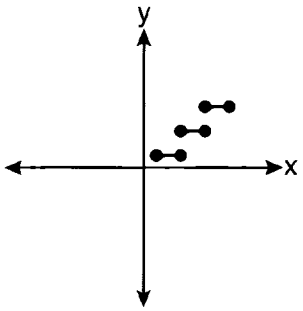
104 Ms. Bell's mathematics class consists of 4 sophomores, 10 juniors, and 5 seniors. How many different ways can Ms. Bell create a four-member committee of juniors if each junior has an equal chance of being selected?

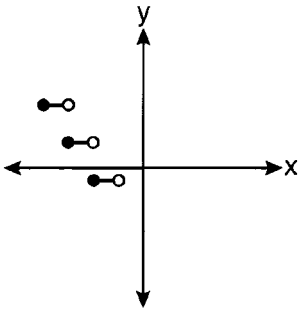
1) 210
2) 3,876
3) 5,040
4) 93,024

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

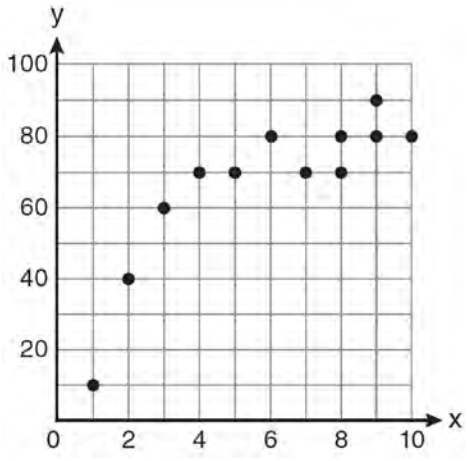
1) 

2) 

3) 

4) 

106 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

107 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

108 Which values of x in the interval $0° \le x < 360°$ satisfy the equation $2\sin^2 x + \sin x - 1 = 0$?

1) $\{30°, 270°\}$
2) $\{30°, 150°, 270°\}$
3) $\{90°, 210°, 330°\}$
4) $\{90°, 210°, 270°, 330°\}$

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

110 If $\cos\theta = \frac{3}{4}$, then what is $\cos 2\theta$?

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

111 If $f(x) = 4x^2 - x + 1$, then $f(a+1)$ equals

1) $4a^2 - a + 6$
2) $4a^2 - a + 4$
3) $4a^2 + 7a + 6$
4) $4a^2 + 7a + 4$

112 Which equation could be used to solve $\frac{5}{x-3} - \frac{2}{x} = 1$?

1) $x^2 - 6x - 3 = 0$
2) $x^2 - 6x + 3 = 0$
3) $x^2 - 6x - 6 = 0$
4) $x^2 - 6x + 6 = 0$

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

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

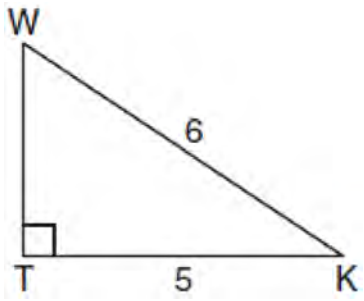
114 A video-streaming service can choose from six half-hour shows and four one-hour shows. Which expression could be used to calculate the number of different ways the service can choose four half-hour shows and two one-hour shows?

1) ${}_6P_4 \cdot {}_4P_2$
2) ${}_6P_4 + {}_4P_2$
3) ${}_6C_4 \cdot {}_4C_2$
4) ${}_6C_4 + {}_4C_2$

115 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) $\cot(90° - A) = \frac{1}{3}$

116 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'

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

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

118 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) $4x^8y^{28}$

119 Which equation represents a circle with its center at $(2,-3)$ and that passes through the point $(6,2)$?

1) $(x-2)^2+(y+3)^2=\sqrt{41}$
2) $(x+2)^2+(y-3)^2=\sqrt{41}$
3) $(x-2)^2+(y+3)^2=41$
4) $(x+2)^2+(y-3)^2=41$

120 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

121 What is a formula for the nth term of sequence B shown below?

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

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

122 Which list of ordered pairs does *not* represent a one-to-one function?

1) $(1,-1),(2,0),(3,1),(4,2)$
2) $(1,2),(2,3),(3,4),(4,6)$
3) $(1,3),(2,4),(3,3),(4,1)$
4) $(1,5),(2,4),(3,1),(4,0)$

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

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

124 If $\log x = 2\log a + \log b$, then x equals

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

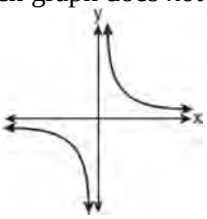
125 What is the third term in the expansion of $(2x - 3)^5$?

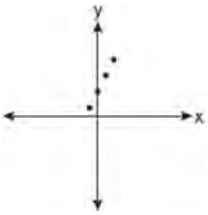
1) $720x^3$
2) $180x^3$
3) $-540x^2$
4) $-1080x^2$

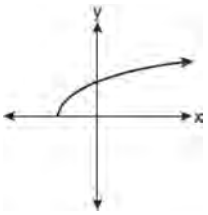
126 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?

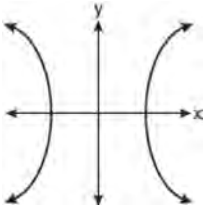
1) $\frac{\pi}{2}$
2) $\frac{2\pi}{3}$
3) $\frac{5\pi}{6}$
4) $\frac{7\pi}{6}$

127 Which graph does *not* represent a function?

1) 

2) 

3) 

4) 

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

129 Which transformation of $y = f(x)$ moves the graph 7 units to the left and 3 units down?

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

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

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

131 Which expression is equivalent to the sum of the sequence $6, 12, 20, 30$?

1) $\sum_{n=4}^{7} 2^n - 10$
2) $\sum_{n=3}^{6} \frac{2n^2}{3}$
3) $\sum_{n=2}^{5} 5n - 4$
4) $\sum_{n=2}^{5} n^2 + n$

132 In $\triangle FGH$, $f = 6$, $g = 9$, and $m\angle H = 57$. Which statement can be used to determine the numerical value of h?

1) $h^2 = 6^2 + 9^2 - 2(9)(h)\cos 57°$
2) $h^2 = 6^2 + 9^2 - 2(6)(9)\cos 57°$
3) $6^2 = 9^2 + h^2 - 2(9)(h)\cos 57°$
4) $9^2 = 6^2 + h^2 - 2(6)(h)\cos 57°$

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

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

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

135 Which equation has real, rational, and unequal roots?

1) $x^2 + 10x + 25 = 0$
2) $x^2 - 5x + 4 = 0$
3) $x^2 - 3x + 1 = 0$
4) $x^2 - 2x + 5 = 0$

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

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

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

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

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

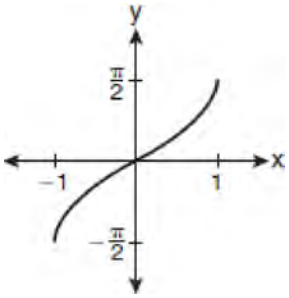
139 In $\triangle ABC$, $m\angle A = 120$, $b = 10$, and $c = 18$. What is the area of $\triangle ABC$ to the *nearest square inch*?

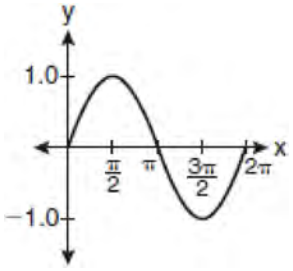
1) 52
2) 78
3) 90
4) 156

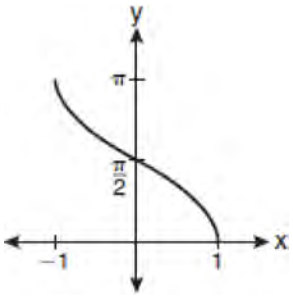
140 What is the inverse of the function $f(x) = \log_4 x$?

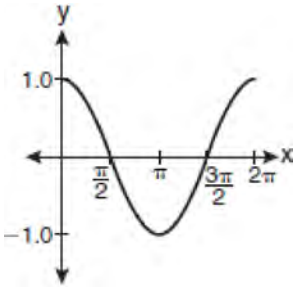
1) $f^{-1}(x) = x^4$
2) $f^{-1}(x) = 4^x$
3) $f^{-1}(x) = \log_x 4$
4) $f^{-1}(x) = -\log_x 4$

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

1) 

2) 

3) 

4) 

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

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

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

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

145 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) $0, -1, -2$

146 What is the total number of different nine-letter arrangements that can be formed using the letters in the word "TENNESSEE"?

1) 3,780
2) 15,120
3) 45,360
4) 362,880

147 If $\sin A = \frac{3}{8}$, what is the value of $\cos 2A$?

1) $-\frac{9}{64}$
2) $\frac{1}{4}$
3) $\frac{23}{32}$
4) $\frac{55}{64}$

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

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

149 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

150 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

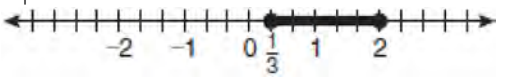
151 Which task is *not* a component of an observational study?
1) The researcher decides who will make up the sample.
2) The researcher analyzes the data received from the sample.
3) The researcher gathers data from the sample, using surveys or taking measurements.
4) The researcher divides the sample into two groups, with one group acting as a control group.

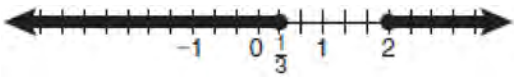
152 What is the area of a parallelogram that has sides measuring 8 cm and 12 cm and includes an angle of 120°?
1) $24\sqrt{3}$
2) $48\sqrt{3}$
3) $83\sqrt{3}$
4) $96\sqrt{3}$

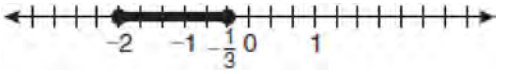
153 A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can *not* be the first digit, no digit may be repeated, and the last digit must be 5?
1) 448
2) 504
3) 2,240
4) 2,520

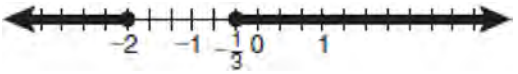
154 What is the solution set of $|x-2| = 3x+10$?
1) { }
2) $\{-2\}$
3) $\{-6\}$
4) $\{-2,-6\}$

155 Which expression is equivalent to $(5^{-2}a^3b^{-4})^{-1}$?
1) $\frac{10b^4}{a^3}$
2) $\frac{25b^4}{a^3}$
3) $\frac{a^3}{25b^4}$
4) $\frac{a^2}{125b^5}$

156 Which graph represents the solution set of $|6x-7| \leq 5$?
1) 

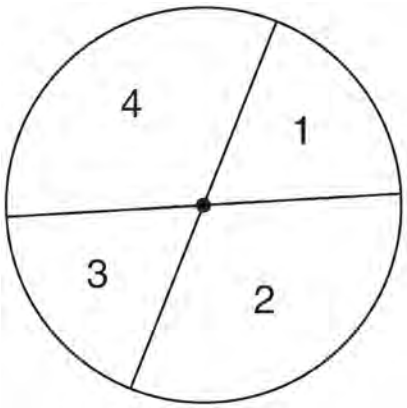
2) 

3) 

4) 

157 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) $4x^2 + 3x - 2 = 0$

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



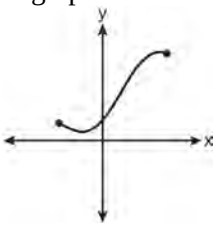
If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

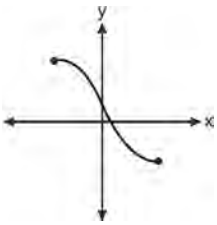
1) $\frac{1}{6}$
2) $\frac{1}{3}$
3) $\frac{1}{2}$
4) $\frac{2}{3}$

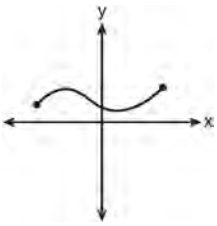
159 Which value of k will make $x^2 - \frac{1}{4}x + k$ a perfect square trinomial?

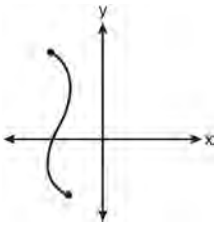
1) $\frac{1}{64}$
2) $\frac{1}{16}$
3) $\frac{1}{8}$
4) $\frac{1}{4}$

160 Which graph does *not* represent a function?

1) 

2) 

3) 

4) 

161 The function $f(x) = \tan x$ is defined in such a way that $f^{-1}(x)$ is a function. What can be the domain of $f(x)$?

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

162 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

163 What is the number of degrees in an angle whose radian measure is $\frac{11\pi}{12}$?
1) 150
2) 165
3) 330
4) 518

164 How many different ways can teams of four members be formed from a class of 20 students?
1) 5
2) 80
3) 4,845
4) 116,280

165 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) $\{(0,1),(1,0),(2,0),(3,2)\}$

166 The terminal side of an angle measuring $\frac{4\pi}{5}$ radians lies in Quadrant
1) I
2) II
3) III
4) IV

167 What is the fourth term of the sequence defined by $a_1 = 3xy^5$

$a_n = \left(\frac{2x}{y}\right)a_{n-1}$?
1) $12x^3y^3$
2) $24x^2y^4$
3) $24x^4y^2$
4) $48x^5y$

168 If $f(x) = 2x^2 + 1$ and $g(x) = 3x - 2$, what is the value of $f(g(-2))$?
1) -127
2) -23
3) 25
4) 129

169 The table below displays the number of siblings of each of the 20 students in a class.

Number of Siblings	Frequency
0	2
1	5
2	7
3	4
4	2

What is the population standard deviation, to the *nearest hundredth*, for this group?
1) 1.11
2) 1.12
3) 1.14
4) 1.15

170 The roots of $3x^2 + x = 14$ are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

171 How many full cycles of the function $y = 3\sin 2x$ appear in π radians?
1) 1
2) 2
3) 3
4) 4

172 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) $17 = \frac{446 + 16x}{26 + x}$

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

174 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) $\csc^2\theta$

175 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) $x^2 - x - 3$

176 The expression $\left(\frac{3}{2}x + 1\right)\left(\frac{3}{2}x - 1\right) - \left(\frac{3}{2}x - 1\right)^2$ is equivalent to
1) 0
2) $-3x$
3) $\frac{3}{4}x - 2$
4) $3x - 2$

177 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

178 The expression $\frac{5}{4-\sqrt{11}}$ is equivalent to

1) $4+\sqrt{11}$
2) $\frac{20+5\sqrt{11}}{27}$
3) $4-\sqrt{11}$
4) $\frac{20-5\sqrt{11}}{27}$

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

1) 2π
2) 2
3) 8π
4) 8

180 Which statement about the equation $3x^2+9x-12=0$ is true?

1) The product of the roots is –12.
2) The product of the roots is –4.
3) The sum of the roots is 3.
4) The sum of the roots is –9.

181 When $-3-2i$ is multiplied by its conjugate, the result is

1) –13
2) –5
3) 5
4) 13

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

183 An arithmetic sequence has a first term of 10 and a sixth term of 40. What is the 20th term of this sequence?

1) 105
2) 110
3) 124
4) 130

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

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

186 A population, p(x), of wild turkeys in a certain area is represented by the function $p(x) = 17(1.15)^{2x}$, where x is the number of years since 2010. How many more turkeys will be in the population for the year 2015 than 2010?

1) 46
2) 49
3) 51
4) 68

187 The conjugate of $7 - 5i$ is

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

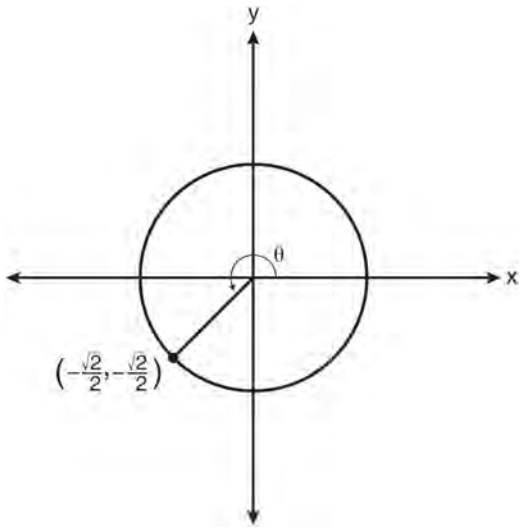
188 The expression $\frac{1 + \cos 2A}{\sin 2A}$ is equivalent to

1) $\cot A$
2) $\tan A$
3) $\sec A$
4) $1 + \cot 2A$

189 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}

190 In the diagram below of a unit circle, the ordered pair $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ represents the point where the terminal side of θ intersects the unit circle.



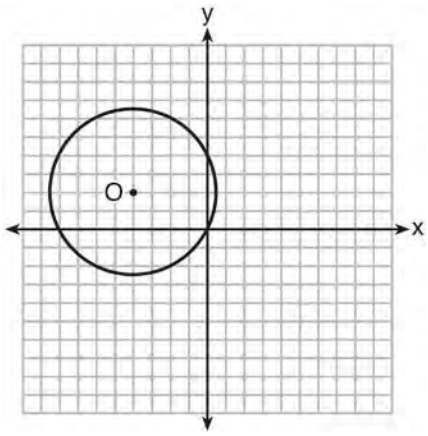
What is m$\angle\theta$?

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

191 The equation $\log_a x = y$ where $x > 0$ and $a > 1$ is equivalent to

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

192 A circle with center *O* and passing through the origin is graphed below.



What is the equation of circle *O*?

1) $x^2 + y^2 = 2\sqrt{5}$
2) $x^2 + y^2 = 20$
3) $(x+4)^2 + (y-2)^2 = 2\sqrt{5}$
4) $(x+4)^2 + (y-2)^2 = 20$

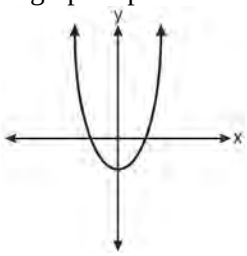
193 What is the product of the roots of $4x^2 - 5x = 3$?

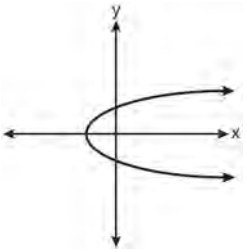
1) $\frac{3}{4}$
2) $\frac{5}{4}$
3) $-\frac{3}{4}$
4) $-\frac{5}{4}$

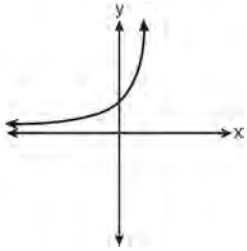
194 An amateur bowler calculated his bowling average for the season. If the data are normally distributed, about how many of his 50 games were within one standard deviation of the mean?

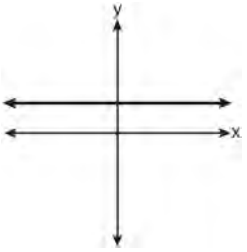
1) 14
2) 17
3) 34
4) 48

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

1)


2)


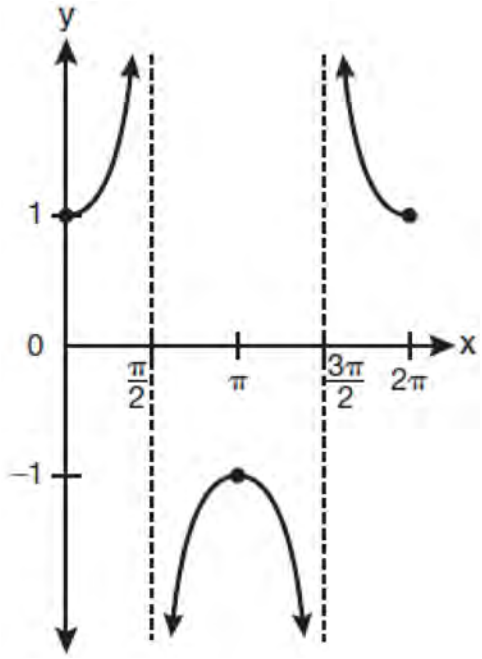
3)


4)


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

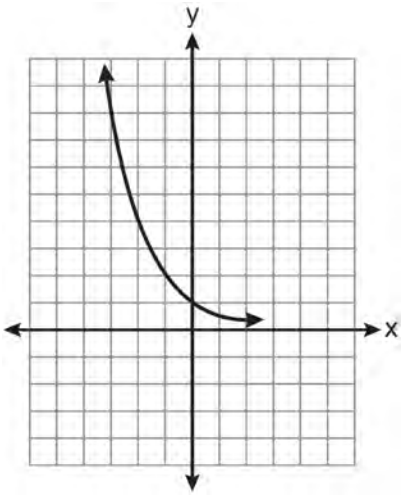
1) $-\frac{1}{2}$ and -3
2) $\frac{1}{2}$ and 3
3) $\frac{-7 \pm \sqrt{73}}{4}$
4) $\frac{7 \pm \sqrt{73}}{4}$

197 Which equation is represented by the graph below?



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

198 Which equation is represented by the graph below?



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

199 Circle O has a radius of 2 units. An angle with a measure of $\frac{\pi}{6}$ radians is in standard position. If the terminal side of the angle intersects the circle at point B, what are the coordinates of B?

1) $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$
2) $\left(\sqrt{3}, 1\right)$
3) $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
4) $\left(1, \sqrt{3}\right)$

200 The first four terms of the sequence defined by $a_1 = \frac{1}{2}$ and $a_{n+1} = 1 - a_n$ are

1) $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}$

2) $\frac{1}{2}, 1, 1\frac{1}{2}, 2$

3) $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$

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

201 The table below shows five numbers and their frequency of occurrence.

Number	Frequency
5	9
7	5
8	8
12	8
14	8

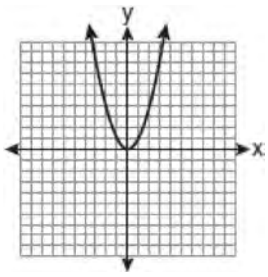
The interquartile range for these data is

1) 7
2) 5
3) 7 to 12
4) 6 to 13

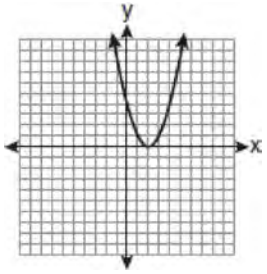
202 Factored completely, the expression $6x - x^3 - x^2$ is equivalent to

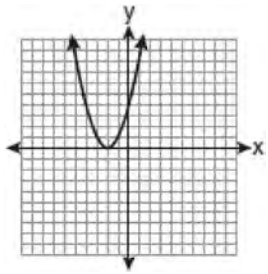
1) $x(x+3)(x-2)$
2) $x(x-3)(x+2)$
3) $-x(x-3)(x+2)$
4) $-x(x+3)(x-2)$

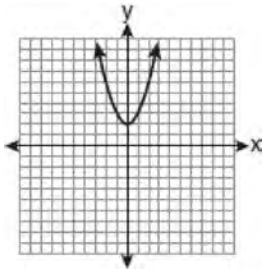
203 The graph below shows the function f(x).



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

1)


2)


3)


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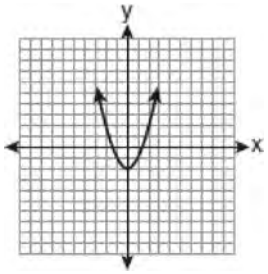
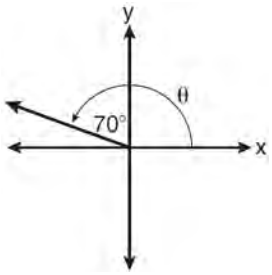
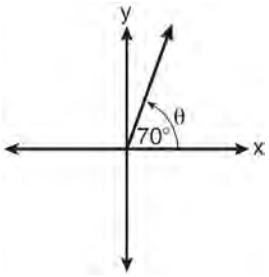
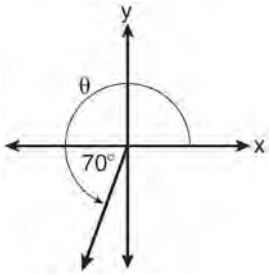
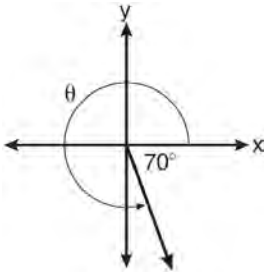


204 In which graph is θ coterminal with an angle of $-70°$?

1) 

2) 

3) 

4) 

205 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) $(-6,-3)$

206 Six people met at a dinner party, and each person shook hands once with everyone there. Which expression represents the total number of handshakes?

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

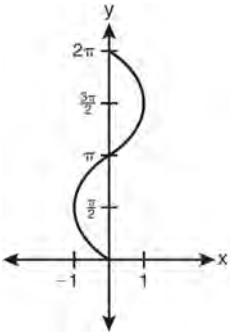
207 What is the value of $4x^{\frac{1}{2}} + x^0 + x^{-\frac{1}{4}}$ when $x = 16$?

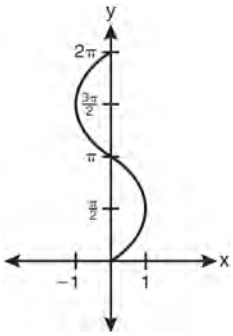
1) $7\frac{1}{2}$
2) $9\frac{1}{2}$
3) $16\frac{1}{2}$
4) $17\frac{1}{2}$

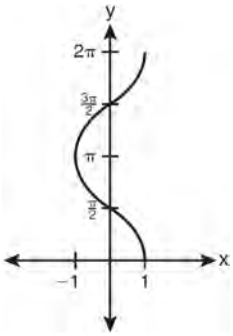
208 Written in simplest form, the expression $\frac{\frac{x}{4} - \frac{1}{x}}{\frac{1}{2x} + \frac{1}{4}}$ is equivalent to

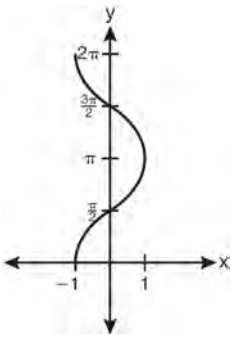
1) $x - 1$
2) $x - 2$
3) $\frac{x-2}{2}$
4) $\frac{x^2 - 4}{x + 2}$

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

1) 

2) 

3) 

4) 

210 The scores on a standardized exam have a mean of 82 and a standard deviation of 3.6. Assuming a normal distribution, a student's score of 91 would rank

1) below the 75th percentile
2) between the 75th and 85th percentiles
3) between the 85th and 95th percentiles
4) above the 95th percentile

211 A theater has 35 seats in the first row. Each row has four more seats than the row before it. Which expression represents the number of seats in the *n*th row?

1) $35 + (n + 4)$
2) $35 + (4n)$
3) $35 + (n + 1)(4)$
4) $35 + (n - 1)(4)$

212 The expression $\sqrt{-180x^{16}}$ is equivalent to

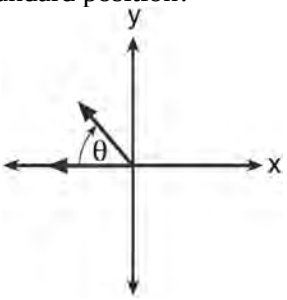
1) $-6x^4\sqrt{5}$
2) $-6x^8\sqrt{5}$
3) $6x^4 i\sqrt{5}$
4) $6x^8 i\sqrt{5}$

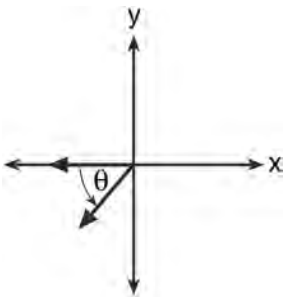
213 If $m = \{(-1,1),(1,1),(-2,4),(2,4),(-3,9),(3,9)\}$, which statement is true?

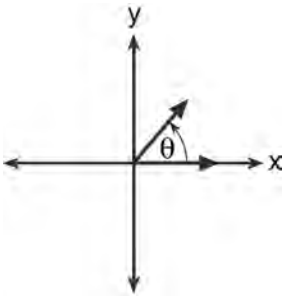
1) *m* and its inverse are both functions.
2) *m* is a function and its inverse is not a function.
3) *m* is not a function and its inverse is a function.
4) Neither *m* nor its inverse is a function.

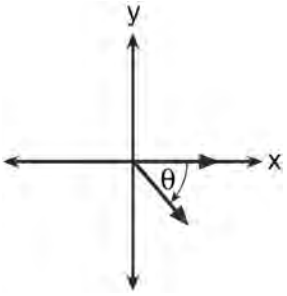
Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

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

1) 

2) 

3) 

4) 

215 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) $\csc(-118°)$

216 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

217 The formula to determine continuously compounded interest is $A = Pe^{rt}$, where A is the amount of money in the account, P is the initial investment, r is the interest rate, and t is the time, in years. Which equation could be used to determine the value of an account with an $18,000 initial investment, at an interest rate of 1.25% for 24 months?

1) $A = 18{,}000e^{1.25 \cdot 2}$
2) $A = 18{,}000e^{1.25 \cdot 24}$
3) $A = 18{,}000e^{0.0125 \cdot 2}$
4) $A = 18{,}000e^{0.0125 \cdot 24}$

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

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

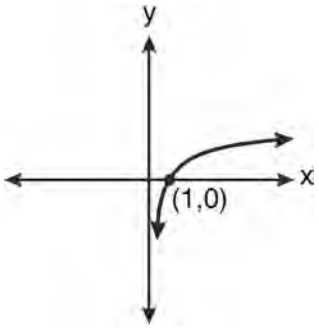
220 If *d* varies inversely as *t*, and $d = 20$ when $t = 2$, what is the value of *t* when $d = -5$?

1) 8
2) 2
3) –8
4) –2

221 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) $\{y \mid y \in \text{real numbers}\}$

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

1)


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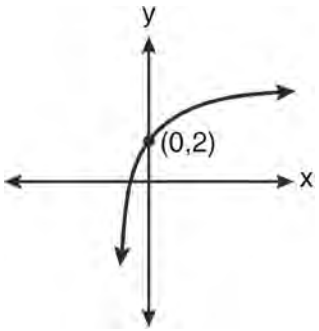

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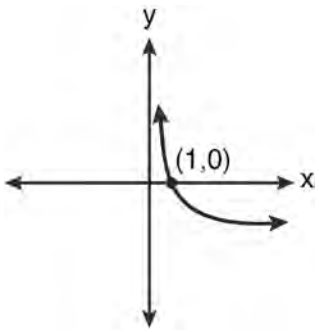

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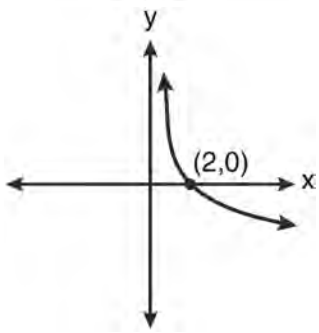
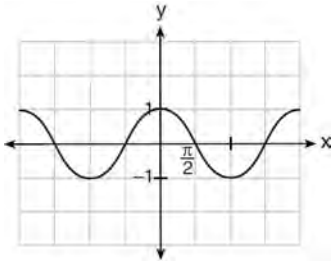
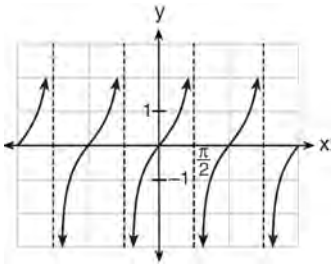
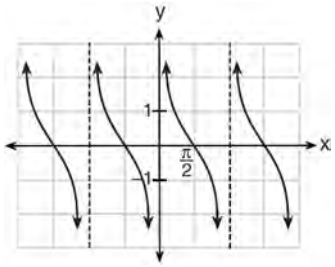
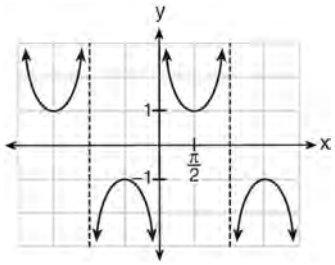


223 Which is a graph of $y = \cot x$?

1) 

2) 

3) 

4) 

224 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) $\{225°, 315°\}$

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

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

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

227 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) $\sum_{n=3}^{23} (3n - 4)$

228 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

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

230 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?

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

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

1) $\frac{12!}{3!}$
2) $\frac{12!}{6!}$
3) $\frac{{}_{12}P_{12}}{8}$
4) $\frac{{}_{12}P_{12}}{6!}$

233 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

234 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) $\log 16 + 2\log m$

235 The expression $(x+i)^2 - (x-i)^2$ is equivalent to
1) 0
2) -2
3) $-2 + 4xi$
4) $4xi$

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

237 A cliff diver on a Caribbean island jumps from a height of 105 feet, with an initial upward velocity of 5 feet per second. An equation that models the height, h(t), above the water, in feet, of the diver in time elapsed, t, in seconds, is $h(t) = -16t^2 + 5t + 105$. How many seconds, to the *nearest hundredth*, does it take the diver to fall 45 feet below his starting point?
1) 1.45
2) 1.84
3) 2.10
4) 2.72

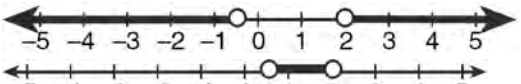
238 If $\log 2 = a$ and $\log 3 = b$, the expression $\log \frac{9}{20}$ is equivalent to
1) $2b - a + 1$
2) $2b - a - 1$
3) $b^2 - a + 10$
4) $\frac{2b}{a+1}$

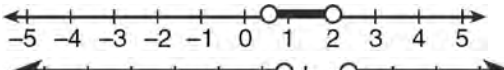
239 Which expression is equivalent to $\left(9x^2y^6\right)^{-\frac{1}{2}}$?
1) $\frac{1}{3xy^3}$
2) $3xy^3$
3) $\frac{3}{xy^3}$
4) $\frac{xy^3}{3}$

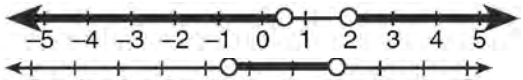
240 The roots of the equation $2x^2 + 4 = 9x$ are
1) real, rational, and equal
2) real, rational, and unequal
3) real, irrational, and unequal
4) imaginary

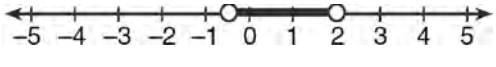
241 What is the solution set for the equation $\sqrt{5x+29} = x + 3$?
1) $\{4\}$
2) $\{-5\}$
3) $\{4, 5\}$
4) $\{-5, 4\}$

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

1) 

2) 

3) 

4) 

243 Which function is one-to-one?

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

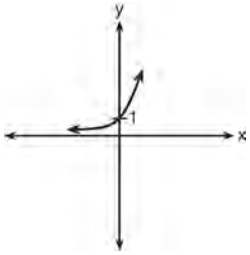
244 Liz has applied to a college that requires students to score in the top 6.7% on the mathematics portion of an aptitude test. The scores on the test are approximately normally distributed with a mean score of 576 and a standard deviation of 104. What is the minimum score Liz must earn to meet this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

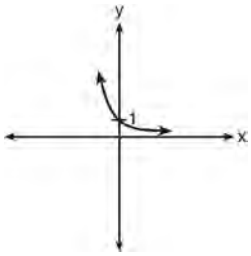
1) 680
2) 732
3) 740
4) 784

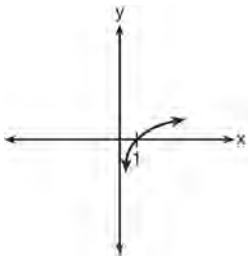
245 Approximately how many degrees does five radians equal?

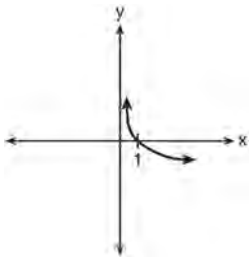
1) 286
2) 900
3) $\frac{\pi}{36}$
4) 5π

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

1) 

2) 

3) 

4) 

247 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) $\frac{7}{9}$

248 Which statement regarding the inverse function is true?

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

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

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

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

251 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

252 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) $\frac{15}{4}x^4y^2$

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

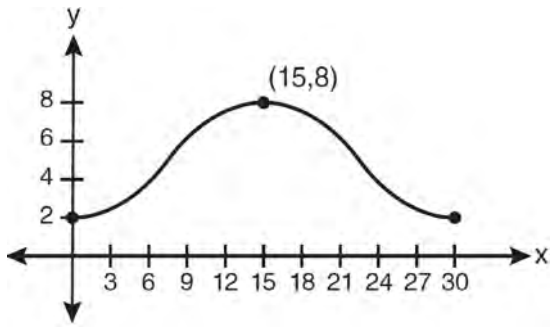
254 If $\sin x = \sin y = a$ and $\cos x = \cos y = b$, then $\cos(x - y)$ is

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

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

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

256 Which equation is graphed in the diagram below?



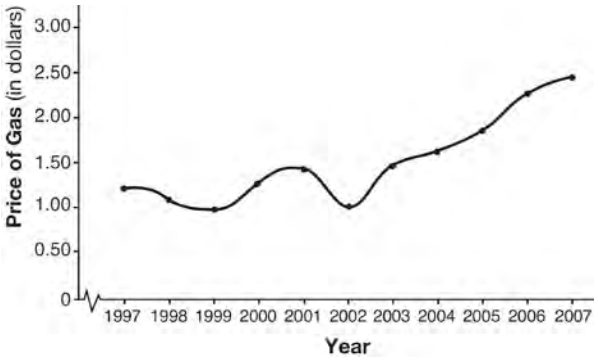
1) $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$

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

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

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

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



What is the approximate range of this graph?

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

258 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

259 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) $4a^2 - 20a + 30$

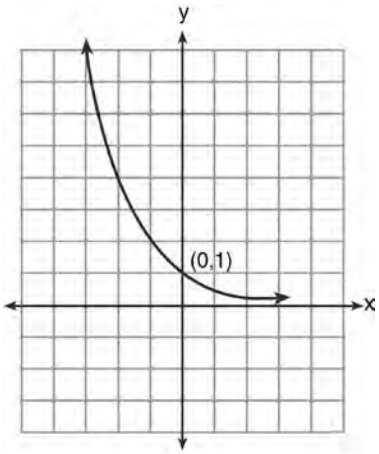
260 The yearbook staff has designed a survey to learn student opinions on how the yearbook could be improved for this year. If they want to distribute this survey to 100 students and obtain the most reliable data, they should survey

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

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

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

262 What is the equation of the graph shown below?



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

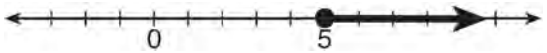
263 If p varies inversely as q, and $p = 10$ when $q = \frac{3}{2}$, what is the value of p when $q = \frac{3}{5}$?

1) 25
2) 15
3) 9
4) 4

264 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) $4n^{-1} > (6n)^{-1}$

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

1) 

2) 

3) 

4) 

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

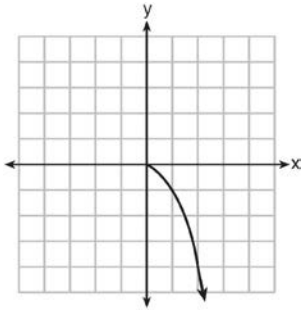
267 What is the product of the roots of the quadratic equation $2x^2 - 7x = 5$?

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

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

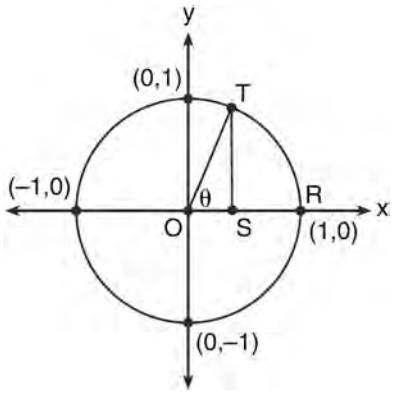
1) $-y^3$
2) $-6x^4y^2$
3) $6x^4y^2$
4) $2x^4y^2$

269 What is the range of the function shown below?



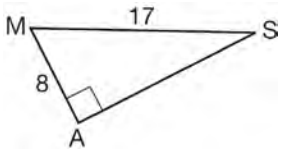
1) $x \leq 0$
2) $x \geq 0$
3) $y \leq 0$
4) $y \geq 0$

270 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) $\overline{OS}$

271 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'

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

273 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%

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

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

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

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

276 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) $-\frac{x}{x-2}$

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

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

278 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) $-65,535$

279 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 $(e, 1)$.

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

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

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

283 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 $\sec P > 0$

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

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

285 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

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

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

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

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

288 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) $3\sqrt{2}$

289 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) ${}_{30}C_3 + {}_{20}C_2$

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

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

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

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

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

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

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

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

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

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

296 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

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

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

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

300 A school math team consists of three juniors and five seniors. How many different groups can be formed that consist of one junior and two seniors?
1) 13
2) 15
3) 30
4) 60

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

302 What is the number of degrees in an angle whose radian measure is $\dfrac{8\pi}{5}$?
1) 576
2) 288
3) 225
4) 113

303 What is the equation of the circle passing through the point $(6,5)$ and centered at $(3,-4)$?
1) $(x-6)^2+(y-5)^2=82$
2) $(x-6)^2+(y-5)^2=90$
3) $(x-3)^2+(y+4)^2=82$
4) $(x-3)^2+(y+4)^2=90$

304 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

305 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

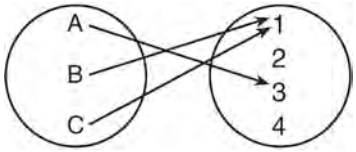
306 What is the period of the graph $y = \frac{1}{2}\sin 6x$?

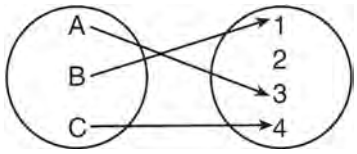
1) $\frac{\pi}{6}$
2) $\frac{\pi}{3}$
3) $\frac{\pi}{2}$
4) 6π

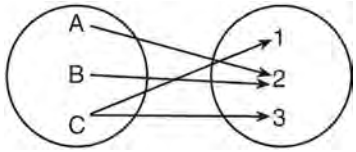
307 The value of $\csc 138°23'$ rounded to four decimal places is

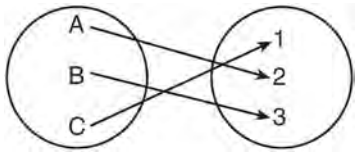
1) –1.3376
2) –1.3408
3) 1.5012
4) 1.5057

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

1) 

2) 

3) 

4) 

309 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) $-3 \pm 2i$

310 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

311 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) $(-4,9)$

312 The expression $\left(2 - 3\sqrt{x}\right)^2$ is equivalent to

1) $4 - 9x$
2) $4 - 3x$
3) $4 - 12\sqrt{x} + 9x$
4) $4 - 12\sqrt{x} + 6x$

313 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) $6x^2\sqrt[3]{2}$

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

315 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

316 If $f(x) = 2x^2 - 3x + 1$ and $g(x) = x + 5$, what is $f(g(x))$?

1) $2x^2 + 17x + 36$
2) $2x^2 + 17x + 66$
3) $2x^2 - 3x + 6$
4) $2x^2 - 3x + 36$

317 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

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

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

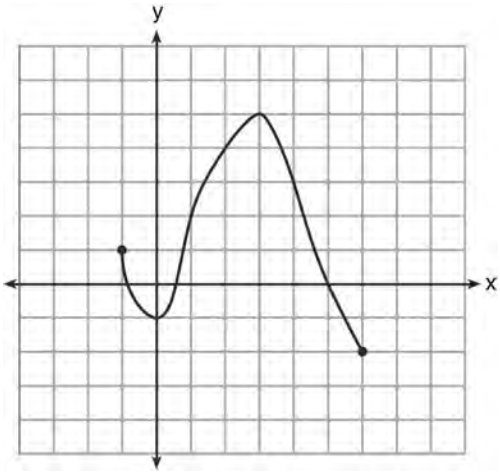
320 Expressed with a rational denominator and in simplest form, $\frac{x}{x-\sqrt{x}}$ is

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

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

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

322 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) $-2 \le y \le 5$

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

324 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) $(-6,-2)$

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

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

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

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

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

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

328 Which function is one-to-one?

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

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

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

330 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

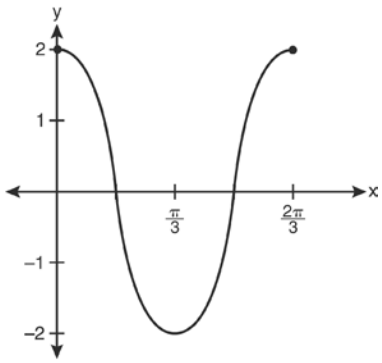
1) between -1 and 0
2) between 0 and 1
3) equal to -1
4) equal to 0

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

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

332 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

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

334 Two sides of a triangular-shaped sandbox measure 22 feet and 13 feet. If the angle between these two sides measures 55°, what is the area of the sandbox, to the *nearest square foot*?
1) 82
2) 117
3) 143
4) 234

335 When $x^{-1} + 1$ is divided by $x + 1$, the quotient equals
1) 1
2) $\frac{1}{x}$
3) x
4) $-\frac{1}{x}$

336 The expression $\frac{\cot x}{\csc x}$ is equivalent to
1) $\sin x$
2) $\cos x$
3) $\tan x$
4) $\sec x$

337 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

338 For which value of k will the roots of the equation $2x^2 - 5x + k = 0$ be real and rational numbers?
1) 1
2) –5
3) 0
4) 4

339 In $\triangle PQR$, p equals

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

340 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

341 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) ${}_8C_5$

342 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) $-2a+5$

343 The expression $\sqrt[4]{81x^2y^5}$ is equivalent to

1) $3x^{\frac{1}{2}}y^{\frac{5}{4}}$
2) $3x^{\frac{1}{2}}y^{\frac{4}{5}}$
3) $9xy^{\frac{5}{2}}$
4) $9xy^{\frac{2}{5}}$

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

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

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

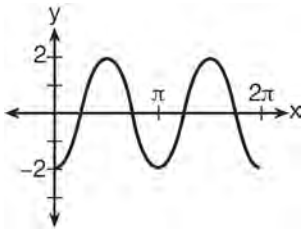
346 When factored completely, the expression $3x^3 - 5x^2 - 48x + 80$ is equivalent to

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

347 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

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

349 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) $\cos x + \sin x$

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

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

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

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

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

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

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

354 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

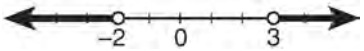
355 Which expression is equivalent to $(n \circ m \circ p)(x)$, given $m(x) = \sin x$, $n(x) = 3x$, and $p(x) = x^2$?

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

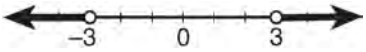
356 The expression $\sin(\theta + 90)°$ is equivalent to

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

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

1) 

2) 

3) 

4) 

358 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

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

360 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
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

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

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

362 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) $\{60°, 300°\}$

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

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

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

365 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) $\frac{\pi}{2} \le x \le \frac{3\pi}{2}$

366 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

367 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

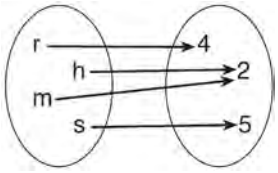
368 The expression $(2a)^{-4}$ is equivalent to

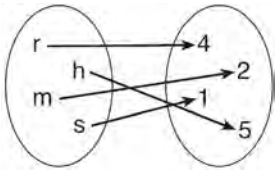
1) $-8a^4$
2) $\frac{16}{a^4}$
3) $-\frac{2}{a^4}$
4) $\frac{1}{16a^4}$

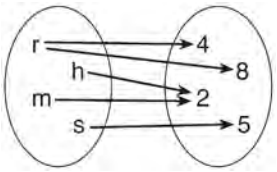
369 What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?

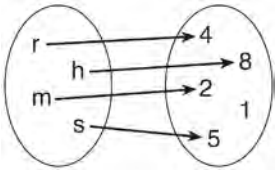
1) $(-8,-3)$
2) $(-8,3)$
3) $(8,-3)$
4) $(8,3)$

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

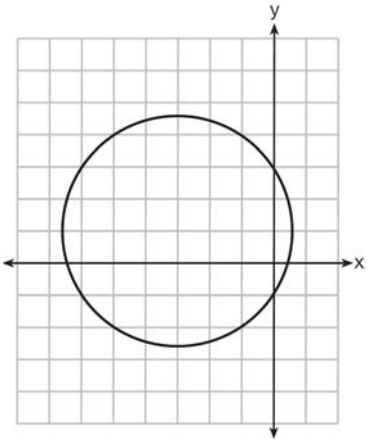
1) 

2) 

3) 

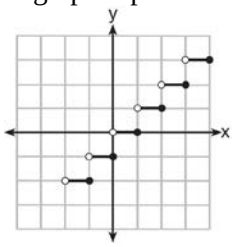
4) 

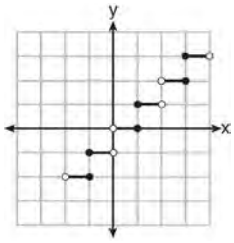
371 Which equation is represented by the graph below?

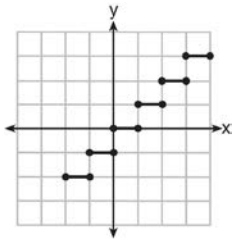


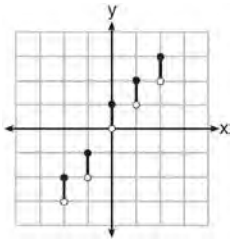
1) $(x-3)^2 + (y+1)^2 = 5$
2) $(x+3)^2 + (y-1)^2 = 5$
3) $(x-1)^2 + (y+3)^2 = 13$
4) $(x+3)^2 + (y-1)^2 = 13$

372 Which graph represents a function?

1) 

2) 

3) 

4) 

373 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) $10a^2b\sqrt[3]{8}$

374 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

375 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

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

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

377 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) $4x^2 - 9x - 3 = 0$

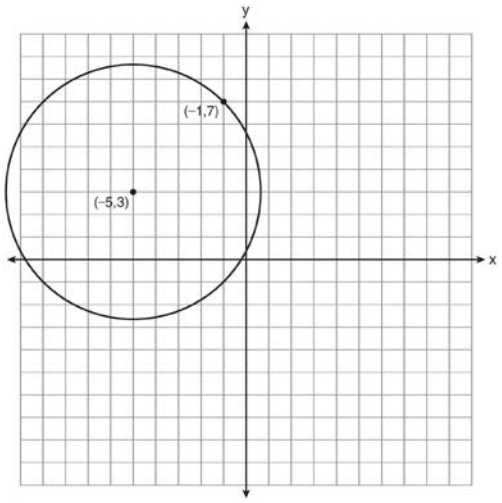
378 In parallelogram $BFLO$, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal $\overline{BL}$ is drawn, what is the area of $\triangle BLF$?

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

Algebra 2/Trigonometry 2 Point Regents Exam Questions

379 The probability that Kay and Joseph Dowling will have a redheaded child is 1 out of 4. If the Dowlings plan to have three children, what is the *exact* probability that only one child will have red hair?

380 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.

381 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.

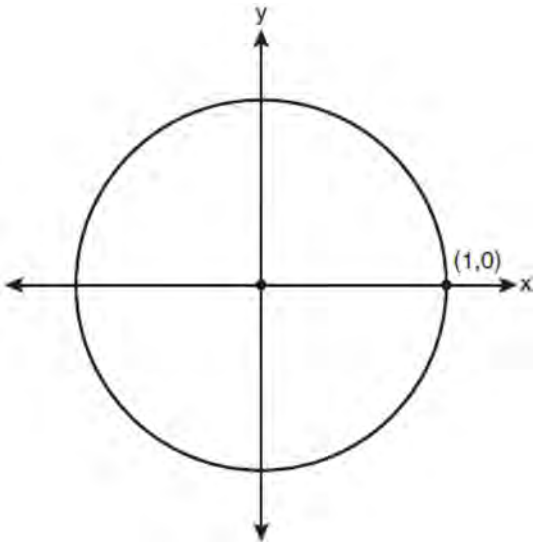
382 Determine, to the *nearest minute*, the number of degrees in an angle whose measure is 2.5 radians.

383 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.

384 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 $\sin 240°$.



385 The probability of winning a game is $\frac{2}{3}$.

Determine the probability, expressed as a fraction, of winning *exactly* four games if seven games are played.

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

387 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.

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

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

390 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.

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

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

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

394 In triangle ABC, determine the number of distinct triangles that can be formed if $m\angle A = 85$, side $a = 8$, and side $c = 2$. Justify your answer.

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

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

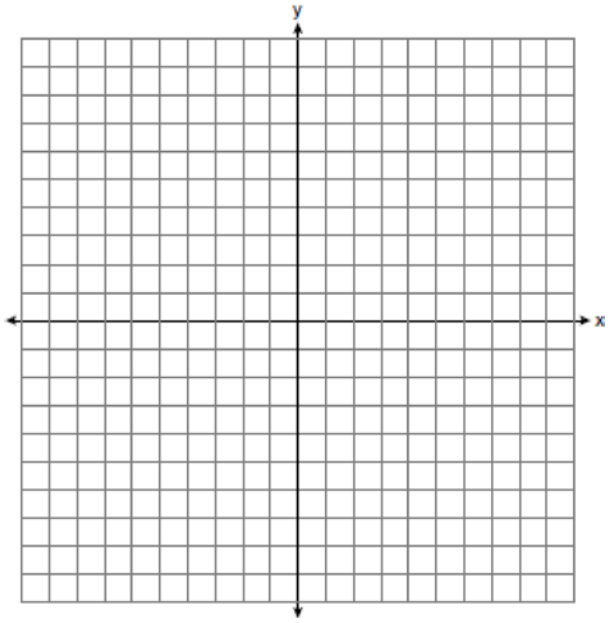
397 Solve algebraically for x: $16^{2x+3} = 64^{x+2}$

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

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

400 Solve algebraically for the exact values of x:
$\frac{5x}{2} = \frac{1}{x} + \frac{x}{4}$

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



402 Solve algebraically for x: $5^{4x} = 125^{x-1}$

403 In a circle, an arc length of 6.6 is intercepted by a central angle of $\frac{2}{3}$ radians. Determine the length of the radius.

404 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.*

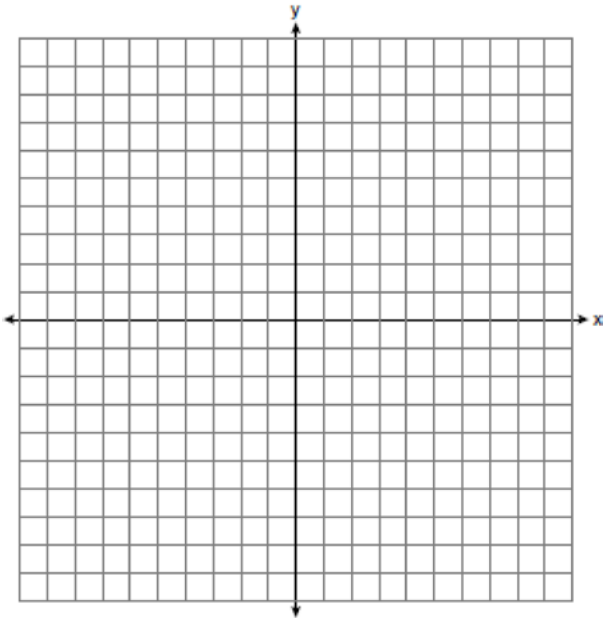
405 Find, to the *nearest tenth of a square foot*, the area of a rhombus that has a side of 6 feet and an angle of 50°.

406 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.

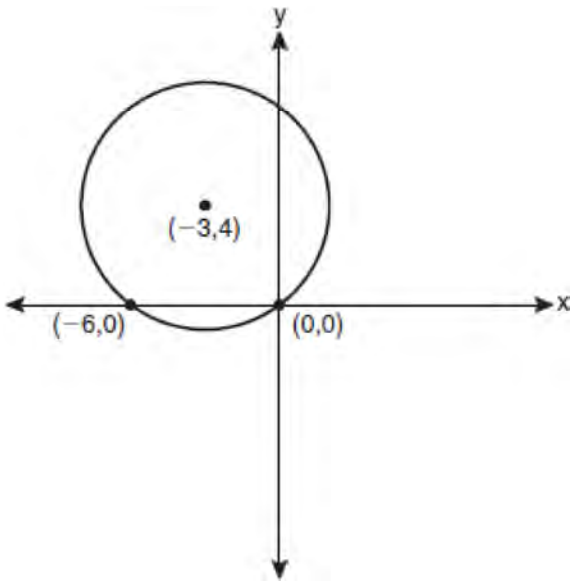
407 The number of bacteria present in a Petri dish can be modeled by the function $N = 50e^{3t}$, where N is the number of bacteria present in the Petri dish after t hours. Using this model, determine, to the *nearest hundredth*, the number of hours it will take for N to reach 30,700.

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

409 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.



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



411 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%.

412 If $\log_{(x+1)} 64 = 3$, find the value of x.

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

414 If x is a real number, express $2xi(i-4i^2)$ in simplest $a+bi$ form.

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

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

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

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

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

420 If p and q vary inversely and p is 25 when q is 6, determine q when p is equal to 30.

421 The probability of Ashley being the catcher in a softball game is $\frac{2}{5}$. Calculate the exact probability that she will be the catcher in *exactly* five of the next six games.

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

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

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

425 Determine which set of data given below has the stronger linear relationship between x and y. Justify your choice.

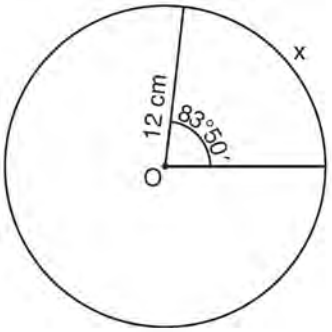
Set A

x	1	2	3	4	5	6
y	24	30	36	51	70	86

Set B

x	1	2	3	4	5	6
y	81	64	49	36	25	16

426 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'.



427 Express $xi^8 - yi^6$ in simplest form.

428 Show that $\frac{\sec^2 x - 1}{\sec^2 x}$ is equivalent to $\sin^2 x$.

429 Factor completely: $x^3 - 6x^2 - 25x + 150$

430 The area of a parallelogram is 594, and the lengths of its sides are 32 and 46. Determine, to the *nearest tenth of a degree*, the measure of the acute angle of the parallelogram.

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

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

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

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

435 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*.

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

437 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.

438 Given the equation $3x^2 + 2x + k = 0$, state the sum and product of the roots.

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

440 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.

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

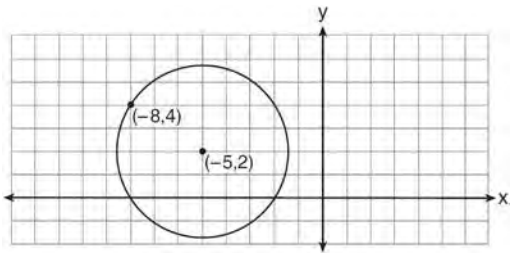
$$a_1 = -3$$

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

442 Determine, to the *nearest minute*, the degree measure of an angle of $\frac{5}{11}\pi$ radians.

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

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



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

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

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

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

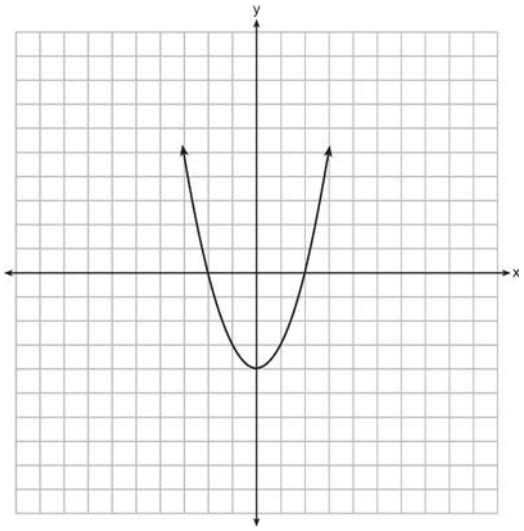
449 Find the number of possible different 10-letter arrangements using the letters of the word "STATISTICS."

450 Express in simplest form: $\dfrac{\dfrac{36-x^2}{(x+6)^2}}{\dfrac{x-3}{x^2+3x-18}}$

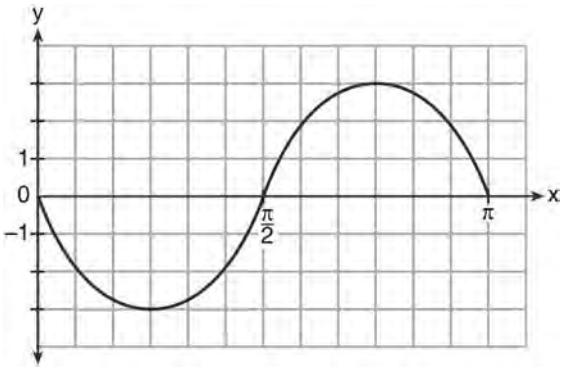
451 Two sides of a parallelogram are 24 feet and 30 feet. The measure of the angle between these sides is 57°. Find the area of the parallelogram, to the *nearest square foot*.

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

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



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



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

456 Simplify: $\sum_{a=1}^{4}\left(x - a^2\right)$.

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

458 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.

459 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.

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

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

462 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.

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

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

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

466 Solve for x: $\frac{1}{16} = 2^{3x-1}$

467 If $f(x) = x^2 - x$ and $g(x) = x + 1$, determine $f(g(x))$ in simplest form.

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

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

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

471 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.

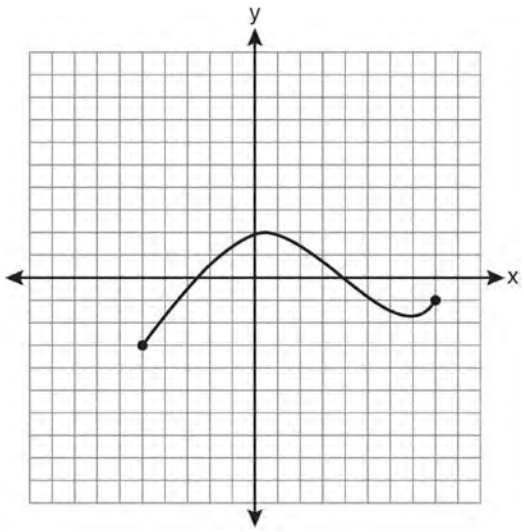
472 Determine the sum of the first twenty terms of the sequence whose first five terms are 5, 14, 23, 32, 41.

473 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.

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

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

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



State the domain and range of this function.

477 Find, to the *nearest tenth*, the radian measure of 216º.

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

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

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

481 On a test that has a normal distribution of scores, a score of 57 falls one standard deviation below the mean, and a score of 81 is two standard deviations above the mean. Determine the mean score of this test.

482 Solve $e^{4x} = 12$ algebraically for x, rounded to the *nearest hundredth*.

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

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

485 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.*

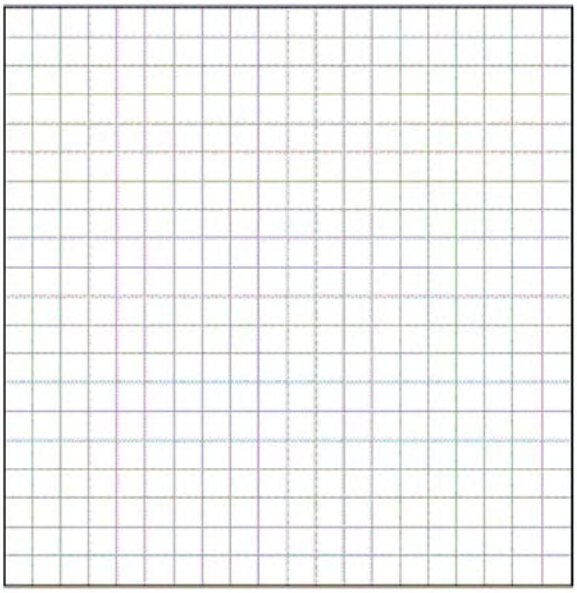
486 The table below shows the concentration of ozone in Earth's atmosphere at different altitudes. Write the exponential regression equation that models these data, rounding *all* values to the *nearest thousandth*.

Concentration of Ozone

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

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

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



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

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

Algebra 2/Trigonometry 4 Point Regents Exam Questions

491 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.

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

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

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

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

496 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.

497 Solve algebraically for x: $|3x-5| - x < 17$

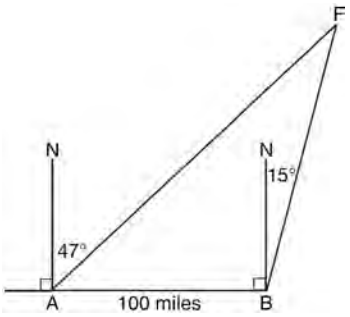
498 Solve algebraically for x: $\frac{1}{x+3} - \frac{2}{3-x} = \frac{4}{x^2-9}$

499 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.

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

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

501 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.]



502 Use the recursive sequence defined below to express the next three terms as fractions reduced to lowest terms.

$$a_1 = 2$$

$$a_n = 3\left(a_{n-1}\right)^{-2}$$

503 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.

504 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?

505 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.

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

507 In a triangle, two sides that measure 8 centimeters and 11 centimeters form an angle that measures 82°. To the *nearest tenth of a degree*, determine the measure of the *smallest* angle in the triangle.

508 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.

509 The table below shows the final examination scores for Mr. Spear's class last year.

Test Score	Frequency
72	1
76	1
79	4
83	5
85	7
88	5
94	3

Find the population standard deviation based on these data, to the *nearest hundredth*. Determine the number of students whose scores are within one population standard deviation of the mean.

510 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*.

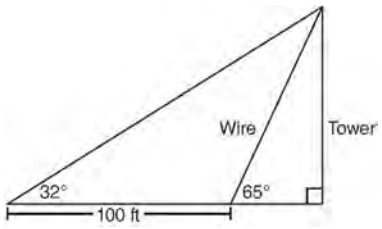
511 Because Sam's backyard gets very little sunlight, the probability that a geranium planted there will flower is 0.28. Sam planted five geraniums. Determine the probability, to the *nearest thousandth*, that *at least* four geraniums will flower.

512 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.

513 Solve algebraically for x: $\frac{3}{x} + \frac{x}{x+2} = -\frac{2}{x+2}$

514 Find the measure of the smallest angle, to the *nearest degree*, of a triangle whose sides measure 28, 47, and 34.

515 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*.



516 The table below shows the amount of a decaying radioactive substance that remained for selected years after 1990.

Years After 1990 (x)	0	2	5	9	14	17	19
Amount (y)	750	451	219	84	25	12	8

Write an exponential regression equation for this set of data, rounding all values to the *nearest thousandth*. Using this equation, determine the amount of the substance that remained in 2002, to the *nearest integer*.

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

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

519 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*.

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

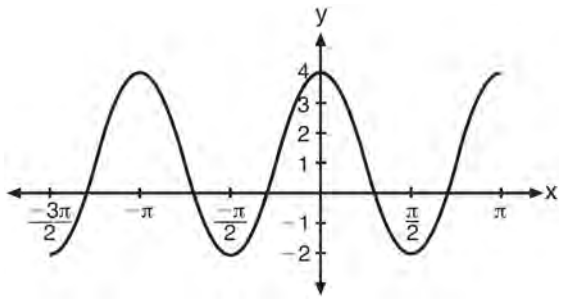
521 If $\log_4 x = 2.5$ and $\log_y 125 = -\frac{3}{2}$, find the numerical value of $\frac{x}{y}$, in simplest form.

522 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?

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

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

525 The periodic graph below can be represented by the trigonometric equation $y = a\cos bx + c$ where a, b, and c are real numbers.



State the values of a, b, and c, and write an equation for the graph.

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

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

528 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 $\tan(A + B)$.

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

530 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.

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

532 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.

Algebra 2/Trigonometry 6 Point Regents Exam Questions

533 In the interval $0° \le \theta < 360°$, solve the equation $5\cos\theta = 2\sec\theta - 3$ algebraically for all values of θ, to the *nearest tenth of a degree*.

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

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

536 A homeowner wants to increase the size of a rectangular deck that now measures 14 feet by 22 feet. The building code allows for a deck to have a maximum area of 800 square feet. If the length and width are increased by the same number of feet, find the maximum number of whole feet each dimension can be increased and *not* exceed the building code. [Only an algebraic solution can receive full credit.]

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

538 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.

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

540 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.]

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

542 Solve algebraically, to the *nearest hundredth*, for all values of x:
$\log_2(x^2 - 7x + 12) - \log_2(2x - 10) = 3$

543 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.

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

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

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

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

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions
Answer Section

1 ANS: 4

$(3-2a)^0+(3-2a)^1+(3-2a)^2=1+3-2a+9-12a+4a^2=4a^2-14a+13$

PTS: 2 REF: 061526a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

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

3 ANS: 2 PTS: 2 REF: 081502a2 STA: A2.S.8
TOP: Correlation Coefficient

4 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

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

6 ANS: 4 PTS: 2 REF: 061506a2 STA: A2.A.9
TOP: Negative Exponents

7 ANS: 4

$\frac{3-\sqrt{8}}{\sqrt{3}}\cdot\frac{\sqrt{3}}{\sqrt{3}}=\frac{3\sqrt{3}-\sqrt{24}}{3}=\frac{3\sqrt{3}-2\sqrt{6}}{3}=\sqrt{3}-\frac{2}{3}\sqrt{6}$

PTS: 2 REF: 081518a2 STA: A2.N.5 TOP: Rationalizing Denominators

8 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

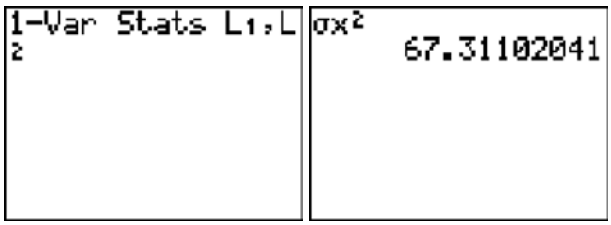
9 ANS: 4

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

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

10 ANS: 3 PTS: 2 REF: 081525a2 STA: A2.A.36
TOP: Binomial Expansions

11 ANS: 3



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

12 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

13 ANS: 3

$${}_9C_3 = 84$$

PTS: 2 REF: 081513a2 STA: A2.S.11 TOP: Combinations

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

15 ANS: 1

$$\frac{{}_{11}P_{11}}{3!2!2!2!} = \frac{39,916,800}{48} = 831,600$$

PTS: 2 REF: 081512a2 STA: A2.S.10 TOP: Permutations

16 ANS: 2

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

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

17 ANS: 3

$$x^2 = 12x - 7$$

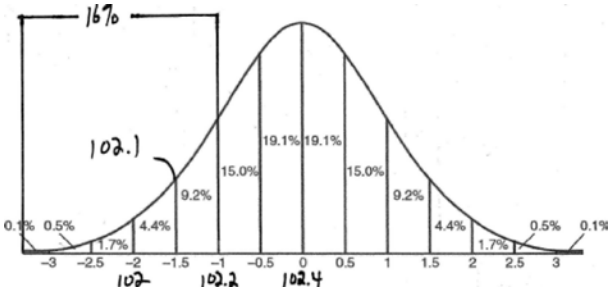
$$x^2 - 12x = -7$$

$$x^2 - 12x + 36 = -7 + 36$$

$$(x - 6)^2 = 29$$

PTS: 2 REF: 061505a2 STA: A2.A.24 TOP: Completing the Square

18 ANS: 1



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

19 ANS: 1

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

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

20 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

21 ANS: 2 PTS: 2 REF: 061510a2 STA: A2.A.5
TOP: Inverse Variation

22 ANS: 2

$x^3 - 2x^2 - 9x + 18$

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

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

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

PTS: 2 REF: 011511a2 STA: A2.A.7 TOP: Factoring by Grouping

23 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

24 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

25 ANS: 3

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

PTS: 2 REF: 081519a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

26 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

27 ANS: 3 PTS: 2 REF: 061514a2 STA: A2.A.55
TOP: Trigonometric Ratios

28 ANS: 1 PTS: 2 REF: 081501a2 STA: A2.A.50
TOP: Solving Polynomial Equations

29 ANS: 3

$x = 5^4 = 625$

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

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

31 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

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

33 ANS: 1

$\sqrt[3]{64a^5b^6} = \sqrt[3]{4^3a^3a^2b^6} = 4ab^2\sqrt[3]{a^2}$

PTS: 2 REF: 011516a2 STA: A2.N.2 TOP: Operations with Radicals

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

35 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

36 ANS: 2

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

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

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

38 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

39 ANS: 4

$$\frac{\sqrt{34}}{\sin 30} = \frac{12}{\sin B}$$

$$B = \sin^{-1}\frac{12\sin 30}{\sqrt{34}}$$

$$\approx \sin^{-1}\frac{6}{5.8}$$

PTS: 2 REF: 011523a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

40 ANS: 2

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

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

41 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

42 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

43 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

44 ANS: 3 PTS: 2 REF: 081517a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

45 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

46 ANS: 2

$A = 50\left(1 + \frac{.0325}{4}\right)^{4 \cdot 12} = 50(1.008125)^{48} \approx 73.73$

PTS: 2 REF: 081511a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

47 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

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

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

49 ANS: 2 PTS: 2 REF: 011502a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

50 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

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

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

53 ANS: 2 PTS: 2 REF: 011507a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

54 ANS: 1 PTS: 2 REF: 011506a2 STA: A2.A.53
TOP: Graphing Exponential Functions

55 ANS: 1

$\frac{{}_{11}P_{11}}{2!2!2!2!} = \frac{39,916,800}{16} = 2,494,800$

PTS: 2 REF: 011518a2 STA: A2.S.10 TOP: Permutations

56 ANS: 1

If $\sin\theta = \frac{15}{17}$, then $\cos\theta = \frac{8}{17}$. $\tan\theta = \frac{\frac{8}{17}}{\frac{15}{17}} = \frac{8}{15}$

PTS: 2 REF: 081508a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced

57 ANS: 3 PTS: 2 REF: 061515a2 STA: A2.N.3
TOP: Operations with Polynomials

58 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

59 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

60 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

61 ANS: 1

$\sin 120 = \frac{\sqrt{3}}{2}$ $\csc 120 = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

PTS: 2 REF: 081505a2 STA: A2.A.59 TOP: Reciprocal Trigonometric Relationships

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

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

64 ANS: 2

$9 - x^2 < 0$

$x^2 - 9 > 0$

$(x+3)(x-3) > 0$

$x + 3 > 0$ and $x - 3 > 0$

$x > -3$ and $x > 3$

$x > 3$

or $x + 3 < 0$ and $x - 3 < 0$

$x < -3$ and $x < 3$

$x < -3$

PTS: 2 REF: 061507a2 STA: A2.A.4 TOP: Quadratic Inequalities
KEY: one variable

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

66 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

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

68 ANS: 2

$$\sec\theta = \frac{\sqrt{x^2+y^2}}{x} = \frac{\sqrt{(-4)^2+0^2}}{-4} = \frac{4}{-4} = -1$$

PTS: 2 REF: 011520a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

69 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

70 ANS: 3

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

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

71 ANS: 4

$3 \cdot 400 = 8x$

$150 = x$

PTS: 2 REF: 081507a2 STA: A2.A.5 TOP: Inverse Variation

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

73 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

74 ANS: 3

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

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

75 ANS: 4 PTS: 2 REF: 061518a2 STA: A2.A.51
TOP: Domain and Range

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

77 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

78 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

79 ANS: 2

$s = \theta r = \frac{2\pi}{5} \cdot 18 \approx 23$

PTS: 2 REF: 011526a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

80 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

81 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

82 ANS: 3

$$\sin^2 x\left(1 + \frac{\cos^2 x}{\sin^2 x}\right) = \sin^2 x + \cos^2 x = 1 \quad \frac{1}{\cos^2 x}(\cos^2 x) = 1 \quad \cos^2 x\left(\frac{\sin^2 x}{\cos^2 x} - 1\right) = \sin^2 x - \cos^2 x \neq 1$$

$$\frac{\cos^2 x}{\sin^2 x}\left(\frac{1}{\cos^2 x} - 1\right) = \frac{1}{\sin^2 x} - \frac{\cos^2 x}{\sin^2 x} = \csc^2 x - \cot x = 1$$

PTS: 2 REF: 011515a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

83 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

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

85 ANS: 2

$$8^2 = 64$$

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

86 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

87 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

88 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

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

90 ANS: 2 PTS: 2 REF: 081515a2 STA: A2.A.57
TOP: Reference Angles

91 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

92 ANS: 3

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

$2 \times 12 = 24$

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

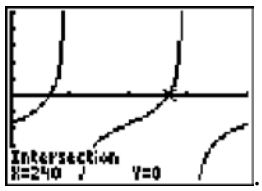
93 ANS: 2

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

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

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

95 ANS: 1

$\tan\theta - \sqrt{3} = 0$. 

.

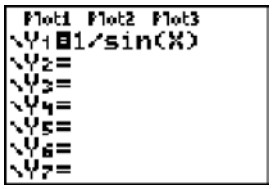
$\tan\theta = \sqrt{3}$

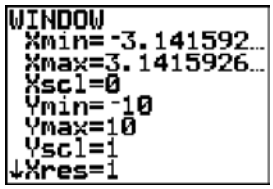
$\theta = \tan^{-1}\sqrt{3}$

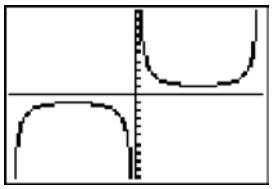
$\theta = 60, 240$

PTS: 2 REF: fall0903a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: basic

96 ANS: 1







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

97 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

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

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

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

100 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

101 ANS: 1

$\sqrt[3]{27a^3} \cdot \sqrt[4]{16b^8} = 3a \cdot 2b^2 = 6ab^2$

PTS: 2 REF: 061504a2 STA: A2.A.14 TOP: Operations with Radicals
KEY: with variables | index > 2

102 ANS: 2 PTS: 2 REF: 011521a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

103 ANS: 1

$\dfrac{\frac{3}{4}}{-\frac{1}{2}} = -\dfrac{3}{2}$

PTS: 2 REF: 011508a2 STA: A2.A.31 TOP: Sequences

104 ANS: 1

${}_{10}C_4 = 210$

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

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

106 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
TOP: Regression

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

108 ANS: 2

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

$\sin x = \dfrac{1}{2}, -1$

$x = 30, 150, 270$

PTS: 2 REF: 081514a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: quadratics

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

110 ANS: 1

$\cos 2\theta = 2\left(\frac{3}{4}\right)^2 - 1 = 2\left(\frac{9}{16}\right) - 1 = \frac{9}{8} - \frac{8}{8} = \frac{1}{8}$

PTS: 2 REF: 081522a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: evaluating

111 ANS: 4

$f(a+1) = 4(a+1)^2 - (a+1) + 1$

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

$= 4a^2 + 8a + 4 - a$

$= 4a^2 + 7a + 4$

PTS: 2 REF: 011527a2 STA: A2.A.41 TOP: Functional Notation

112 ANS: 3

$\frac{5x}{x(x-3)} - \frac{2(x-3)}{x(x-3)} = \frac{x(x-3)}{x(x-3)}$

$5x - 2x + 6 = x^2 - 3x$

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

PTS: 2 REF: 011522a2 STA: A2.A.23 TOP: Solving Rationals
KEY: irrational and complex solutions

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

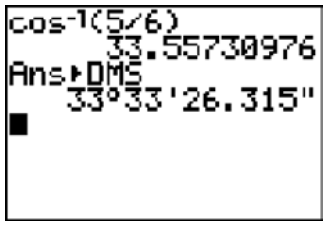
114 ANS: 3 PTS: 2 REF: 061523a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

115 ANS: 3

Cofunctions tangent and cotangent are complementary

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

116 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

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

118 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

119 ANS: 3

$$r = \sqrt{(6-2)^2 + (2--3)^2} = \sqrt{16+25} = \sqrt{41}$$

PTS: 2 REF: 081516a2 STA: A2.A.48 TOP: Equations of Circles

120 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

121 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

122 ANS: 3 PTS: 2 REF: 061501a2 STA: A2.A.43
TOP: Defining Functions

123 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

124 ANS: 1

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

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

$$x = a^2 b$$

PTS: 2 REF: 061517a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: antilogarithms

125 ANS: 1

$_5C_2(2x)^{5-2}(-3)^2 = 720x^3$

PTS: 2 REF: 011519a2 STA: A2.A.36 TOP: Binomial Expansions

126 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

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

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

129 ANS: 1 PTS: 2 REF: 061516a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

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

131 ANS: 4 PTS: 2 REF: 011504a2 STA: A2.A.34
TOP: Sigma Notation

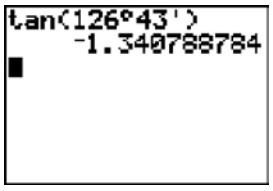
132 ANS: 2 PTS: 2 REF: 011501a2 STA: A2.A.73
TOP: Law of Cosines KEY: side, without calculator

133 ANS: 4

$\frac{3 \pm \sqrt{(-3)^2 - 4(1)(-9)}}{2(1)} = \frac{3 \pm \sqrt{45}}{2} = \frac{3 \pm 3\sqrt{5}}{2}$

PTS: 2 REF: 061009a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

134 ANS: 2



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

135 ANS: 2

$(-5)^2 - 4(1)(4) = 9$

PTS: 2 REF: 011506a2 STA: A2.A.2 TOP: Using the Discriminant

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

137 ANS: 1

n	3	4	5	Σ
$-r^2 + r$	$-3^2 + 3 = -6$	$-4^2 + 4 = -12$	$-5^2 + 5 = -20$	-38

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

138 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

139 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

140 ANS: 2 PTS: 2 REF: 061521a2 STA: A2.A.44
TOP: Inverse of Functions KEY: equations

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

142 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

143 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

144 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

145 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

146 ANS: 1

$\frac{{}_9P_9}{4! \cdot 2! \cdot 2!} = \frac{362,880}{96} = 3,780$

PTS: 2 REF: 061511a2 STA: A2.S.10 TOP: Permutations

147 ANS: 3

$\cos 2A = 1 - 2\sin^2 A = 1 - 2\left(\frac{3}{8}\right)^2 = \frac{32}{32} - \frac{9}{32} = \frac{23}{32}$

PTS: 2 REF: 011510a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: evaluating

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

149 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

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

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

152 ANS: 2

$K = 8 \cdot 12 \sin 120 = 96 \cdot \frac{\sqrt{3}}{2} = 48\sqrt{3}$

PTS: 2 REF: 061508a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: parallelograms

153 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

154 ANS: 2

$x - 2 = 3x + 10$ -6 is extraneous. $x - 2 = -3x - 10$

$-12 = 2x$ $\qquad 4x = -8$

$-6 = x$ $\qquad x = -2$

PTS: 2 REF: 061513a2 STA: A2.A.1 TOP: Absolute Value Equations

155 ANS: 2

$5^2 a^{-3} b^4 = \dfrac{25b^4}{a^3}$

PTS: 2 REF: 011514a2 STA: A2.A.9 TOP: Negative Exponents

156 ANS: 1

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

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

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

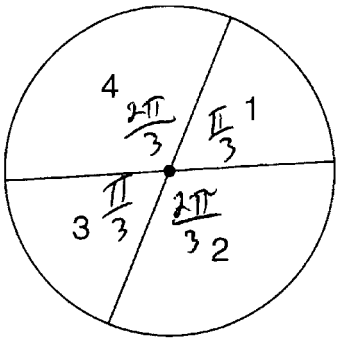
PTS: 2 REF: fall0905a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

157 ANS: 3

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

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

158 ANS: 2



$\dfrac{\frac{\pi}{3} + \frac{\pi}{3}}{2\pi} = \dfrac{\frac{2\pi}{3}}{2\pi} = \dfrac{1}{3}$

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

159 ANS: 1

$\left(\dfrac{1}{2}\left(-\dfrac{1}{4}\right)\right)^2 = \dfrac{1}{64}$

PTS: 2 REF: 081527a2 STA: A2.A.24 TOP: Completing the Square

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

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

162 ANS: 1
$_9C_3a^6(-4b)^3 = -5376a^6b^3$

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

163 ANS: 2
$\frac{11\pi}{12} \cdot \frac{180}{\pi} = 165$

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

164 ANS: 3
$_{20}C_4 = 4,845$

PTS: 2 REF: 011509a2 STA: A2.S.11 TOP: Combinations

165 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

166 ANS: 2 PTS: 2 REF: 061502a2 STA: A2.M.1
TOP: Radian Measure

167 ANS: 3
$a_4 = 3xy^5\left(\frac{2x}{y}\right)^3 = 3xy^5\left(\frac{8x^3}{y^3}\right) = 24x^4y^2$

PTS: 2 REF: 061512a2 STA: A2.A.33 TOP: Sequences

168 ANS: 4
$g(-2) = 3(-2) - 2 = -8$ $f(-8) = 2(-8)^2 + 1 = 128 + 1 = 129$

PTS: 2 REF: 061503a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

169 ANS: 2 PTS: 2 REF: 081509a2 STA: A2.S.4
TOP: Dispersion KEY: basic, group frequency distributions

170 ANS: 3
$3x^2 + x - 14 = 0$ $1^2 - 4(3)(-14) = 1 + 168 = 169 = 13^2$

PTS: 2 REF: 061524a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

171 ANS: 1

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

$$\frac{\pi}{\pi} = 1$$

PTS: 2 REF: 061519a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

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

173 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

174 ANS: 3

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

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

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

176 ANS: 4

$$\left(\frac{3}{2}x - 1\right)\left[\left(\frac{3}{2}x + 1\right) - \left(\frac{3}{2}x - 1\right)\right] = \left(\frac{3}{2}x - 1\right)(2) = 3x - 2$$

PTS: 2 REF: 011524a2 STA: A2.N.3 TOP: Operations with Polynomials

177 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

178 ANS: 1

$$\frac{5}{4-\sqrt{11}} \cdot \frac{4+\sqrt{11}}{4+\sqrt{11}} = \frac{5(4+\sqrt{11})}{16-11} = \frac{5(4+\sqrt{11})}{5} = 4+\sqrt{11}$$

PTS: 2 REF: 061509a2 STA: A2.N.5 TOP: Rationalizing Denominators

179 ANS: 4

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

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

180 ANS: 2

$P = \frac{c}{a} = \frac{-12}{3} = -4$

PTS: 2 REF: 081506a2 STA: A2.A.20 TOP: Roots of Quadratics

181 ANS: 4

$(-3-2i)(-3+2i) = 9-4i^2 = 9+4 = 13$

PTS: 2 REF: 011512a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

182 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

183 ANS: 3

$\frac{40-10}{6-1} = \frac{30}{5} = 6 \quad a_n = 6n+4$

$a_{20} = 6(20)+4 = 124$

PTS: 2 REF: 081510a2 STA: A2.A.32 TOP: Sequences

184 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

185 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

186 ANS: 3

$p(5) - p(0) = 17(1.15)^{2(5)} - 17(1.15)^{2(0)} \approx 68.8 - 17 \approx 51$

PTS: 2 REF: 061527a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

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

188 ANS: 1

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

PTS: 2 REF: 061522a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: simplifying

189 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

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

191 ANS: 3 PTS: 2 REF: 011503a2 STA: A2.A.28
TOP: Logarithmic Equations KEY: basic

192 ANS: 4 PTS: 2 REF: 011513a2 STA: A2.A.49
TOP: Equations of Circles

193 ANS: 3

$$\frac{c}{a} = \frac{-3}{4}$$

PTS: 2 REF: 011517a2 STA: A2.A.20 TOP: Roots of Quadratics

194 ANS: 3

$68\% \times 50 = 34$

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

195 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.

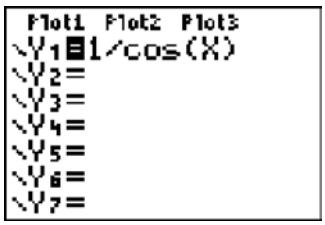
PTS: 2 REF: 081020a2 STA: A2.A.43 TOP: Defining Functions

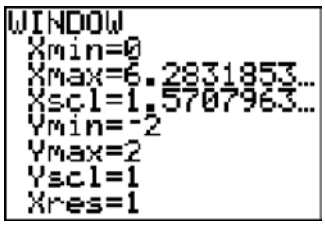
196 ANS: 3

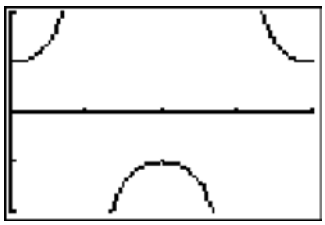
$$\frac{-7 \pm \sqrt{7^2 - 4(2)(-3)}}{2(2)} = \frac{-7 \pm \sqrt{73}}{4}$$

PTS: 2 REF: 081009a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

197 ANS: 3







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

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

199 ANS: 2

$x = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3} \quad y = 2 \cdot \frac{1}{2} = 1$

PTS: 2 REF: 061525a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

200 ANS: 1 PTS: 2 REF: 081520a2 STA: A2.A.33
TOP: Sequences

201 ANS: 2

$12 - 7 = 5$

PTS: 2 REF: 011525a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

202 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

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

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

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

206 ANS: 4 PTS: 2 REF: 081526a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

207 ANS: 4

$f(16) = 4(16)^{\frac{1}{2}} + 16^0 + 16^{-\frac{1}{4}}$

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

$= 17\frac{1}{2}$

PTS: 2 REF: 081503a2 STA: A2.N.1 TOP: Negative and Fractional Exponents

208 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

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

210 ANS: 4

$$\frac{91-82}{3.6} = 2.5\,\text{sd}$$

PTS: 2 REF: 081521a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

211 ANS: 4 PTS: 2 REF: 061520a2 STA: A2.A.29
TOP: Sequences

212 ANS: 4

$$\sqrt{-180x^{16}} = 6x^8 i\sqrt{5}$$

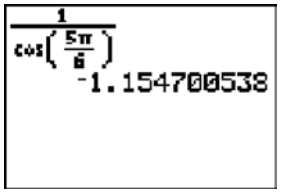
PTS: 2 REF: 081524a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers

213 ANS: 2 PTS: 2 REF: 081523a2 STA: A2.A.44
TOP: Inverse of Functions KEY: ordered pairs

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions
Answer Section

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

215 ANS: 1



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

216 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

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

218 ANS: 4

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

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

219 ANS: 1
The binomials are conjugates, so use FL.

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

220 ANS: 3

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

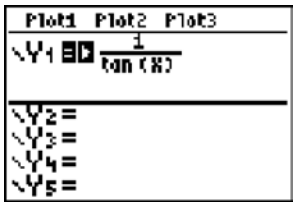
$$-8 = t$$

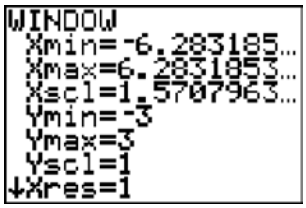
PTS: 2 REF: 011412a2 STA: A2.A.5 TOP: Inverse Variation

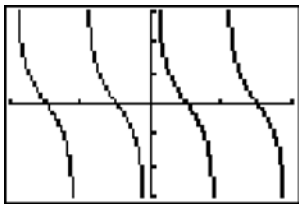
221 ANS: 2 PTS: 2 REF: 011222a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

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

223 ANS: 3







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

224 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

225 ANS: 1

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

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

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

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

228 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

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

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

231 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

232 ANS: 3

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

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

233 ANS: 1

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

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

234 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

235 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

236 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

237 ANS: 2

$$60 = -16t^2 + 5t + 105 \quad t = \frac{-5 \pm \sqrt{5^2 - 4(-16)(45)}}{2(-16)} \approx \frac{-5 \pm 53.89}{-32} \approx 1.84$$

$$0 = -16t^2 + 5t + 45$$

PTS: 2 REF: 061424a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

238 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

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

240 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

241 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

242 ANS: 3

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

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

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

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

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

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

244 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

245 ANS: 1

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

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

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

247 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

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

249 ANS: 2

The binomials are conjugates, so use FL.

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

250 ANS: 2

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

$30 + x^2 - 9 = 5x + 15$

$x^2 - 5x + 6 = 0$

$(x-3)(x-2) = 0$

$x = 2$

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

251 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

252 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

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

254 ANS: 2

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

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

$= b^2 + a^2$

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

255 ANS: 4

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

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

256 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

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

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

259 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

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

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

262 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

263 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

264 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

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

267 ANS: 4

$2x^2 - 7x - 5 = 0$

$\frac{c}{a} = \frac{-5}{2}$

PTS: 2 REF: 061414a2 STA: A2.A.20 TOP: Roots of Quadratics

268 ANS: 3

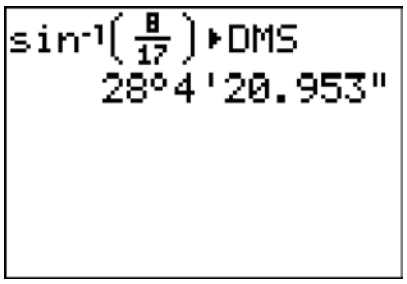
${}_3C_2(2x^4)^1(-y)^2 = 6x^4y^2$

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

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

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

271 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

272 ANS: 1 PTS: 2 REF: 061324a2 STA: A2.A.9
TOP: Negative Exponents

273 ANS: 3

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

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

274 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

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

276 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

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

278 ANS: 3

$S_8 = \dfrac{3(1-(-4)^8)}{1-(-4)} = \dfrac{196,605}{5} = -39,321$

PTS: 2 REF: 061304a2 STA: A2.A.35 TOP: Summations
KEY: geometric

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

280 ANS: 2

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

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

281 ANS: 1

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

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

282 ANS: 3

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

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

283 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

284 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain

285 ANS: 1

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

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

286 ANS: 1 PTS: 2 REF: 061420a2 STA: A2.A.34
TOP: Sigma Notation

287 ANS: 2

$\sqrt{2x-4} = x-2$

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

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

$0 = (x-4)(x-2)$

$x = 4,2$

PTS: 2 REF: 061406a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

288 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

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

290 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

291 ANS: 1 PTS: 2 REF: 061401a2 STA: A2.S.2
TOP: Analysis of Data

292 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

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

294 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

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

296 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

297 ANS: 4

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

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

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

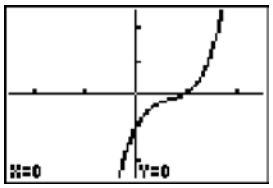
PTS: 2 REF: 011426a2 STA: A2.A.7 TOP: Factoring by Grouping

298 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

299 ANS: 4



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

300 ANS: 3

${}_3C_1 \cdot {}_5C_2 = 3 \cdot 10 = 30$

PTS: 2 REF: 061422a2 STA: A2.S.12 TOP: Combinations

301 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

302 ANS: 2

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

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

303 ANS: 4

$r = \sqrt{(6-3)^2 + (5-(-4))^2} = \sqrt{9+81} = \sqrt{90}$

PTS: 2 REF: 061415a2 STA: A2.A.48 TOP: Equations of Circles

304 ANS: 2

$\bar{x} \pm \sigma$

153 ± 22

$131 - 175$

PTS: 2 REF: 011307a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

305 ANS: 4

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

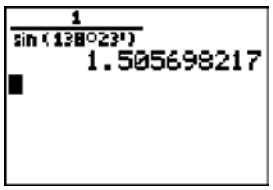
PTS: 2 REF: 011204a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

306 ANS: 2

$\frac{2\pi}{6} = \frac{\pi}{3}$

PTS: 2 REF: 061413a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

307 ANS: 4



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

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

309 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

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

311 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

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

313 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

314 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

315 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

316 ANS: 1

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

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

317 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

318 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

319 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

320 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

321 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

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

323 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

324 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

325 ANS: 3

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

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

326 ANS: 4 PTS: 2 REF: 061411a2 STA: A2.A.30 TOP: Sequences

327 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

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

329 ANS: 3

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

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

330 ANS: 2

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

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

331 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

332 ANS: 2 PTS: 2 REF: 061301a2 STA: A2.S.1
TOP: Analysis of Data

333 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

334 ANS: 2

$\frac{1}{2}(22)(13)\sin 55 \approx 117$

PTS: 2 REF: 061403a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic

335 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

336 ANS: 2

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

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

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

338 ANS: 3

$(-5)^2 - 4(2)(0) = 25$

PTS: 2 REF: 061423a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine equation given nature of roots

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

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

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

342 ANS: 1

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

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

343 ANS: 1

$$\sqrt[4]{81x^2y^5} = 81^{\frac{1}{4}}x^{\frac{2}{4}}y^{\frac{5}{4}} = 3x^{\frac{1}{2}}y^{\frac{5}{4}}$$

PTS: 2 REF: 081504a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

344 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

345 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

346 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

347 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

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

349 ANS: 2 PTS: 2 REF: 011208a2 STA: A2.A.67
TOP: Simplifying Trigonometric Expressions

350 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

351 ANS: 2

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

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

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

352 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

353 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

354 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

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

356 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

357 ANS: 1

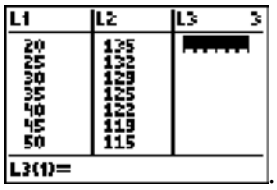
$2x - 1 > 5$. $2x - 1 < -5$

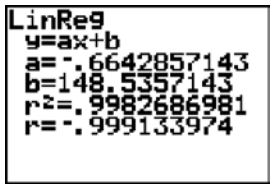
$2x > 6$ $2x > -4$

$x > 3$ $x < -2$

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

358 ANS: 1





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

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

360 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

361 ANS: 1

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

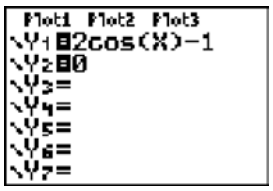
$$N \approx 73$$

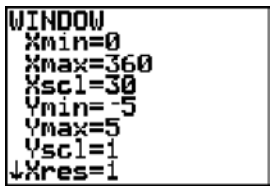
$$73 + 35 < 180$$

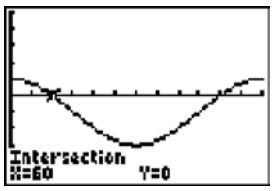
$$(180 - 73) + 35 < 180$$

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

362 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

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

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

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

366 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

367 ANS: 3 PTS: 2 REF: 011305a2 STA: A2.A.37
TOP: Defining Functions

368 ANS: 4 PTS: 2 REF: 061402a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

369 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

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

371 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles

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

373 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

374 ANS: 3

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

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

375 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

376 ANS: 1

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

$A \approx 58$

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

377 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

378 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

Algebra 2/Trigonometry 2 Point Regents Exam Questions
Answer Section

379 ANS:

$${}_3C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^2 = 3 \cdot \frac{1}{4} \cdot \frac{9}{16} = \frac{27}{64}$$

PTS: 2 REF: 061530a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

380 ANS:

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

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

381 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

382 ANS:

$2.5\left(\frac{180}{\pi}\right) = 143°14'$

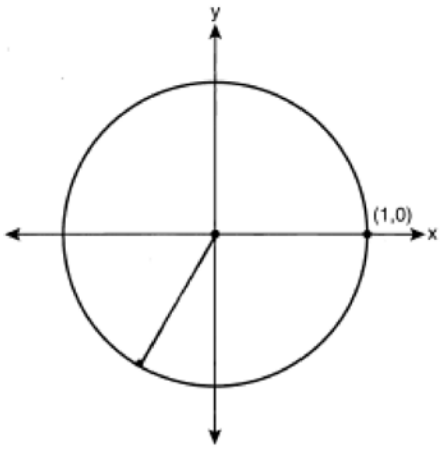
PTS: 2 REF: 081528a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

383 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

384 ANS:



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

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

385 ANS:

$${}_7C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^3 = 35\left(\frac{16}{81}\right)\left(\frac{1}{27}\right) = \frac{560}{2187}$$

PTS: 2 REF: 081531a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

386 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

387 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

388 ANS:

$(x+yi)(x-yi) = x^2 - y^2i^2 = x^2 + y^2$

PTS: 2 REF: 061432a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

389 ANS:

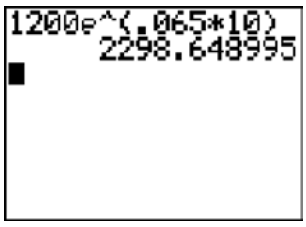
$\frac{31-19}{7-4} = \frac{12}{3} = 4$ $x + (4-1)4 = 19$ $a_n = 7 + (n-1)4$

$x + 12 = 19$

$x = 7$

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

390 ANS:



2,298.65.

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

391 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

392 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

393 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

394 ANS:

$$\frac{8}{\sin 85} = \frac{2}{\sin C}$$

$85 + 14.4 < 180$ 1 triangle

$85 + 165.6 \geq 180$

$$C = \sin^{-1}\left(\frac{2\sin 85}{8}\right)$$

$C \approx 14.4$

PTS: 2 REF: 061529a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

395 ANS:

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

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

396 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

397 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

398 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

399 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

400 ANS:

$\frac{10x}{4} = \frac{1}{x} + \frac{x}{4}$

$\frac{9x}{4} = \frac{1}{x}$

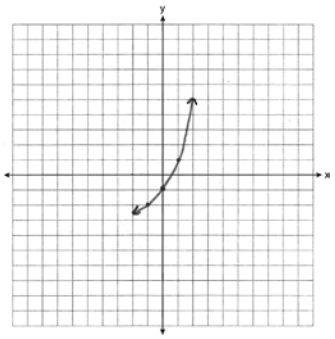
$9x^2 = 4$

$x^2 = \frac{4}{9}$

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

PTS: 2 REF: 081534a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

401 ANS:



PTS: 2 REF: 011234a2 STA: A2.A.53 TOP: Graphing Exponential Functions

402 ANS:

$5^{4x} = \left(5^3\right)^{x-1}$

$4x = 3x - 3$

$x = -3$

PTS: 2 REF: 061528a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base shown

403 ANS:

$r = \dfrac{6.6}{\dfrac{2}{3}} = 9.9$

PTS: 2 REF: 081532a2 STA: A2.A.61 TOP: Arc Length
KEY: radius

404 ANS:

$y = 10.596(1.586)^x$

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

405 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

406 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

407 ANS:

$30700 = 50e^{3t}$

$614 = e^{3t}$

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

$\ln 614 = 3t \ln e$

$\ln 614 = 3t$

$2.14 \approx t$

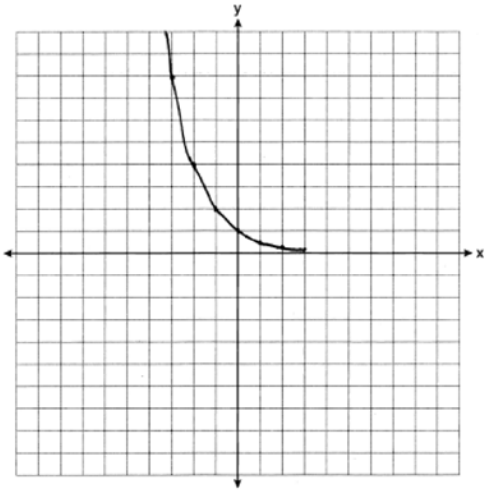
PTS: 2 REF: 011333a2 STA: A2.A.6 TOP: Exponential Growth

408 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

409 ANS:



$y = 0$

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

410 ANS:

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

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

411 ANS:

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

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

412 ANS:

$(x+1)^3 = 64$

$x+1=4$

$x=3$

PTS: 2 REF: 061531a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

413 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

414 ANS:

$2xi(i-4i^2) = 2xi^2 - 8xi^3 = 2xi^2 - 8xi^3 = -2x + 8xi$

PTS: 2 REF: 011533a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

415 ANS:

$\sec x = \sqrt{2}$

$\cos x = \frac{1}{\sqrt{2}}$

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

$x = 45°, 315°$

PTS: 2 REF: 061434a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

416 ANS:

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

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

417 ANS:

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

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

418 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

419 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

420 ANS:

$25 \cdot 6 = 30q$

$5 = q$

PTS: 2 REF: 011528a2 STA: A2.A.5 TOP: Inverse Variation

421 ANS:

$${}_6C_5\left(\frac{2}{5}\right)^5\left(\frac{3}{5}\right) = 6\left(\frac{32}{3125}\right)\left(\frac{3}{5}\right) = \frac{576}{15,625}$$

PTS: 2 REF: 011532a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

422 ANS:

$-4x + 5 < 13 \quad -4x + 5 > -13 \quad -2 < x < 4.5$

$-4x < 8 \qquad -4x > -18$

$x > -2 \qquad x < 4.5$

PTS: 2 REF: 011432a2 STA: A2.A.1 TOP: Absolute Value Inequalities

423 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

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

424 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

425 ANS:

$r_A \approx 0.976\ r_B \approx 0.994$ Set B has the stronger linear relationship since r is higher.

PTS: 2 REF: 061535a2 STA: A2.S.8 TOP: Correlation Coefficient

426 ANS:

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

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

427 ANS:

$xi^8 - yi^6 = x(1) - y(-1) = x + y$

PTS: 2 REF: 061533a2 STA: A2.N.7 TOP: Imaginary Numbers

428 ANS:

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

PTS: 2 REF: 081533a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

429 ANS:

$x^2(x-6) - 25(x-6)$

$(x^2 - 25)(x-6)$

$(x+5)(x-5)(x-6)$

PTS: 2 REF: 061532a2 STA: A2.A.7 TOP: Factoring by Grouping

430 ANS:

$594 = 32 \cdot 46 \sin C$

$\frac{594}{1472} = \sin C$

$23.8 \approx C$

PTS: 2 REF: 011535a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

431 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

432 ANS:

$x(x+3) = 10$

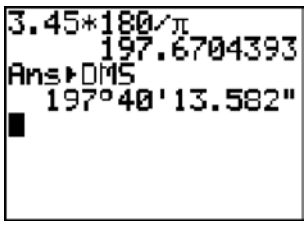
$x^2 + 3x - 10 = 0$

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

$x = -5, 2$

PTS: 2 REF: 011431a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

433 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

434 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

435 ANS:

7.4

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

436 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

437 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

438 ANS:

Sum $\frac{-b}{a} = \frac{-2}{3}$. Product $\frac{c}{a} = \frac{k}{3}$

PTS: 2 REF: 061534a2 STA: A2.A.20 TOP: Roots of Quadratics

439 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

440 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

441 ANS:

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

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

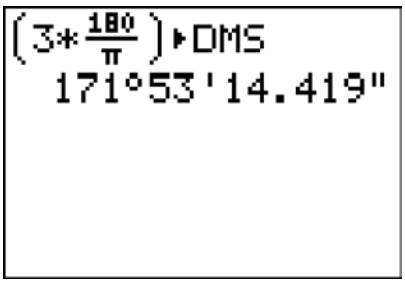
442 ANS:

$$\frac{5}{11}\pi\left(\frac{180}{\pi}\right) = 81°49'$$

PTS: 2 REF: 011531a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

443 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

444 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

445 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

446 ANS:

$$(5x - 1)^{\frac{1}{3}} = 4$$
$$5x - 1 = 64$$
$$5x = 65$$
$$x = 13$$

PTS: 2 REF: 061433a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

447 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

448 ANS:

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

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

449 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

450 ANS:

$$\frac{(6 - x)(6 + x)}{(x + 6)(x + 6)} \cdot \frac{(x + 6)(x - 3)}{x - 3} = 6 - x$$

PTS: 2 REF: 011529a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: division

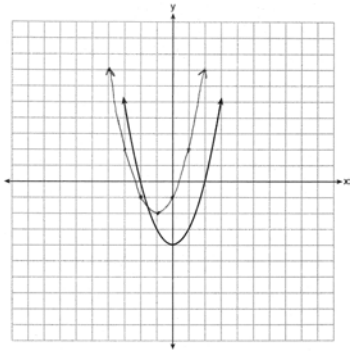
451 ANS:
$K = ab\sin C = 24 \cdot 30 \sin 57 \approx 604$

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

452 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

453 ANS:



PTS: 2 REF: 061435a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

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

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

455 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

456 ANS:
$x - 1 + x - 4 + x - 9 + x - 16 = 4x - 30$

PTS: 2 REF: 081535a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

457 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

458 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

459 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

460 ANS:

$$2.5 \cdot \frac{180}{\pi} \approx 143°14'$$

PTS: 2 REF: 061431a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

461 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

462 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

463 ANS:

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

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

464 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

465 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

466 ANS:

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

$-4 = 3x - 1$

$-3 = 3x$

$-1 = x$

PTS: 2 REF: 081529a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base shown

467 ANS:

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

PTS: 2 REF: 081530a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

468 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

469 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.67 TOP: Proving Trigonometric Identities

470 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

471 ANS:

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

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

472 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

473 ANS:

41,040.

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

474 ANS:

$b^2 - 4ac = 0$

$k^2 - 4(1)(4) = 0$

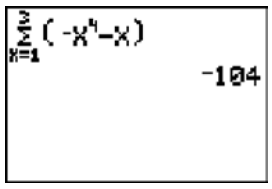
$k^2 - 16 = 0$

$(k+4)(k-4) = 0$

$k = \pm 4$

PTS: 2 REF: 061028a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine equation given nature of roots

475 ANS:



−104.

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

476 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

477 ANS:

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

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

478 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

479 ANS:

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

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

480 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

481 ANS:

$$\text{sd} = \frac{81-57}{3} = 8$$

$57 + 8 = 65$

$81 - 2(8) = 65$

PTS: 2 REF: 011534a2 STA: A2.S.5 TOP: Normal Distributions
KEY: mean and standard deviation

482 ANS:

$\ln e^{4x} = \ln 12$

$4x = \ln 12$

$x = \frac{\ln 12}{4}$

≈ 0.62

PTS: 2 REF: 011530a2 STA: A2.A.27 TOP: Exponential Equations
KEY: without common base

483 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

484 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

485 ANS:

$y = 180.377(0.954)^x$

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

486 ANS:

$y = 0.488(1.116)^x$

PTS: 2 REF: 061429a2 STA: A2.S.7 TOP: Exponential Regression

487 ANS:

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

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

488 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

489 ANS:

$2x - 3 > 5$ or $2x - 3 < -5$

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

$x > 4$ $\quad$ $x < -1$

PTS: 2 REF: 061430a2 STA: A2.A.1 TOP: Absolute Value Inequalities

490 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

Algebra 2/Trigonometry 4 Point Regents Exam Questions
Answer Section

491 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

492 ANS:

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

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

493 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

494 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

495 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

496 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

497 ANS:

$|3x - 5| < x + 17$ $3x - 5 < x + 17$ and $3x - 5 > -x - 17$ $-3 < x < 11$

$2x < 22$ $4x > -12$

$x < 11$ $x > -3$

PTS: 4 REF: 081538a2 STA: A2.A.1 TOP: Absolute Value Inequalities

498 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

499 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

500 ANS:

$\frac{13}{x}=10-x$. $x=\frac{10\pm\sqrt{100-4(1)(13)}}{2(1)}=\frac{10\pm\sqrt{48}}{2}=\frac{10\pm4\sqrt{3}}{2}=5\pm2\sqrt{3}$

$13=10x-x^2$

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

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

501 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

502 ANS:

$a_2=3(2)^{-2}=\frac{3}{4}$ $a_3=3\left(\frac{3}{4}\right)^{-2}=\frac{16}{3}$ $a_4=3\left(\frac{16}{3}\right)^{-2}=\frac{27}{256}$

PTS: 4 REF: 011537a2 STA: A2.A.33 TOP: Recursive Sequences

503 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

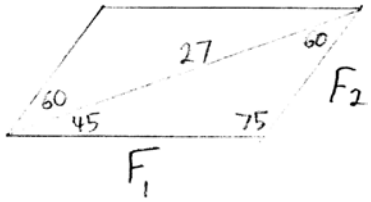
504 ANS:

$\sigma_x \approx 6.2$. 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

505 ANS:



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

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

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

506 ANS:

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

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

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

$4x^2 - 9 = 0$ or $2x + 1 = 0$

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

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

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

507 ANS:

$a = \sqrt{8^2 + 11^2 - 2(8)(11)\cos 82} \approx 12.67$. The angle opposite the shortest side: $\frac{8}{\sin x} = \frac{12.67}{\sin 82}$

$x \approx 38.7$

PTS: 4 REF: 081536a2 STA: A2.A.73 TOP: Law of Cosines
KEY: advanced

508 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

509 ANS:

5.17 84.46 ± 5.17

$79.29 - 89.63$

$5 + 7 + 5 = 17$

PTS: 4 REF: 061538a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced, group frequency distributions

510 ANS:

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

$a \approx 10.3$

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

511 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

512 ANS:

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

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

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

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

513 ANS:

$$\frac{3}{x}+\frac{x}{x+2}=-\frac{2}{x+2}$$

$$\frac{x+2}{x+2}=-\frac{3}{x}$$

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

$$x=-3$$

PTS: 4 REF: 061537a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

514 ANS:

$$28^2=47^2+34^2-2(47)(34)\cos A$$

$$784=3365-3196\cos A$$

$$-2581=-3196\cos A$$

$$\frac{2581}{3196}=\cos A$$

$$36\approx A$$

PTS: 4 REF: 061536a2 STA: A2.A.73 TOP: Law of Cosines
KEY: find angle

515 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

516 ANS:

$y=733.646(0.786)^x$ $733.646(0.786)^{12}\approx 41$

PTS: 4 REF: 011536a2 STA: A2.S.7 TOP: Exponential Regression

517 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

518 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

519 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

520 ANS:

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

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

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

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

$x = \pm 2, -5$

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

521 ANS:

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

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

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

522 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

523 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

524 ANS:

$$\frac{1 + \frac{3}{x}}{1 - \frac{5}{x} - \frac{24}{x^2}} \cdot \frac{x^2}{x^2} = \frac{x^2 + 3x}{x^2 - 5x - 24} = \frac{x(x+3)}{(x-8)(x+3)} = \frac{x}{x-8}$$

PTS: 4 REF: 061436a2 STA: A2.A.17 TOP: Complex Fractions

525 ANS:

$a = 3, b = 2, c = 1$ $y = 3\cos 2x + 1.$

PTS: 2 REF: 011538a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

526 ANS:

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

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

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

$x = \pm 2, \frac{1}{2}$

PTS: 4 REF: 081537a2 STA: A2.A.26 TOP: Solving Polynomial Equations

527 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

528 ANS:

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

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

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

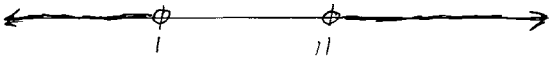
$\cos^2 B = \frac{16}{41}$

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

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

529 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

530 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

531 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

532 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

Algebra 2/Trigonometry 6 Point Regents Exam Questions
Answer Section

533 ANS:

$$5\cos\theta - 2\sec\theta + 3 = 0$$

$$5\cos\theta - \frac{2}{\cos\theta} + 3 = 0$$

$$5\cos^2\theta + 3\cos\theta - 2 = 0$$

$$(5\cos\theta - 2)(\cos\theta + 1) = 0$$

$$\cos\theta = \frac{2}{5}, -1$$

$$\theta \approx 66.4, 293.6, 180$$

PTS: 6 REF: 061539a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

534 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

535 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

536 ANS:

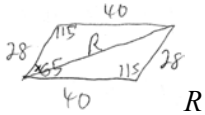
$(x+14)(x+22)=800$ $x=\dfrac{-36\pm\sqrt{(-36)^2-4(1)(-492)}}{2(1)}=\dfrac{-36+\sqrt{3264}}{2}\approx 10.6$ 10 feet increase.

$x^2+36x+308=800$

$x^2+36x-492=0$

PTS: 6 REF: 011539a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

537 ANS:



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

$x\approx 39$

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

538 ANS:

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

$C\approx 33$

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

539 ANS:

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

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

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

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

540 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

541 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

542 ANS:

$\log_2\left(\frac{x^2 - 7x + 12}{2x - 10}\right) = 3$ $x = \frac{23 \pm \sqrt{(-23)^2 - 4(1)(92)}}{2(1)} \approx 17.84, 5.16$

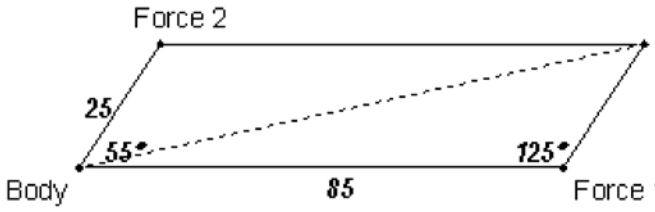
$$\frac{x^2 - 7x + 12}{2x - 10} = 8$$

$$x^2 - 7x + 12 = 16x - 80$$

$$x^2 - 23x + 92 = 0$$

PTS: 6 REF: 081539a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: applying properties of logarithms

543 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

544 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

545 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

546 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