JEFFERSON MATH PROJECT
REGENTS BY TYPE

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

www.jmap.org

Dear Sir

I have to acknolege the reciept of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensible as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.
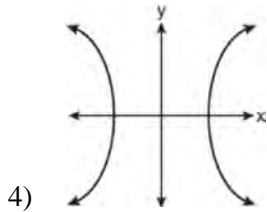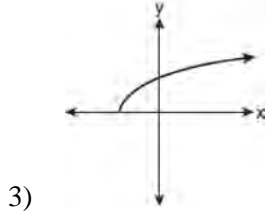
Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions

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

1)

2)

3)

4)
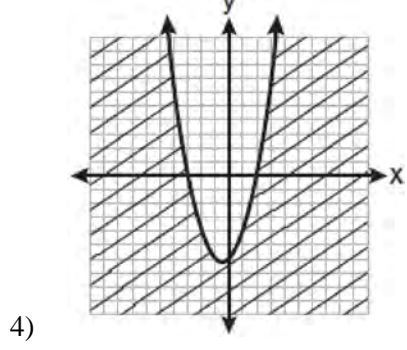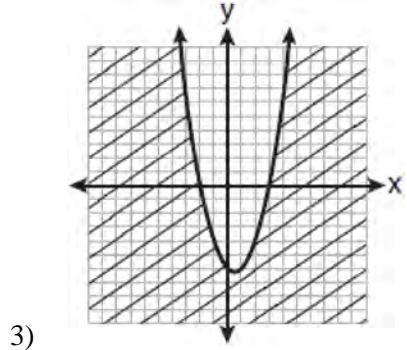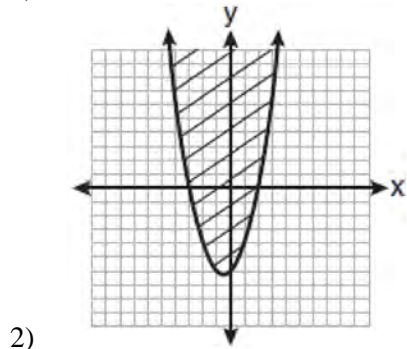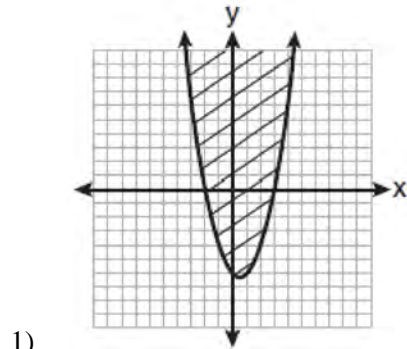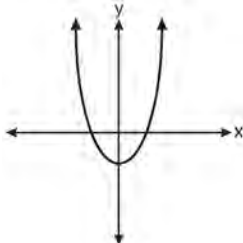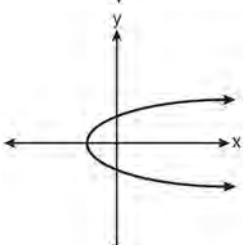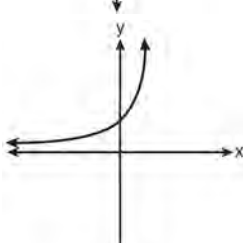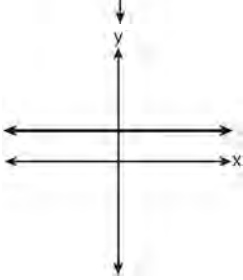
2 Which graph does *not* represent a function?

1)

2)

3)

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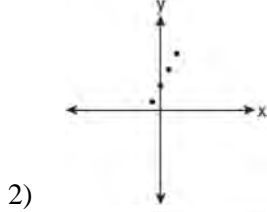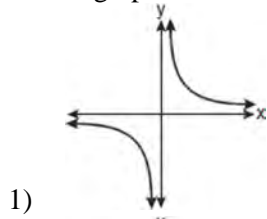
3 Which task is *not* a component of an observational study?
   1) The researcher decides who will make up the sample.
   2) The researcher analyzes the data received from the sample.
   3) The researcher gathers data from the sample, using surveys or taking measurements.
   4) The researcher divides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

1

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

1)

2)

3)

4)

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

6 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

7 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

8 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

9 Which function is one-to-one?
1) $k(x) = x^2 + 2$
2) $g(x) = x^3 + 2$
3) $f(x) = |x| + 2$
4) $j(x) = x^4 + 2$

10 The graph of $y = f(x)$ is shown below.
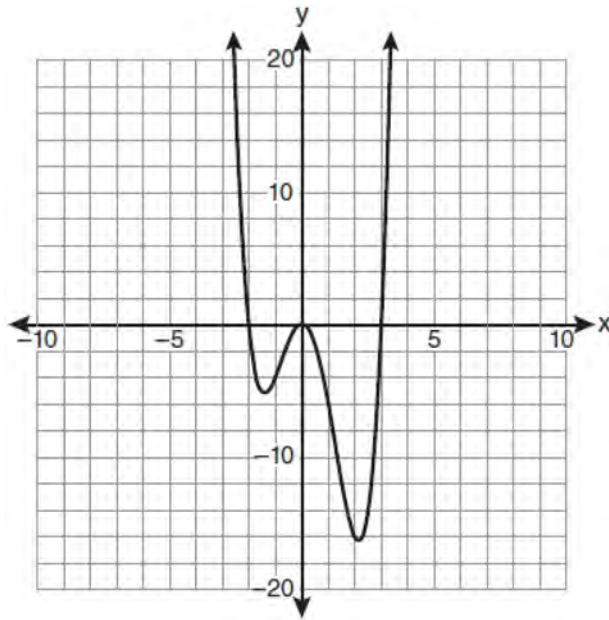
Which set lists all the real solutions of $f(x) = 0$?
1) $\{-3, 2\}$
2) $\{-2, 3\}$
3) $\{-3, 0, 2\}$
4) $\{-2, 0, 3\}$

11 Which expression is equivalent to $\dfrac{\sqrt{3} + 5}{\sqrt{3} - 5}$?

1) $-\dfrac{14 + 5\sqrt{3}}{11}$

2) $-\dfrac{17 + 5\sqrt{3}}{11}$

3) $\dfrac{14 + 5\sqrt{3}}{14}$

4) $\dfrac{17 + 5\sqrt{3}}{14}$

12 What is the domain of the function
$f(x) = \sqrt{x - 2} + 3$?
1) $(-\infty, \infty)$
2) $(2, \infty)$
3) $[2, \infty)$
4) $[3, \infty)$

13 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

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

15 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

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

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

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

18 In which interval of $f(x) = \cos(x)$ is the inverse also a function?
1) $-\dfrac{\pi}{2} < x < \dfrac{\pi}{2}$
2) $-\dfrac{\pi}{2} \le x \le \dfrac{\pi}{2}$
3) $0 \le x \le \pi$
4) $\dfrac{\pi}{2} \le x \le \dfrac{3\pi}{2}$

19 The expression $2\log x - (3\log y + \log z)$ is equivalent to
1) $\log \dfrac{x^2}{y^3 z}$
2) $\log \dfrac{x^2 z}{y^3}$
3) $\log \dfrac{2x}{3yz}$
4) $\log \dfrac{2xz}{3y}$

20 Which summation represents $5 + 7 + 9 + 11 + \ldots + 43$?
1) $\displaystyle\sum_{n=5}^{43} n$
2) $\displaystyle\sum_{n=1}^{20} (2n+3)$
3) $\displaystyle\sum_{n=4}^{24} (2n-3)$
4) $\displaystyle\sum_{n=3}^{23} (3n-4)$

21 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

22 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

23 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

24 Which graph represents the equation $y = \cos^{-1}x$?
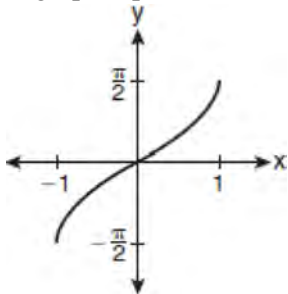
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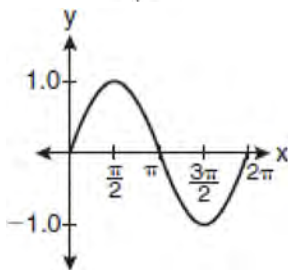
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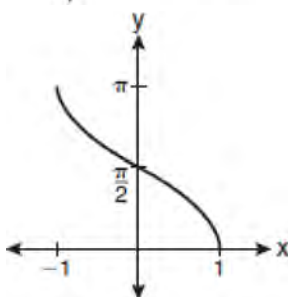
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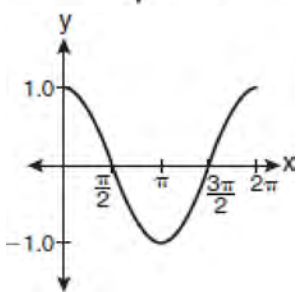
4)

25 Which graph represents a relation that is *not* a function?
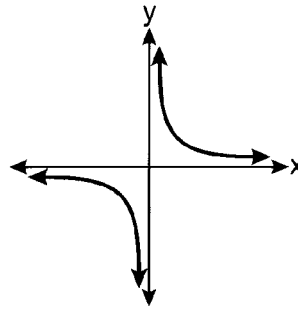
1)
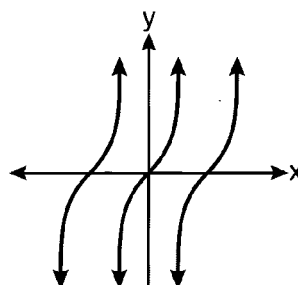
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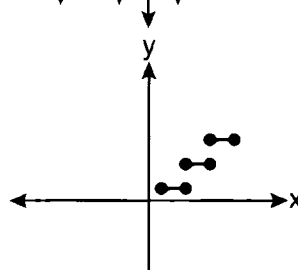
3)
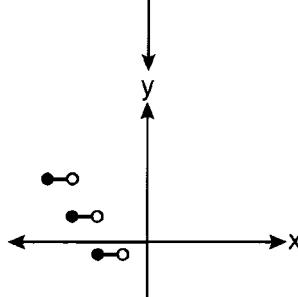
4)

26 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

27 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
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

28 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

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

30 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) $2x^2 - 6x + 4 = 0$

31 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

32 What is the domain of the function shown below?
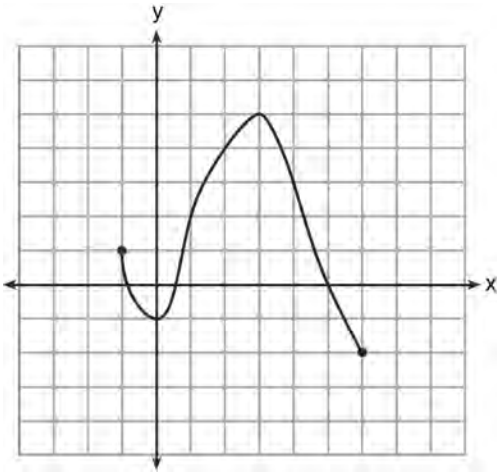
1) $-1 \le x \le 6$
2) $-1 \le y \le 6$
3) $-2 \le x \le 5$
4) $-2 \le y \le 5$

33 When $x^{-1} - 1$ is divided by $x - 1$, the quotient is
1) -1
2) $-\dfrac{1}{x}$
3) $\dfrac{1}{x^2}$
4) $\dfrac{1}{(x-1)^2}$

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

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

35 The expression $(x^2 - 1)^{-\frac{2}{3}}$ is equivalent to
1) $\sqrt[3]{(x^2 - 1)^2}$
2) $\dfrac{1}{\sqrt[3]{(x^2 - 1)^2}}$
3) $\sqrt{(x^2 - 1)^3}$
4) $\dfrac{1}{\sqrt{(x^2 - 1)^3}}$

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

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

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

38 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) $\{60°, 300°\}$

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

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

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

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

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

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

42 In the diagram below of right triangle JTM, $JT = 12$, $JM = 6$, and $m\angle JMT = 90$.
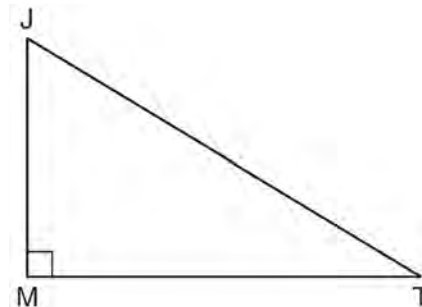
What is the value of $\cot J$?

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

43 Twenty different cameras will be assigned to several boxes. Three cameras will be randomly selected and assigned to box A. Which expression can be used to calculate the number of ways that three cameras can be assigned to box A?

1) $20!$
2) $\dfrac{20!}{3!}$
3) $_{20}C_3$
4) $_{20}P_3$

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

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

45 What is the solution set of the equation
$|4a + 6| - 4a = -10$?
1) $\varnothing$
2) $\{0\}$
3) $\left\{\dfrac{1}{2}\right\}$
4) $\left\{0, \dfrac{1}{2}\right\}$

47 Which equation has roots with the sum equal to $\dfrac{9}{4}$
and the product equal to $\dfrac{3}{4}$?
1) $4x^2 + 9x + 3 = 0$
2) $4x^2 + 9x - 3 = 0$
3) $4x^2 - 9x + 3 = 0$
4) $4x^2 - 9x - 3 = 0$

46 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

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

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

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

51 What is the fifteenth term of the sequence
$5, -10, 20, -40, 80, \ldots$?
1) $-163,840$
2) $-81,920$
3) $81,920$
4) $327,680$

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

53 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) $4x^8y^{28}$

54 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

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

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

57 The graph of $y = x^3 - 4x^2 + x + 6$ is shown below.
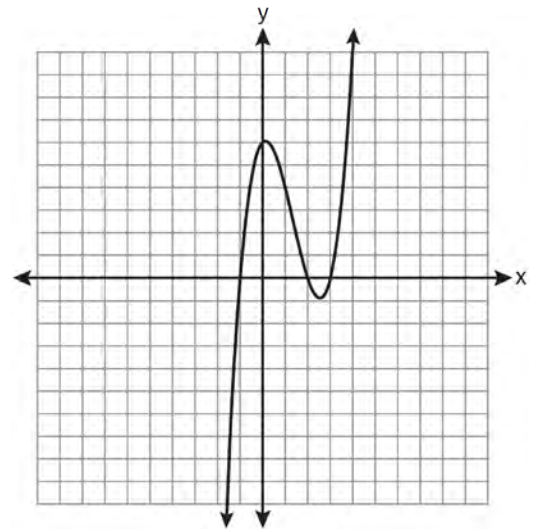
What is the product of the roots of the equation
$x^3 - 4x^2 + x + 6 = 0$?
1) -36
2) -6
3) 6
4) 4

58 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

59 The expression $x^{-\frac{2}{5}}$ is equivalent to
1) $-\sqrt[2]{x^5}$
2) $-\sqrt[5]{x^2}$
3) $\dfrac{1}{\sqrt[2]{x^5}}$
4) $\dfrac{1}{\sqrt[5]{x^2}}$

60 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

61 What is the number of degrees in an angle whose measure is 2 radians?
1) $\dfrac{360}{\pi}$
2) $\dfrac{\pi}{360}$
3) 360
4) 90

62 Which graph represents the solution set of $|6x - 7| \le 5$?
1)
2)
3)
4)
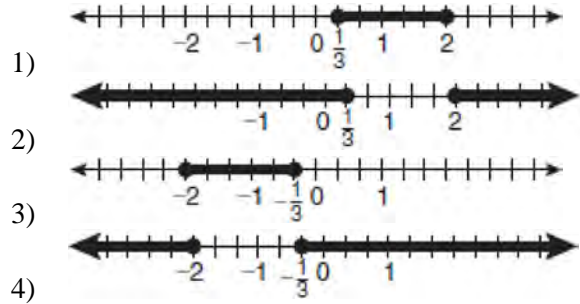
63 If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to
1) $\dfrac{1}{2} \log 5a$
2) $\dfrac{1}{2} \log 6 + \log a$
3) $\log 6 + \log a$
4) $\log 6 + 2\log a$

64 Which function is one-to-one?
1) $f(x) = |x|$
2) $f(x) = 2^x$
3) $f(x) = x^2$
4) $f(x) = \sin x$

65 For which equation does the sum of the roots equal $\dfrac{3}{4}$ 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) $4x^2 + 3x - 2 = 0$

11

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

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

67 Which equation is represented by the graph below?
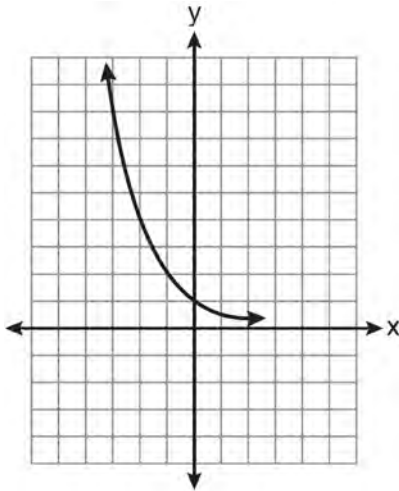
1) $y = 5^x$
2) $y = 0.5^x$
3) $y = 5^{-x}$
4) $y = 0.5^{-x}$

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

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

69 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) $0,-1,-2$

70 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) $(-6,-3)$

71 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

72 The graph below shows the function f(x).
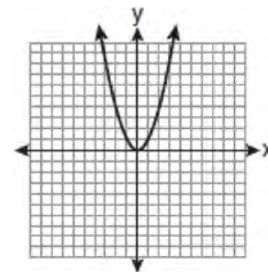
Which graph represents the function $f(x+2)$?

1)

2)

3)

4)

74 If $f(x) = \dfrac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?
1) -13
2) 3.5
3) 3
4) 6

75 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
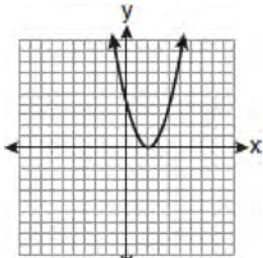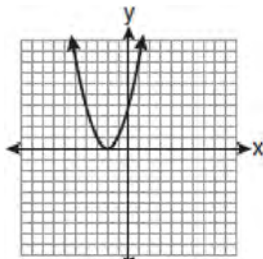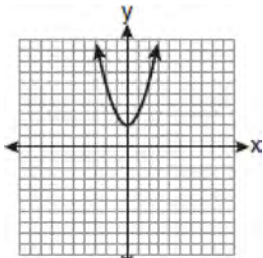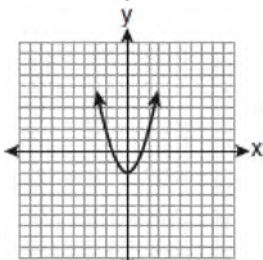
73 The lengths of 100 pipes have a normal distribution with a mean of 102.4 inches and a standard deviation of 0.2 inch. If one of the pipes measures exactly 102.1 inches, its length lies
1)   below the 16th percentile
2)   between the 50th and 84th percentiles
3)   between the 16th and 50th percentiles
4)   above the 84th percentile

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

13

77 The expression $\log_8 64$ is equivalent to
1) 8
2) 2
3) $\frac{1}{2}$
4) $\frac{1}{8}$

78 The conjugate of the complex expression $-5x + 4i$
is
1) $5x - 4i$
2) $5x + 4i$
3) $-5x - 4i$
4) $-5x + 4i$

79 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) $\dfrac{_{15}C_2 \cdot {_5}C_1}{_{30}C_3}$
2) $\dfrac{_{15}P_2 \cdot {_5}P_1}{_{30}C_3}$
3) $\dfrac{_{15}C_2 \cdot {_5}C_1}{_{30}P_3}$
4) $\dfrac{_{15}P_2 \cdot {_5}P_1}{_{30}P_3}$

80 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?
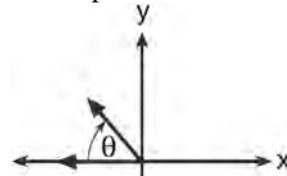
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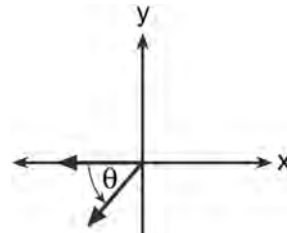
2)
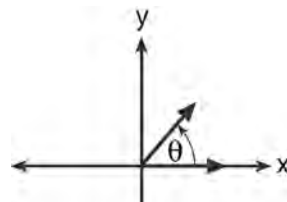
3)
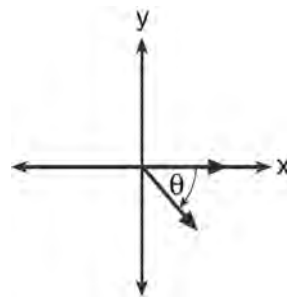
4)

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

14

82 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*?
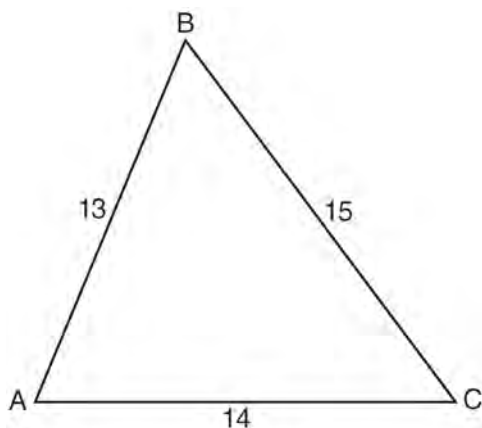
1) 53
2) 59
3) 67
4) 127

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

1) $\dfrac{3}{4}$

2) $\dfrac{64}{81}$

3) $\dfrac{4}{3}$

4) $\dfrac{37}{3}$

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

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

15

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

1)

2)

3)

4)
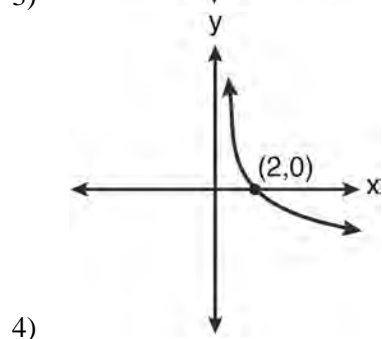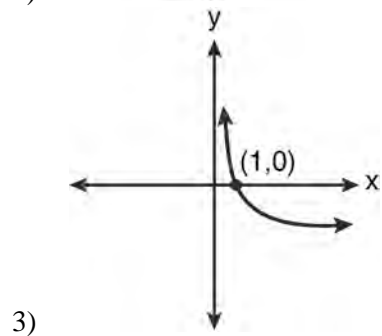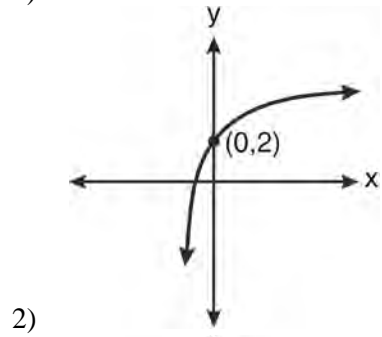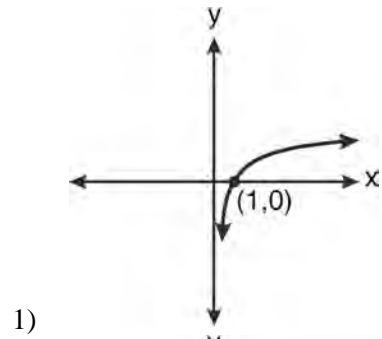
86 If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?
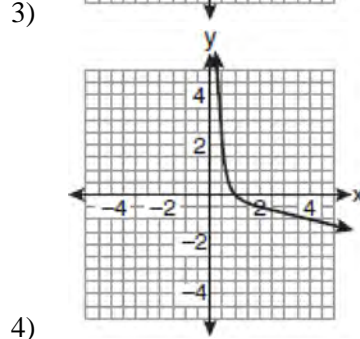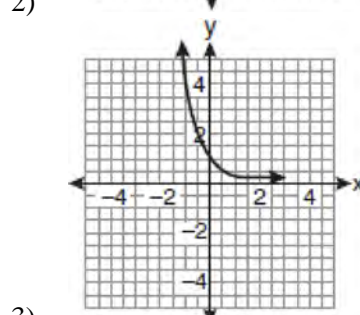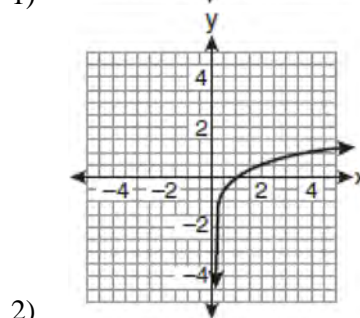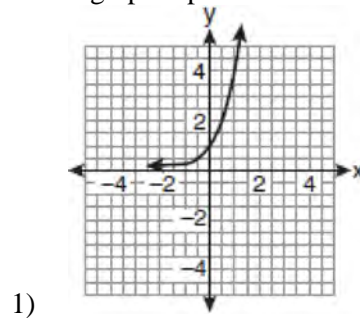
1)

2)

3)

4)

16

87 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

88 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%

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

90 In which graph is θ coterminal with an angle of $-70°$?
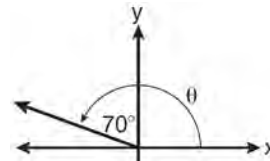
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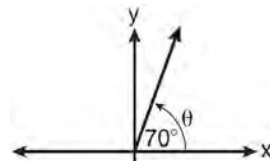
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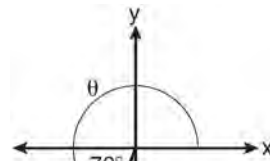
3)
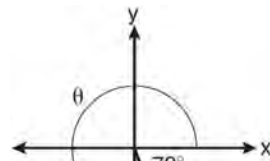
4)

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

1) $-\dfrac{9}{8}$

2) -1

3) $-\dfrac{8}{9}$

4) $\dfrac{8}{9}$

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

1) 0.5

2) 0.4

3) 0.33

4) 0.25

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

1) -1.3407

2) -1.3408

3) -1.3548

4) -1.3549

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

1) $-\dfrac{5}{2}$

2) $-\dfrac{5}{42}$

3) $\dfrac{5}{58}$

4) $\dfrac{5}{18}$

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

1) $\dfrac{3 \pm 3i\sqrt{3}}{2}$

2) $\dfrac{3 \pm 3i\sqrt{5}}{2}$

3) $\dfrac{-3 \pm 3\sqrt{5}}{2}$

4) $\dfrac{3 \pm 3\sqrt{5}}{2}$

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

1) $\{1,3\}$

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

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

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

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

1) $\sin x$

2) $\sin 7x$

3) $\cos x$

4) $\cos 7x$

98 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) $16384\sqrt{10}$

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

100 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) $2x^4y^2$

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

102 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) $\{(0,1),(1,0),(2,0),(3,2)\}$

103 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

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

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

106 What is the value of x in the equation $9^{3x+1} = 27^{x+2}$?
1) 1
2) $\dfrac{1}{3}$
3) $\dfrac{1}{2}$
4) $\dfrac{4}{3}$

19

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

1)

2)

3)

4)
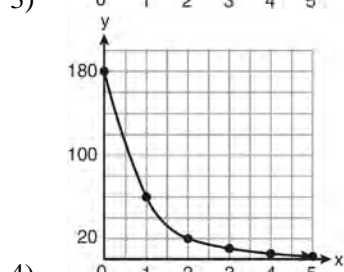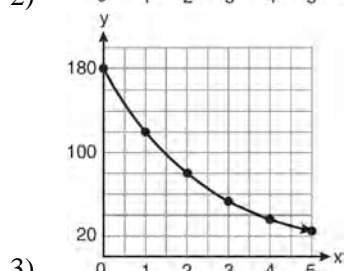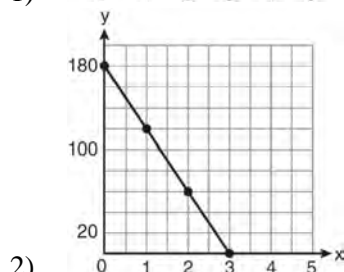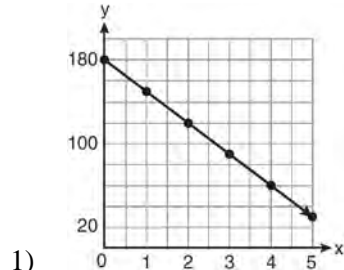
108 A sequence has the following terms: $a_1 = 4$, $a_2 = 10$, $a_3 = 25$, $a_4 = 62.5$. Which formula represents the nth term in the sequence?
1) $a_n = 4 + 2.5n$
2) $a_n = 4 + 2.5(n-1)$
3) $a_n = 4(2.5)^n$
4) $a_n = 4(2.5)^{n-1}$

109 If $\angle A$ is acute and $\tan A = \dfrac{2}{3}$, then
1) $\cot A = \dfrac{2}{3}$
2) $\cot A = \dfrac{1}{3}$
3) $\cot(90° - A) = \dfrac{2}{3}$
4) $\cot(90° - A) = \dfrac{1}{3}$

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

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

112 Which is a graph of $y = \cot x$?
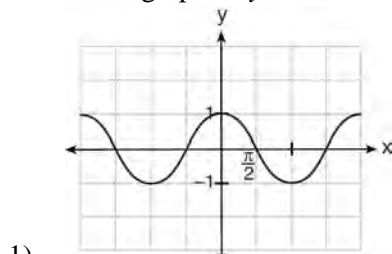
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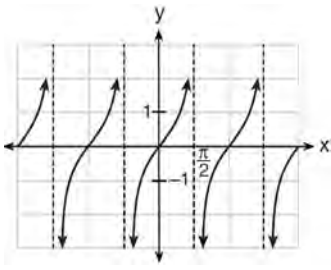
2)
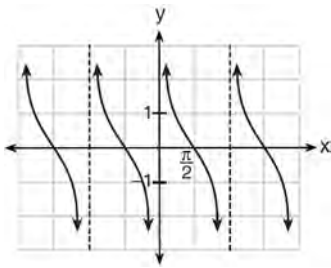
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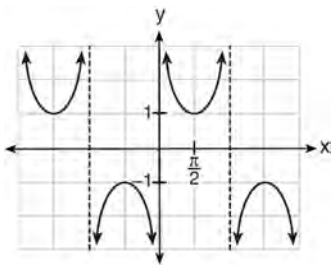
4)

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

114 The roots of the equation $9x^2 + 3x - 4 = 0$ are
1) imaginary
2) real, rational, and equal
3) real, rational, and unequal
4) real, irrational, and unequal

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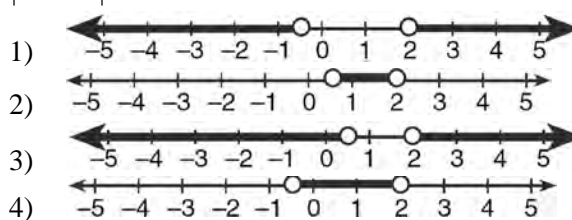
1)

2)

3)

4)

116 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) $-6, 2$

117 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) $\left\{ x \mid -\dfrac{\pi}{2} < x < \dfrac{\pi}{2} \right\}$
4) $\left\{ x \mid -\dfrac{\pi}{2} < x < \dfrac{3\pi}{2} \right\}$

118 The expression $\dfrac{4}{5-\sqrt{13}}$ is equivalent to

1) $\dfrac{4\sqrt{13}}{5\sqrt{13}-13}$

2) $\dfrac{4(5-\sqrt{13})}{38}$

3) $\dfrac{5+\sqrt{13}}{3}$

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

119 Which ratio represents $\csc A$ in the diagram below?
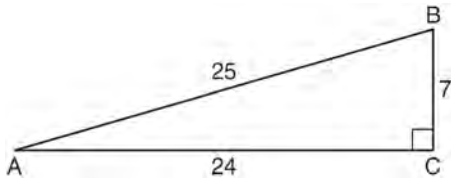
1) $\dfrac{25}{24}$

2) $\dfrac{25}{7}$

3) $\dfrac{24}{7}$

4) $\dfrac{7}{24}$

120 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

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

1) $a_n = 6\left(\dfrac{1}{3}\right)^n$

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

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

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

122 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) $3\sin^2 x$

123 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) $\dfrac{8!}{4!}$
3) $\dfrac{8!}{2!+2!}$
4) $\dfrac{8!}{2! \cdot 2!}$

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

   1)   6.4

   2)   2.56

   3) $\dfrac{9}{5}$

   4) $\dfrac{8}{5}$

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

   1) π

   2) $\dfrac{2\pi}{3}$

   3) $\dfrac{3\pi}{2}$

   4) 2π

125 Which equation is represented by the graph below?
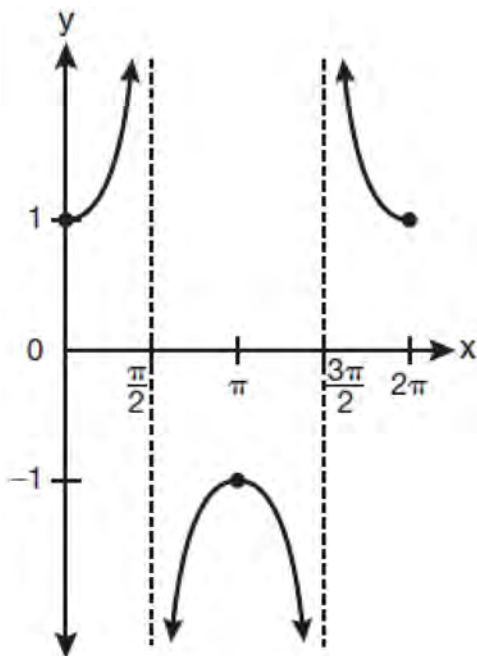
   1) $y = \cot x$

   2) $y = \csc x$

   3) $y = \sec x$

   4) $y = \tan x$

127 The fraction $\dfrac{3}{\sqrt{3a^2b}}$ is equivalent to

   1) $\dfrac{1}{a\sqrt{b}}$

   2) $\dfrac{\sqrt{b}}{ab}$

   3) $\dfrac{\sqrt{3b}}{ab}$

   4) $\dfrac{\sqrt{3}}{a}$

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

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

   1)   60°, 240°

   2)   72°, 252°

   3)   72°, 108°, 252°, 288°

   4)   60°, 120°, 240°, 300°

130 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

131 What are the domain and the range of the function shown in the graph below?
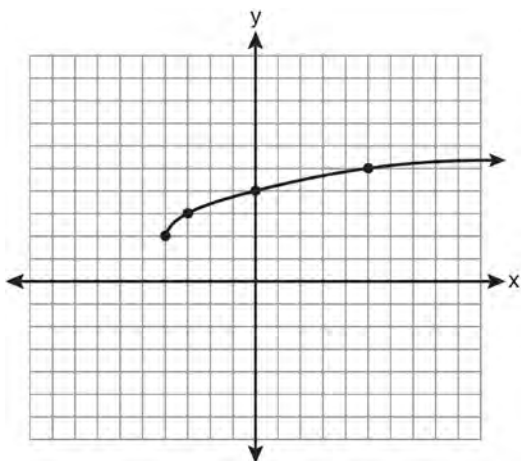
1) $\{x|x > -4\}; \{y|y > 2\}$
2) $\{x|x \geq -4\}; \{y|y \geq 2\}$
3) $\{x|x > 2\}; \{y|y > -4\}$
4) $\{x|x \geq 2\}; \{y|y \geq -4\}$

132 The roots of the equation $2x^2 + 7x - 3 = 0$ are
1) $-\dfrac{1}{2}$ and -3
2) $\dfrac{1}{2}$ and 3
3) $\dfrac{-7 \pm \sqrt{73}}{4}$
4) $\dfrac{7 \pm \sqrt{73}}{4}$

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

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

24

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

136 Which graph does *not* represent a function?
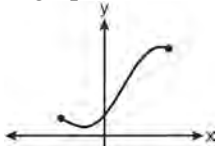
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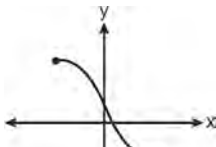
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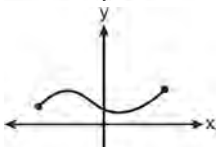
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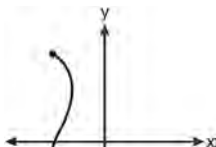
4)

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

138 Which equation represents the circle shown in the graph below that passes through the point $(0,-1)$?
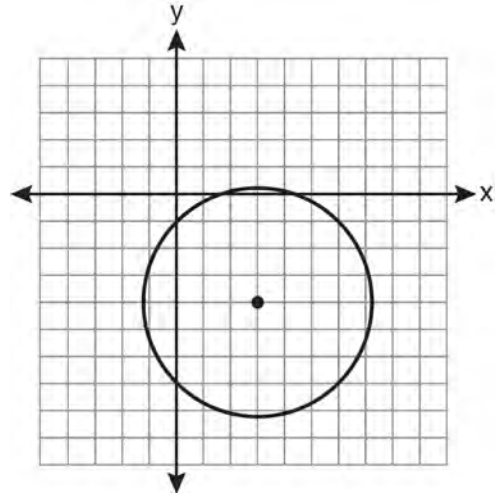
 1) $(x-3)^2 + (y+4)^2 = 16$
 2) $(x-3)^2 + (y+4)^2 = 18$
 3) $(x+3)^2 + (y-4)^2 = 16$
 4) $(x+3)^2 + (y-4)^2 = 18$

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

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

1) $\dfrac{8}{5}$

2) -3

3) 3

4) 9

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

1) $\cos^2\theta$

2) $\sin^2\theta$

3) $\sec^2\theta$

4) $\csc^2\theta$

142 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

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

1) 1

2) -1

3) i

4) $-i$

144 Which graph shows $y = \cos^{-1}x$?
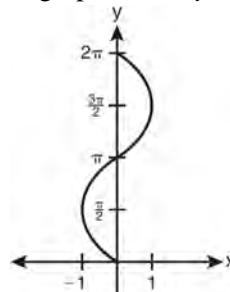
1)
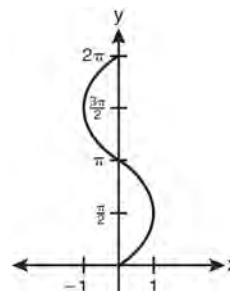
2)
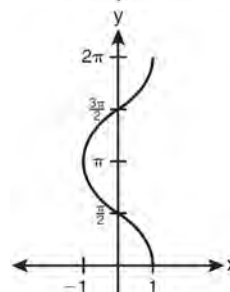
3)
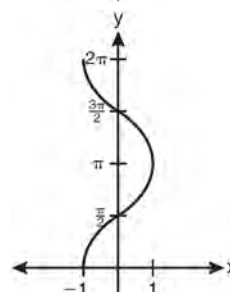
4)

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

146 Which equation is graphed in the diagram below?
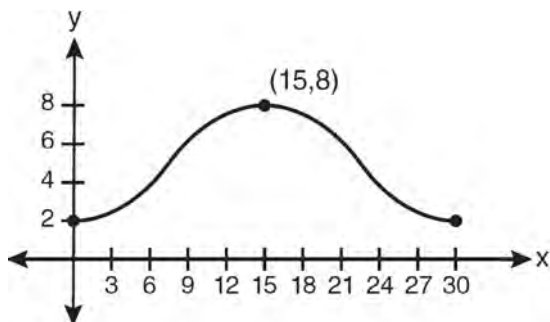
1) $y = 3\cos\left(\dfrac{\pi}{30}x\right) + 8$

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

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

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

147 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

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

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

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

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

149 What is the solution set of the equation
$3x^5 - 48x = 0$?
1) $\{0, \pm2\}$
2) $\{0, \pm2, 3\}$
3) $\{0, \pm2, \pm2i\}$
4) $\{\pm2, \pm2i\}$

150 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

27

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

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

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

154 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

155 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) $\displaystyle\sum_{k=1}^{20}(2k-1)$

2) $\displaystyle\sum_{k=2}^{40}(k-1)$

3) $\displaystyle\sum_{k=-1}^{37}(k+2)$

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

156 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 $(e,1)$.

28

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

$\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$
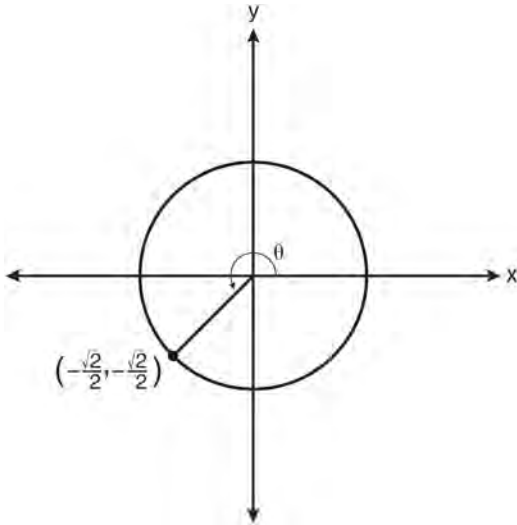
What is $m\angle\theta$?
1)   45
2)   135
3)   225
4)   240

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

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

160 What is the coefficient of the fourth term in the expansion of $(a - 4b)^9$?
1) $-5,376$
2) -336
3) 336
4) $5,376$

161 If $\sin^{-1}\left(\dfrac{5}{8}\right) = A$, then
1) $\sin A = \dfrac{5}{8}$
2) $\sin A = \dfrac{8}{5}$
3) $\cos A = \dfrac{5}{8}$
4) $\cos A = \dfrac{8}{5}$

162 What is the radian measure of the smaller angle formed by the hands of a clock at 7 o'clock?
1) $\dfrac{\pi}{2}$
2) $\dfrac{2\pi}{3}$
3) $\dfrac{5\pi}{6}$
4) $\dfrac{7\pi}{6}$

163 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

164 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) $\dfrac{25}{64}$
2) $\dfrac{45}{512}$
3) $\dfrac{75}{512}$
4) $\dfrac{225}{512}$

165 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) $\cos x + \sin x$

166 What is the conjugate of $-2 + 3i$?
1) $-3 + 2i$
2) $-2 - 3i$
3) $2 - 3i$
4) $3 + 2i$

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

168 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) $17 = \dfrac{119 + x}{x}$
2) $17 = \dfrac{119 + 16x}{x}$
3) $17 = \dfrac{446 + x}{26 + x}$
4) $17 = \dfrac{446 + 16x}{26 + x}$

169 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

30

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

171 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

172 What is the radian measure of an angle whose measure is $-420°$?
1) $-\dfrac{7\pi}{3}$
2) $-\dfrac{7\pi}{6}$
3) $\dfrac{7\pi}{6}$
4) $\dfrac{7\pi}{3}$

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

174 Which equation is sketched in the diagram below?
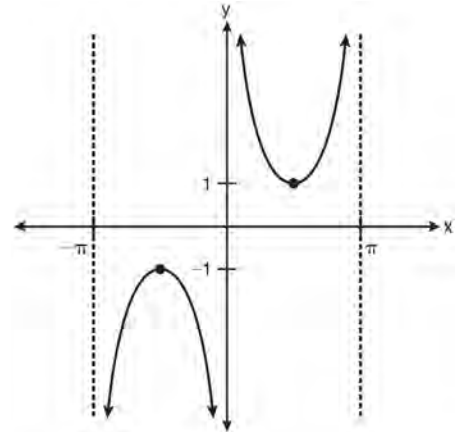
1) $y = \csc x$
2) $y = \sec x$
3) $y = \cot x$
4) $y = \tan x$

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

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

177 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) $\dfrac{3\pi}{4}$

2) π

3) $\dfrac{3\pi}{2}$

4) 3π

178 The expression $\dfrac{2x+4}{\sqrt{x+2}}$ is equivalent to

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

2) $\dfrac{(2x+4)\sqrt{x-2}}{x-4}$

3) $2\sqrt{x-2}$

4) $2\sqrt{x+2}$

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

1) $\dfrac{4}{7}$

2) -2

3) $\dfrac{7}{2}$

4) 4

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

1) -1.3376

2) -1.3408

3) 1.5012

4) 1.5057

181 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) $\{x \mid x < -5 \text{ or } x > 2\}$

182 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.
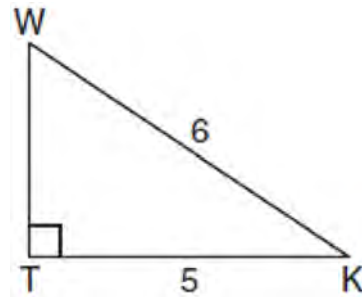
What is the measure of $\angle K$, to the *nearest minute*?

1) $33°33'$

2) $33°34'$

3) $33°55'$

4) $33°56'$

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

1)

2)

3)

4)
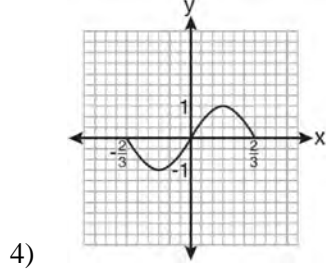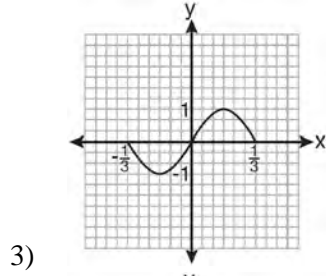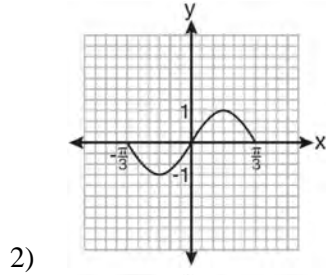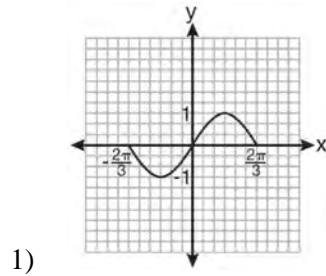
184 The expression $4ab\sqrt{2b} - 3a\sqrt{18b^3} + 7ab\sqrt{6b}$ is equivalent to

1) $2ab\sqrt{6b}$
2) $16ab\sqrt{2b}$
3) $-5ab + 7ab\sqrt{6b}$
4) $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

185 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 $\frac{2\pi}{3}$.
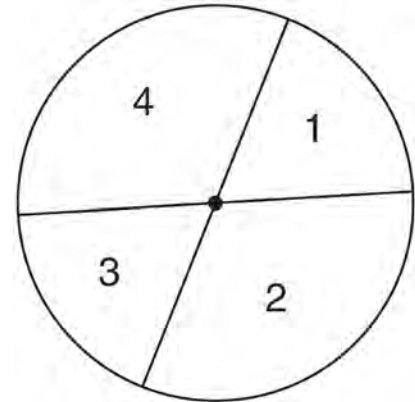
If darts thrown at this board are equally likely to land anywhere on the board, what is the probability that a dart that hits the board will land in either sector 1 or sector 3?

1) $\frac{1}{6}$

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

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

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

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

187 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) $2x^2(2x+3)(3x-2)$

188 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) $\dfrac{7}{2}$

2) $\dfrac{49}{4}$

3) $\dfrac{49}{2}$

4) 49

189 If p varies inversely as q, and $p = 10$ when $q = \dfrac{3}{2}$,

what is the value of p when $q = \dfrac{3}{5}$?

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

Algebra 2/Trigonometry 2 Point Regents Exam Questions

190 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.
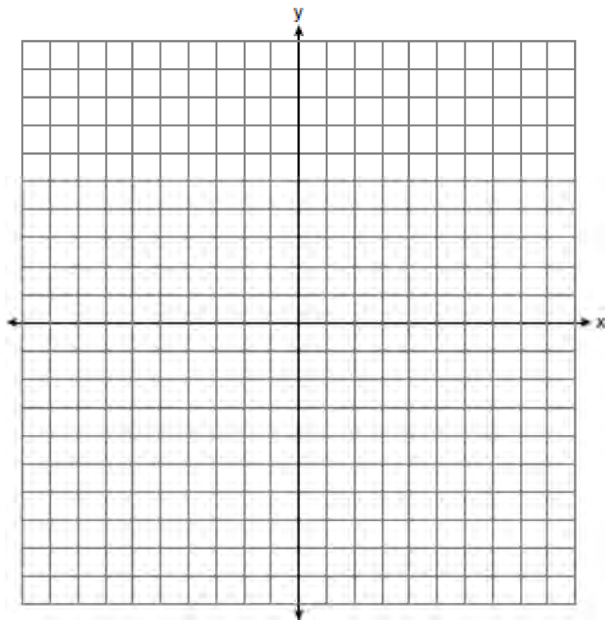
191 A blood bank needs twenty people to help with a blood drive. Twenty-five people have volunteered. Find how many different groups of twenty can be formed from the twenty-five volunteers.

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

193 Solve for x: $\dfrac{4x}{x-3} = 2 + \dfrac{12}{x-3}$

194 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*.

195 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.

196 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.

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

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

199 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.

200 The graph below represents the function $y = f(x).$
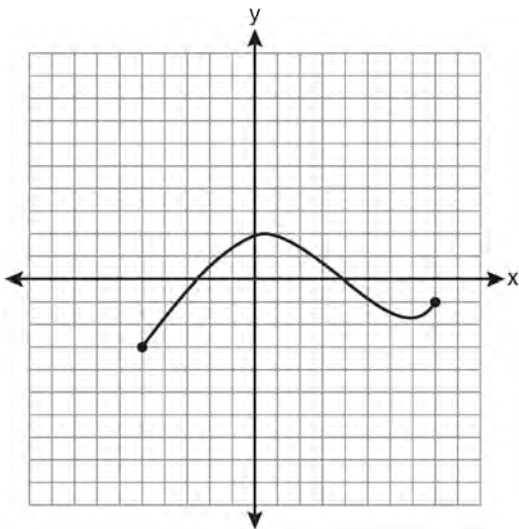
State the domain and range of this function.

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

202 Write an equation of the circle shown in the graph below.
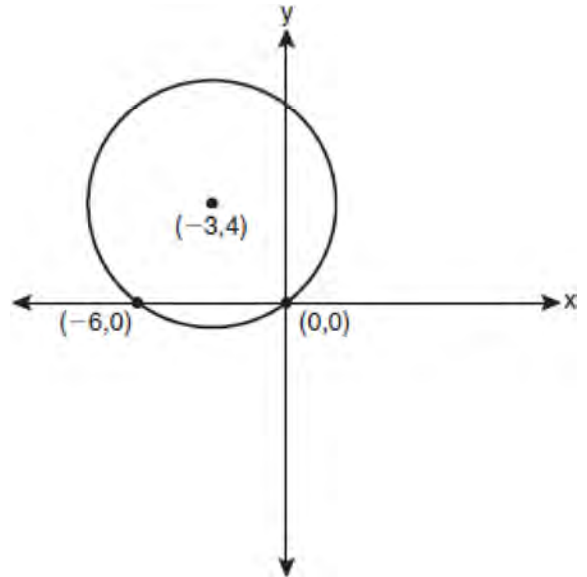
203 Find the first four terms of the recursive sequence defined below.

$$a_1 = -3$$

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

204 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.

205 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.
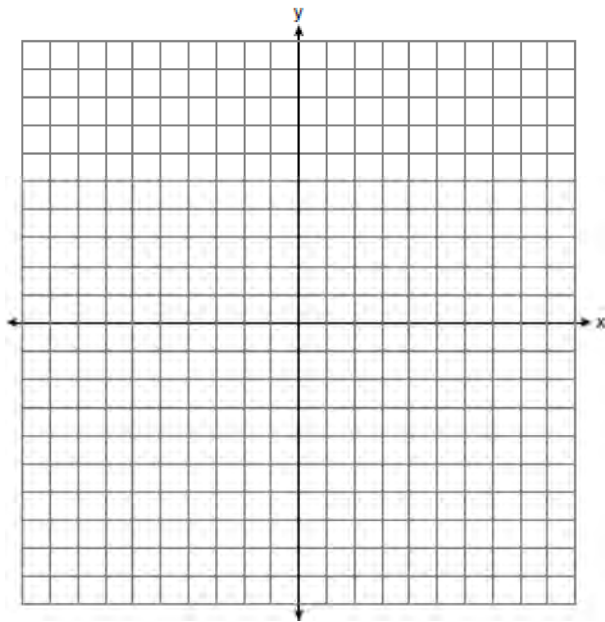
206 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

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

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

209 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)	0	2	4	6	8	10
Temperature in °F (y)	180.2	165.8	146.3	135.4	127.7	110.5

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

210 A circle shown in the diagram below has a center of $(-5, 3)$ and passes through point $(-1, 7)$.
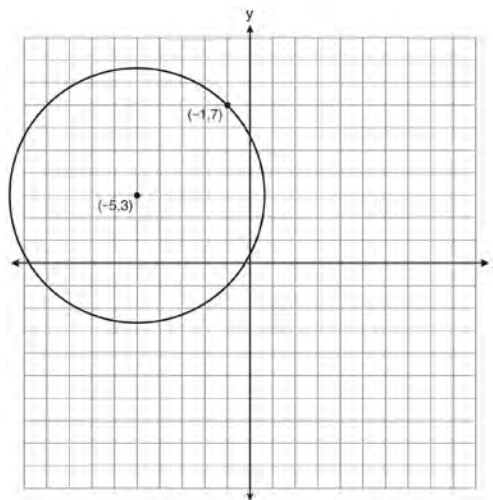
Write an equation that represents the circle.

211 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.*

212 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 $\sin 240°$.
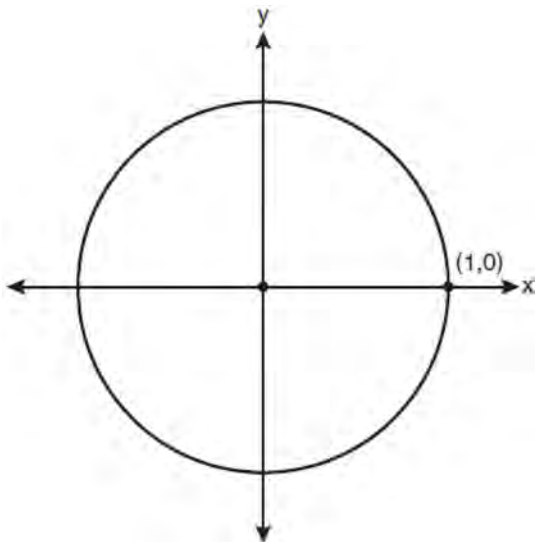
213 Solve algebraically for x: $4 - \sqrt{2x - 5} = 1$

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

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

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

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

218 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.

219 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.

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

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

222 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%.

223 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.*

224 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.

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

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

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

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

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

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

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

38
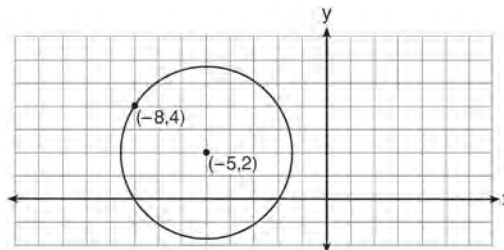
232 Evaluate: $\displaystyle\sum_{n=1}^{3}(-n^4-n)$

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

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

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

234 Express $\cos\theta(\sec\theta-\cos\theta)$, in terms of $\sin\theta$.
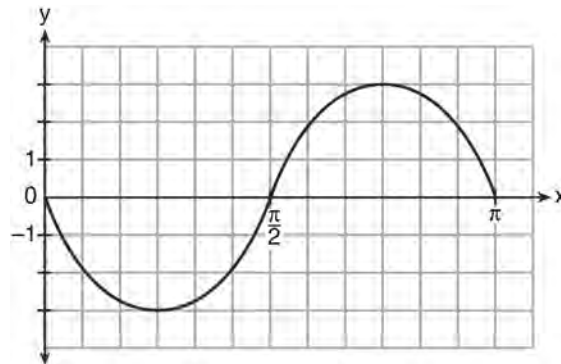
235 Express $\left(\dfrac{2}{3}x-1\right)^2$ as a trinomial.

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

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

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

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

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

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

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

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

Algebra 2/Trigonometry 4 Point Regents Exam Questions

246 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.

$$\begin{array}{ccccc} 25 & 55 & 40 & 65 & 29 \\ 45 & 59 & 35 & 25 & 37 \\ 52 & 30 & 8 & 40 & 55 \end{array}$$

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

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

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

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

250 The probability that a professional baseball player will get a hit is $\dfrac{1}{3}$. Calculate the exact probability that he will get *at least* 3 hits in 5 attempts.

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

252 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*.
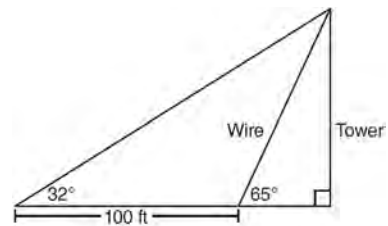
253 The probability that the Stormville Sluggers will win a baseball game is $\dfrac{2}{3}$. Determine the probability, to the *nearest thousandth*, that the Stormville Sluggers will win *at least* 6 of their next 8 games.

254 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.

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

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

257 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.

258 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.

259 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.

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

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

262 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.

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

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

265 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*.

266 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?

Algebra 2/Trigonometry 6 Point Regents Exam Questions

267 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.

268 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.]

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

270 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.

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

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

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

43

Algebra 2/Trigonometry Multiple Choice Regents Exam Questions
Answer Section

1 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

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

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

4 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

5 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

6 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

7 ANS: 4

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

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

8 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
9 ANS: 2   PTS: 2   REF: 061218a2   STA: A2.A.43
TOP: Defining Functions
10 ANS: 4   PTS: 2   REF: 061005a2   STA: A2.A.50
TOP: Solving Polynomial Equations
11 ANS: 1

$$\frac{\sqrt{3}+5}{\sqrt{3}-5} \cdot \frac{\sqrt{3}+5}{\sqrt{3}+5} = \frac{3+5\sqrt{3}+5\sqrt{3}+25}{3-25} = \frac{28+10\sqrt{3}}{-22} = -\frac{14+5\sqrt{3}}{11}$$

PTS: 2   REF: 061012a2   STA: A2.N.5   TOP: Rationalizing Denominators
12 ANS: 3   PTS: 2   REF: fall0923a2   STA: A2.A.39
TOP: Domain and Range   KEY: real domain
13 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
14 ANS: 2

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

PTS: 2   REF: 061002a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees
15 ANS: 1

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

$$A = 58$$

PTS: 2   REF: 011210a2   STA: A2.A.75   TOP: Law of Sines - The Ambiguous Case
16 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
17 ANS: 3   PTS: 2   REF: 081007a2   STA: A2.A.64
TOP: Using Inverse Trigonometric Functions   KEY: basic

18 ANS: 3   PTS: 2   REF: 061224a2   STA: A2.A.63
    TOP: Domain and Range
19 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
20 ANS: 2   PTS: 2   REF: 061205a2   STA: A2.A.34
    TOP: Sigma Notation
21 ANS: 1
    $_{10}C_4 = 210$

    PTS: 2   REF: 061113a2   STA: A2.S.11   TOP: Combinations
22 ANS: 4   PTS: 2   REF: 011201a2   STA: A2.S.2
    TOP: Analysis of Data
23 ANS: 2   PTS: 2   REF: 061021a2   STA: A2.S.8
    TOP: Correlation Coefficient
24 ANS: 3   PTS: 2   REF: fall0913a2   STA: A2.A.65
    TOP: Graphing Trigonometric Functions
25 ANS: 3   PTS: 2   REF: 061114a2   STA: A2.A.38
    TOP: Defining Functions   KEY: graphs
26 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
27 ANS: 1
    (4) shows the strongest linear relationship, but if $r < 0$, $b < 0$.

    PTS: 2   REF: 011223a2   STA: A2.S.8   TOP: Correlation Coefficient
28 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

29 ANS: 3

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

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

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

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

30 ANS: 3

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

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

31 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

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

33 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

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

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

36 ANS: 2
The binomials are conjugates, so use FL.

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

37 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

38 ANS: 4
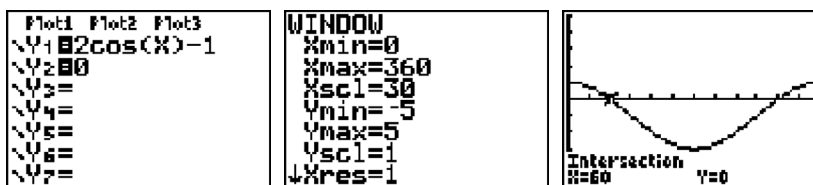
$2\cos\theta = 1$

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

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

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

39 ANS: 1
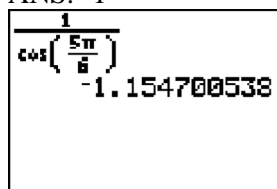
PTS: 2   REF: 011203a2   STA: A2.A.66   TOP: Determining Trigonometric Functions

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

41 ANS: 3

$_6C_3\left(\dfrac{x}{2}\right)^3(-2y)^3 = 20 \cdot \dfrac{x^3}{8} \cdot -8y^3 = -20x^3y^3$

PTS: 2   REF: 061215a2   STA: A2.A.36   TOP: Binomial Expansions

42 ANS: 1

$\sqrt{12^2 - 6^2} = \sqrt{108} = \sqrt{36}\sqrt{3} = 6\sqrt{3}.$ $\cot J = \dfrac{A}{O} = \dfrac{6}{6\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{\sqrt{3}}{3}$

PTS: 2   REF: 011120a2   STA: A2.A.55   TOP: Trigonometric Ratios

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

44 ANS: 4

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

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

$$15 = -30\cos A$$

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

$$120 = \cos A$$

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

45 ANS: 1

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

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

$$8 - 2 \neq -10$$

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

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

46 ANS: 1

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

47 ANS: 3

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

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

48 ANS: 3

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

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

6

49 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

50 ANS: 3

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

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

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

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

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

PTS: 2   REF: 061121a2   STA: A2.A.22   TOP: Solving Radicals
KEY: extraneous solutions

51 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

52 ANS: 2

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

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

53 ANS: 1

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

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

54 ANS: 2

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

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

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

55 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

56 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

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

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

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

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

59 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

60 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

61 ANS: 1

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

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

62 ANS: 1

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

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

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

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

63 ANS: 2

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

$2\log x = \log 6a^2$

$\log x = \dfrac{\log 6}{2} + \dfrac{\log a^2}{2}$

$\log x = \dfrac{1}{2}\log 6 + \dfrac{2\log a}{2}$

$\log x = \dfrac{1}{2}\log 6 + \log a$

PTS: 2   REF: 011224a2   STA: A2.A.19   TOP: Properties of Logarithms
KEY: splitting logs

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

65 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

66 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

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

68 ANS: 2

$\left(\dfrac{w^{-5}}{w^{-9}}\right)^{\frac{1}{2}} = (w^4)^{\frac{1}{2}} = w^2$

PTS: 2   REF: 081011a2   STA: A2.A.8   TOP: Negative and Fractional Exponents

69 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
70 ANS: 1   PTS: 2   REF: 081022a2   STA: A2.A.46
    TOP: Transformations with Functions and Relations
71 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
72 ANS: 2   PTS: 2   REF: fall0926a2   STA: A2.A.46
    TOP: Transformations with Functions and Relations
73 ANS: 1
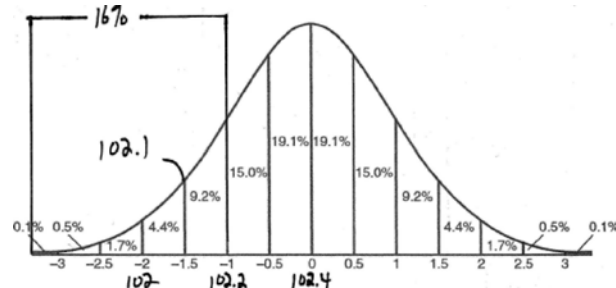
PTS: 2   REF: fall0915a2   STA: A2.S.5   TOP: Normal Distributions
    KEY: interval
74 ANS: 3

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

PTS: 2   REF: fall0902a2   STA: A2.A.42   TOP: Compositions of Functions
    KEY: numbers
75 ANS: 3   PTS: 2   REF: 061127a2   STA: A2.S.6
    TOP: Regression
76 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
77 ANS: 2

$$8^2 = 64$$

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

78 ANS: 3   PTS: 2   REF: 061219a2   STA: A2.N.8
     TOP: Conjugates of Complex Numbers
79 ANS: 1   PTS: 2   REF: 011117a2   STA: A2.S.9
     TOP: Differentiating Permutations and Combinations
80 ANS: 4   PTS: 2   REF: 061206a2   STA: A2.A.60
     TOP: Unit Circle
81 ANS: 4   PTS: 2   REF: 061112a2   STA: A2.A.39
     TOP: Domain and Range   KEY: real domain
82 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
83 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
84 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
85 ANS: 1   PTS: 2   REF: 061211a2   STA: A2.A.54
     TOP: Graphing Logarithmic Functions
86 ANS: 2

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

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

87 ANS: 3

```
1-Var Stats L1,L  σx²
2                 67.31102041
```

PTS: 2   REF: fall0924a2   STA: A2.S.4   TOP: Dispersion
KEY: variance

88 ANS: 3
34.1% + 19.1% = 53.2%

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

89 ANS: 2
$\cos(-305° + 360°) = \cos(55°)$

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

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

91 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

92 ANS: 1

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

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

93 ANS: 2

```
tan(126°43')
      -1.340788784
■
```

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

94 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

95 ANS: 4

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

PTS: 2   REF: 061009a2   STA: A2.A.25   TOP: Quadratic Formula

96 ANS: 3

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

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

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

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

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

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

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

98 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

99 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

100 ANS: 3

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

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

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

102 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

103 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

104 ANS: 3

$x = 5^4 = 625$

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

105 ANS: 2

$$4^{2x+5} = 8^{3x} \qquad .$$

$$\left(2^2\right)^{2x+5} = \left(2^3\right)^{3x}$$

$$2^{4x+10} = 2^{9x}$$

$$4x + 10 = 9x$$

$$10 = 5x$$

$$2 = x$$

PTS: 2   REF: 061105a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base not shown

106 ANS: 4

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

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

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

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

$$3x = 4$$

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

PTS: 2   REF: 081008a2   STA: A2.A.27   TOP: Exponential Equations
KEY: common base not shown

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

108 ANS: 4

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

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

109 ANS: 3

Cofunctions tangent and cotangent are complementary

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

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

    TOP: Conjugates of Complex Numbers

111 ANS: 3   PTS: 2   REF: 081027a2   STA: A2.A.44

    TOP: Inverse of Functions   KEY: equations

112 ANS: 3
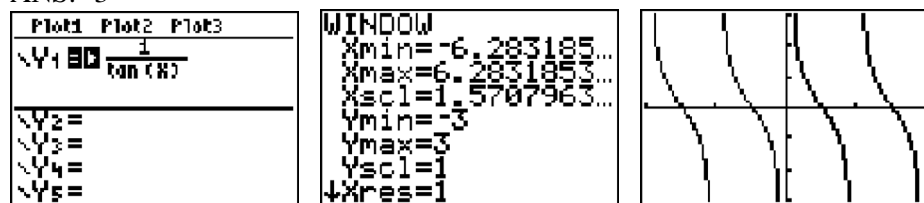
    PTS: 2   REF: 011207a2   STA: A2.A.71   TOP: Graphing Trigonometric Functions

113 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

114 ANS: 4

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

    PTS: 2   REF: 081016a2   STA: A2.A.2   TOP: Using the Discriminant

    KEY: determine nature of roots given equation

115 ANS: 3

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

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

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

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

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

    KEY: graph

116 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

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

118 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

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

120 ANS: 2

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

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

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

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

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

124 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

125 ANS: 3
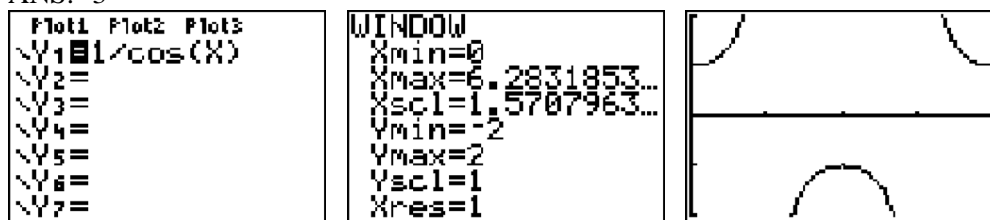
PTS: 2 REF: 061020a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

126 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

127 ANS: 3

$$\frac{3}{\sqrt{3a^2 b}} = \frac{3}{a\sqrt{3b}} \cdot \frac{\sqrt{3b}}{\sqrt{3b}} = \frac{3\sqrt{3b}}{3ab} = \frac{\sqrt{3b}}{ab}$$

PTS: 2 REF: 081019a2 STA: A2.A.15 TOP: Rationalizing Denominators
KEY: index = 2

128 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

129 ANS: 1

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

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

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

$\theta = 60, 240$
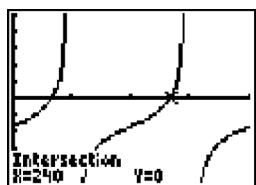
PTS: 2 REF: fall0903a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: basic

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

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

17

132 ANS: 3

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

　　　PTS: 2　　　　　REF: 081009a2　　　STA: A2.A.25　　　TOP: Quadratic Formula
133 ANS: 1　　　　　PTS: 2　　　　　REF: 061210a2　　　STA: A2.A.9
　　　TOP: Negative Exponents
134 ANS: 4　　　　　PTS: 2　　　　　REF: 061120a2　　　STA: A2.A.19
　　　TOP: Properties of Logarithms　　　KEY: splitting logs
135 ANS: 1　　　　　PTS: 2　　　　　REF: 061018a2　　　STA: A2.A.22
　　　TOP: Solving Radicals　　　　　KEY: extraneous solutions
136 ANS: 4　　　　　PTS: 2　　　　　REF: 011101a2　　　STA: A2.A.38
　　　TOP: Defining Functions　　　　KEY: graphs
137 ANS: 3　　　　　PTS: 2　　　　　REF: 011110a2　　　STA: A2.A.30
　　　TOP: Sequences
138 ANS: 2　　　　　PTS: 2　　　　　REF: 011126a2　　　STA: A2.A.49
　　　TOP: Equations of Circles
139 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
140 ANS: 3　　　　　PTS: 2　　　　　REF: 061001a2　　　STA: A2.A.30
　　　TOP: Sequences
141 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
142 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
143 ANS: 1　　　　　PTS: 2　　　　　REF: 061019a2　　　STA: A2.N.7
　　　TOP: Imaginary Numbers
144 ANS: 3　　　　　PTS: 2　　　　　REF: 061119a2　　　STA: A2.A.65
　　　TOP: Graphing Trigonometric Functions

145 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

146 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

147 ANS: 3

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

$$C \approx 78.3$$

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

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

149 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

150 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

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

152 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

153 ANS: 1
The binomials are conjugates, so use FL.

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

154 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

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

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

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

158 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

159 ANS: 4

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

160 ANS: 1

$$_9C_3\,a^6(-4b)^3 = -5376a^6b^3$$

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

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

162 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

163 ANS: 4

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

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

20

164 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

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

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

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

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

169 ANS: 4

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

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

170 ANS: 1

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

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

171 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

172 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

173 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

174 ANS: 1
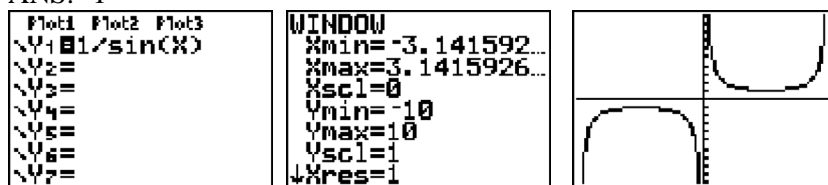
PTS: 2   REF: 011123a2   STA: A2.A.71   TOP: Graphing Trigonometric Functions

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

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

177 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

178 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

179 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

180 ANS: 4
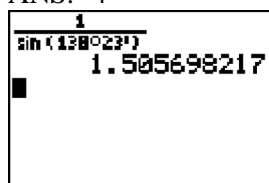
PTS: 2   REF: 061217a2   STA: A2.A.66   TOP: Determining Trigonometric Functions

181 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

182 ANS: 1

```
cos⁻¹(5/6)
        33.55730976
Ans▶DMS
        33°33'26.315"
■
```

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

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

$K \approx 33°33'$

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

183 ANS: 3

$\text{period} = \dfrac{2\pi}{b} = \dfrac{2\pi}{3\pi} = \dfrac{2}{3}$

PTS: 2   REF: 081026a2   STA: A2.A.70   TOP: Graphing Trigonometric Functions
KEY: recognize

184 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

185 ANS: 2
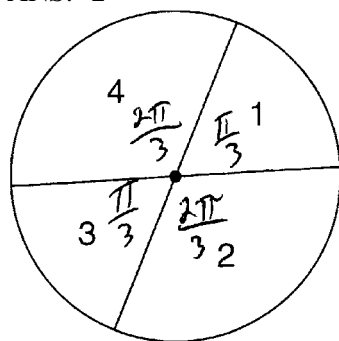
$$\frac{\frac{\pi}{3} + \frac{\pi}{3}}{2\pi} = \frac{\frac{2\pi}{3}}{2\pi} = \frac{1}{3}$$

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

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

187 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

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

189 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

Algebra 2/Trigonometry 2 Point Regents Exam Questions
Answer Section

190 ANS:
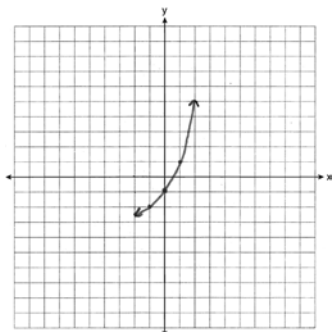
PTS: 2   REF: 011234a2   STA: A2.A.53   TOP: Graphing Exponential Functions

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

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

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

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

193 ANS:

no solution. $\dfrac{4x}{x-3} = 2 + \dfrac{12}{x-3}$

$$\frac{4x-12}{x-3} = 2$$

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

$$4 \neq 2$$

PTS: 2   REF: fall0930a2   STA: A2.A.23   TOP: Solving Rationals
KEY: rational solutions

194 ANS:
7.4
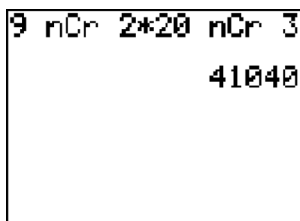
PTS: 2   REF: 061029a2   STA: A2.S.4   TOP: Dispersion
KEY: basic, group frequency distributions

195 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

196 ANS:

```
9 nCr 2*20 nCr 3
            41040
```

41,040.

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

197 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

198 ANS:

Sum $\dfrac{-b}{a} = -\dfrac{11}{5}$. Product $\dfrac{c}{a} = -\dfrac{3}{5}$

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

199 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

200 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

201 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

202 ANS:

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

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

203 ANS:
$-3, -5, -8, -12$

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

204 ANS:

2,298.65.

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

205 ANS:

$y = 0$
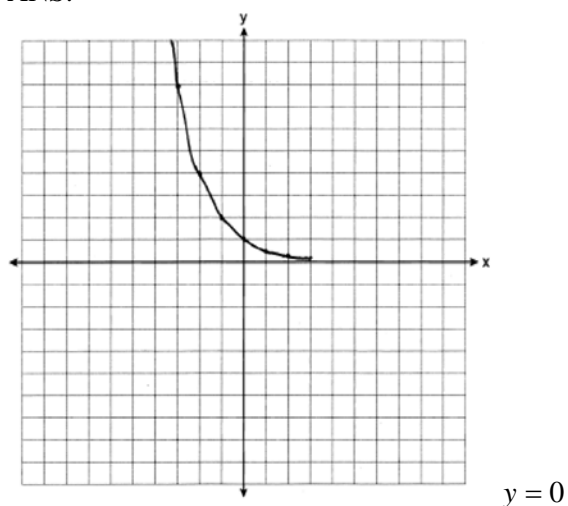
PTS: 2 REF: 061031a2 STA: A2.A.53 TOP: Graphing Exponential Functions

206 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

207 ANS:

$2.5 \cdot \dfrac{180}{\pi} \approx 143.2°$

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

208 ANS:

$$\frac{5(3+\sqrt{2})}{7}. \quad \frac{5}{3-\sqrt{2}} \times \frac{3+\sqrt{2}}{3+\sqrt{2}} = \frac{5(3+\sqrt{2})}{9-2} = \frac{5(3+\sqrt{2})}{7}$$

PTS: 2   REF: fall0928a2   STA: A2.N.5   TOP: Rationalizing Denominators

209 ANS:

$y = 180.377(0.954)^x$

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

210 ANS:

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

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

211 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

212 ANS:
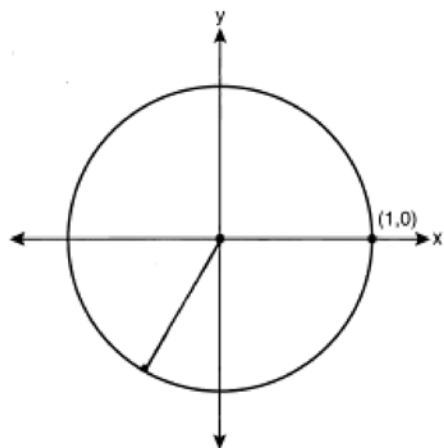
$-\dfrac{\sqrt{3}}{2}$

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

213 ANS:

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

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

$\quad\quad 2x-5 = 9$

$\quad\quad\quad 2x = 14$

$\quad\quad\quad\quad x = 7$

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

214 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

215 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

216 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

217 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

218 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

219 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

220 ANS:

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

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

221 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

222 ANS:

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

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

223 ANS:

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

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

224 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

225 ANS:

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

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

226 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

227 ANS:

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

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

228 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

229 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

230 ANS:

39,916,800. $\dfrac{_{12}P_{12}}{3! \cdot 2!} = \dfrac{479,001,600}{12} = 39,916,800$

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

231 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

232 ANS:

-104.

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

233 ANS:

$\dfrac{12x^2}{y^9}$. $\dfrac{3x^{-4}y^5}{(2x^3y^{-7})^{-2}} = \dfrac{3y^5(2x^3y^{-7})^2}{x^4} = \dfrac{3y^5(4x^6y^{-14})}{x^4} = \dfrac{12x^6y^{-9}}{x^4} = \dfrac{12x^2}{y^9}$

PTS: 2 REF: 061134a2 STA: A2.A.9 TOP: Negative Exponents

234 ANS:

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

PTS: 2 REF: 061230a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

235 ANS:

$\dfrac{4}{9}x^2 - \dfrac{4}{3}x + 1$. $\left(\dfrac{2}{3}x - 1\right)^2 = \left(\dfrac{2}{3}x - 1\right)\left(\dfrac{2}{3}x - 1\right) = \dfrac{4}{9}x^2 - \dfrac{2}{3}x - \dfrac{2}{3}x + 1 = \dfrac{4}{9}x^2 - \dfrac{4}{3}x + 1$

PTS: 2 REF: 081034a2 STA: A2.N.3 TOP: Operations with Polynomials

236 ANS:

197°40'. $3.45 \times \dfrac{180}{\pi} \approx 197°40'$.

PTS: 2   REF: fall0931a2   STA: A2.M.2   TOP: Radian Measure
KEY: degrees

237 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

238 ANS:
$x^2 - 6x - 27 = 0$, $\dfrac{-b}{a} = 6$. $\dfrac{c}{a} = -27$. If $a = 1$ then $b = -6$ and $c = -27$

PTS: 4   REF: 061130a2   STA: A2.A.21   TOP: Roots of Quadratics
KEY: basic

239 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

240 ANS:
$$\dfrac{\sqrt{108x^5 y^8}}{\sqrt{6xy^5}} = \sqrt{18x^4 y^3} = 3x^2 y \sqrt{2y}$$

PTS: 2   REF: 011133a2   STA: A2.A.14   TOP: Operations with Radicals
KEY: with variables | index = 2

241 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

242 ANS:
$$\dfrac{\dfrac{1}{2} - \dfrac{4}{d}}{\dfrac{1}{d} + \dfrac{3}{2d}} = \dfrac{\dfrac{d-8}{2d}}{\dfrac{2d+3d}{2d^2}} = \dfrac{d-8}{2d} \times \dfrac{2d^2}{5d} = \dfrac{d-8}{5}$$

PTS: 2   REF: 061035a2   STA: A2.A.17   TOP: Complex Fractions

243 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

244 ANS:

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

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

245 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

Algebra 2/Trigonometry 4 Point Regents Exam Questions
Answer Section

246 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
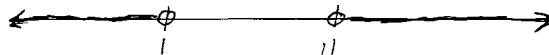KEY: advanced

247 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

248 ANS:

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

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

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

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

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

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

249 ANS:

$\dfrac{-(x^2-4)}{(x+4)(x+3)} \times \dfrac{x+3}{2(x-2)} = \dfrac{-(x+2)(x-2)}{x+4} \times \dfrac{1}{2(x-2)} = \dfrac{-(x+2)}{2(x+4)}$

PTS: 4   REF: 061236a2   STA: A2.A.16   TOP: Multiplication and Division of Rationals
KEY: division

250 ANS:

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

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

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

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

251 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

252 ANS:

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

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

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

253 ANS:

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

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

254 ANS:

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

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

255 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

256 ANS:

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

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

$\frac{x}{y} = \frac{32}{\frac{1}{25}} = 800$

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

257 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

258 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

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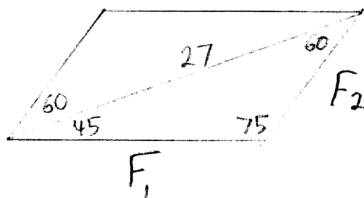
$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}.$ $\frac{27}{\sin 75} = \frac{F_2}{\sin 45}.$

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

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

260 ANS:

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

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

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

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

$\qquad\qquad\qquad 3x = 1$

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

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

261 ANS:

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

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

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

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

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

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

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

262 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

263 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

264 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

265 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

266 ANS:

0.167. $_{10}C_8 \cdot 0.6^8 \cdot 0.4^2 + {}_{10}C_9 \cdot 0.6^9 \cdot 0.4^1 + {}_{10}C_{10} \cdot 0.6^{10} \cdot 0.4^0 \approx 0.167$
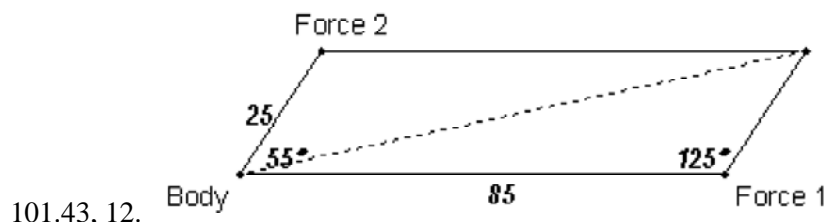
PTS: 4   REF: 061036a2   STA: A2.S.15   TOP: Binomial Probability
KEY: at least or at most

Algebra 2/Trigonometry 6 Point Regents Exam Questions
Answer Section

267 ANS:

101.43, 12.

$r^2 = 25^2 + 85^2 - 2(25)(85)\cos 125.$

$r^2 \approx 10287.7$

$r \approx 101.43$

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

$x \approx 12$

PTS: 6   REF: fall0939a2   STA: A2.A.73   TOP: Vectors

268 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

269 ANS:

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

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

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

$x = -\dfrac{9}{2}$ and $x = \dfrac{1}{2}$

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

PTS: 6   REF: 061139a2   STA: A2.A.3   TOP: Quadratic-Linear Systems
KEY: equations

270 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

271 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

272 ANS:

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

$$\frac{(x^2 + 6)(x - 3)}{x(x - 4)} \cdot \frac{2(x - 2)}{x^3(x - 3)} \cdot \frac{(4 + x)(4 - x)}{(x + 4)(x - 2)}$$

$$\frac{-2(x^2 + 6)}{x^4}$$

PTS: 6   REF: 011239a2   STA: A2.A.16   TOP: Multiplication and Division of Rationals
KEY: division

273 ANS:

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

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

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

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

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

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

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

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

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