JMAP
REGENTS BY PERFORMANCE INDICATOR: TOPIC

NY Algebra 2/Trigonometry Regents Exam Questions
from Fall 2009 to January 2014 Sorted by PI: Topic

www.jmap.org

TABLE OF CONTENTS

Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic

GRAPHS AND STATISTICS

A2.S.1-2: ANALYSIS OF DATA

1 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.

2 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.

3 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

4 A market research firm needs to collect data on viewer preferences for local news programming in Buffalo. Which method of data collection is most appropriate?
1 census
2 survey
3 observation
4 controlled experiment

5 A school cafeteria has five different lunch periods. The cafeteria staff wants to find out which items on the menu are most popular, so they give every student in the first lunch period a list of questions to answer in order to collect data to represent the school. Which type of study does this represent?
1 observation
2 controlled experiment
3 population survey
4 sample survey

6 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

7 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

A2.S.3: AVERAGE KNOWN WITH MISSING DATA

8 The number of minutes students took to complete a quiz is summarized in the table below.

Minutes	14	15	16	17	18	19	20
Number of Students	5	3	x	5	2	10	1

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

1 $17 = \frac{119 + x}{x}$

2 $17 = \frac{119 + 16x}{x}$

3 $17 = \frac{446 + x}{26 + x}$

4 $17 = \frac{446 + 16x}{26 + x}$

9 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

A2.S.4: DISPERSION

10 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*.

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

Statistics Class Averages

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

What is the population variance for this set of data?

1 8.2
2 8.3
3 67.3
4 69.3

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

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

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

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

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

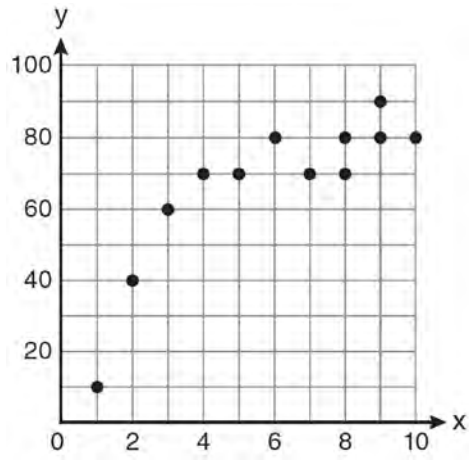
15 The following is a list of the individual points scored by all twelve members of the Webster High School basketball team at a recent game:

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

Find the interquartile range for this set of data.

A2.S.6-7: REGRESSION

16 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

17 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.

18 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.*

19 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.

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

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

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

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

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

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

A2.S.8: CORRELATION COEFFICIENT

22 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

23 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
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

24 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

25 The relationship between t, a student's test scores, and d, the student's success in college, is modeled by the equation $d = 0.48t + 75.2$. Based on this linear regression model, the correlation coefficient could be
1 between –1 and 0
2 between 0 and 1
3 equal to –1
4 equal to 0

26 Which value of r represents data with a strong positive linear correlation between two variables?
1 0.89
2 0.34
3 1.04
4 0.01

A2.S.5: NORMAL DISTRIBUTIONS

27 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

28 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

29 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.

30 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.

31 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%

32 In a certain high school, a survey revealed the mean amount of bottled water consumed by students each day was 153 bottles with a standard deviation of 22 bottles. Assuming the survey represented a normal distribution, what is the range of the number of bottled waters that approximately 68.2% of the students drink?
1 131 – 164
2 131 – 175
3 142 – 164
4 142 – 175

33 Liz has applied to a college that requires students to score in the top 6.7% on the mathematics portion of an aptitude test. The scores on the test are approximately normally distributed with a mean score of 576 and a standard deviation of 104. What is the minimum score Liz must earn to meet this requirement?
1 680
2 732
3 740
4 784

PROBABILITY

A2.S.10: PERMUTATIONS

34 Which formula can be used to determine the total number of different eight-letter arrangements that can be formed using the letters in the word *DEADLINE*?
1 $8!$
2 $\frac{8!}{4!}$
3 $\frac{8!}{2!+2!}$
4 $\frac{8!}{2!\cdot 2!}$

35 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.

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

37 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

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

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

40 Which expression represents the total number of different 11-letter arrangements that can be made using the letters in the word "MATHEMATICS"?
1 $\frac{11!}{3!}$
2 $\frac{11!}{2!+2!+2!}$
3 $\frac{11!}{8!}$
4 $\frac{11!}{2!\cdot 2!\cdot 2!}$

A2.S.11: COMBINATIONS

41 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

42 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

43 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.

44 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

A2.S.9: DIFFERENTIATING BETWEEN PERMUTATIONS AND COMBINATIONS

45 Twenty different cameras will be assigned to several boxes. Three cameras will be randomly selected and assigned to box A. Which expression can be used to calculate the number of ways that three cameras can be assigned to box A?
1 $20!$
2 $\frac{20!}{3!}$
3 ${}_{20}C_3$
4 ${}_{20}P_3$

46 Three marbles are to be drawn at random, without replacement, from a bag containing 15 red marbles, 10 blue marbles, and 5 white marbles. Which expression can be used to calculate the probability of drawing 2 red marbles and 1 white marble from the bag?
1 $\frac{{}_{15}C_2 \cdot {}_5C_1}{{}_{30}C_3}$
2 $\frac{{}_{15}P_2 \cdot {}_5P_1}{{}_{30}C_3}$
3 $\frac{{}_{15}C_2 \cdot {}_5C_1}{{}_{30}P_3}$
4 $\frac{{}_{15}P_2 \cdot {}_5P_1}{{}_{30}P_3}$

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

48 Which problem involves evaluating ${}_6P_4$?
1 How many different four-digit ID numbers can be formed using 1, 2, 3, 4, 5, and 6 without repetition?
2 How many different subcommittees of four can be chosen from a committee having six members?
3 How many different outfits can be made using six shirts and four pairs of pants?
4 How many different ways can one boy and one girl be selected from a group of four boys and six girls?

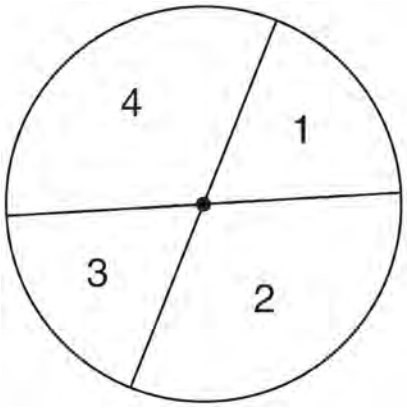
49 A math club has 30 boys and 20 girls. Which expression represents the total number of different 5-member teams, consisting of 3 boys and 2 girls, that can be formed?
1 ${}_{30}P_3 \cdot {}_{20}P_2$
2 ${}_{30}C_3 \cdot {}_{20}C_2$
3 ${}_{30}P_3 + {}_{20}P_2$
4 ${}_{30}C_3 + {}_{20}C_2$

A2.S.12: SAMPLE SPACE

50 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.

A2.S.13: GEOMETRIC PROBABILITY

51 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 $\frac{2}{3}$

A2.S.15: BINOMIAL PROBABILITY

52 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?

53 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.

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

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

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

1 $\frac{25}{64}$

2 $\frac{45}{512}$

3 $\frac{75}{512}$

4 $\frac{225}{512}$

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

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

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

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

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

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

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

ABSOLUTE VALUE

A2.A.1: ABSOLUTE VALUE EQUATIONS AND INEQUALITIES

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

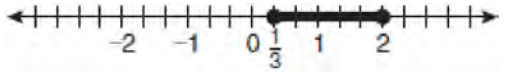
1 $\varnothing$

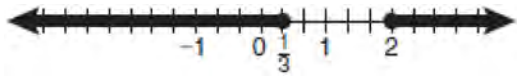
2 $\{0\}$

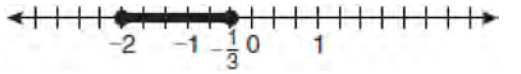
3 $\left\{\frac{1}{2}\right\}$

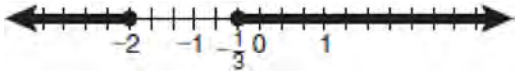
4 $\left\{0, \frac{1}{2}\right\}$

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

1 

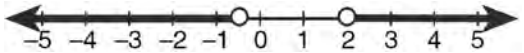
2 

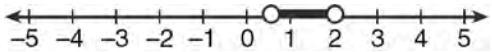
3 

4 

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

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

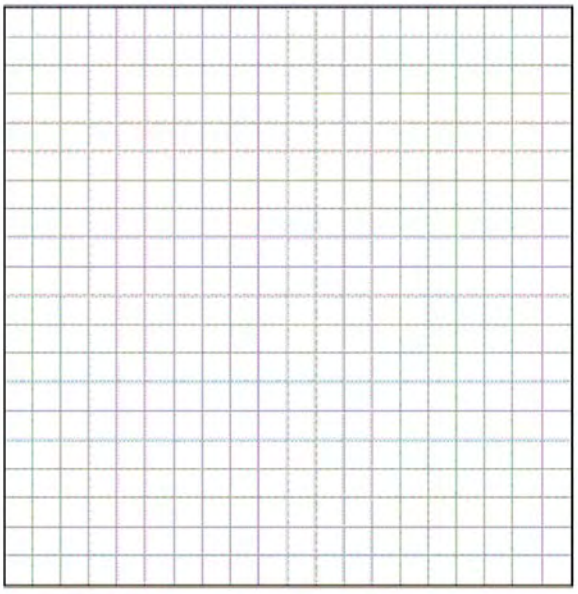
1 

2 

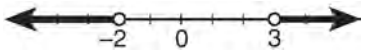
3 

4 

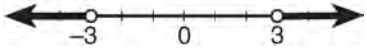
64 Determine the solution of the inequality $|3 - 2x| \geq 7$. [The use of the grid below is optional.]



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

1 

2 

3 

4 

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

QUADRATICS

A2.A.20-21: ROOTS OF QUADRATICS

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

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

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

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

71 For which equation does the sum of the roots equal $\frac{3}{4}$ and the product of the roots equal -2?

1 $4x^2 - 8x + 3 = 0$

2 $4x^2 + 8x + 3 = 0$

3 $4x^2 - 3x - 8 = 0$

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

72 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 $2x^2 - 6x + 4 = 0$

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

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

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

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

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

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

75 What is the product of the roots of $x^2 - 4x + k = 0$ if one of the roots is 7?
1 21
2 −11
3 −21
4 −77

A2.A.7: FACTORING POLYNOMIALS

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

77 Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to
1 $x^2(4x + 6)(3x - 2)$
2 $2(2x^2 + 3x)(3x^2 - 2x)$
3 $2x^2(2x - 3)(3x + 2)$
4 $2x^2(2x + 3)(3x - 2)$

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

A2.A.7: FACTORING THE DIFFERENCE OF PERFECT SQUARES

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

A2.A.7: FACTORING BY GROUPING

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

81 When factored completely, the expression $3x^3 - 5x^2 - 48x + 80$ is equivalent to
1 $(x^2 - 16)(3x - 5)$
2 $(x^2 + 16)(3x - 5)(3x + 5)$
3 $(x + 4)(x - 4)(3x - 5)$
4 $(x + 4)(x - 4)(3x - 5)(3x - 5)$

82 The expression $x^2(x + 2) - (x + 2)$ is equivalent to
1 x^2
2 $x^2 - 1$
3 $x^3 + 2x^2 - x + 2$
4 $(x + 1)(x - 1)(x + 2)$

A2.A.25: QUADRATIC FORMULA

83 The solutions of the equation $y^2 - 3y = 9$ are
1 $\frac{3 \pm 3i\sqrt{3}}{2}$
2 $\frac{3 \pm 3i\sqrt{5}}{2}$
3 $\frac{-3 \pm 3\sqrt{5}}{2}$
4 $\frac{3 \pm 3\sqrt{5}}{2}$

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

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

A2.A.2: USING THE DISCRIMINANT

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

87 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

88 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

89 The discriminant of a quadratic equation is 24. The roots are
1 imaginary
2 real, rational, and equal
3 real, rational, and unequal
4 real, irrational, and unequal

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

A2.A.24: COMPLETING THE SQUARE

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

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

93 Brian correctly used a method of completing the square to solve the equation $x^2 + 7x - 11 = 0$. Brian's first step was to rewrite the equation as $x^2 + 7x = 11$. He then added a number to both sides of the equation. Which number did he add?
1 $\frac{7}{2}$
2 $\frac{49}{4}$
3 $\frac{49}{2}$
4 49

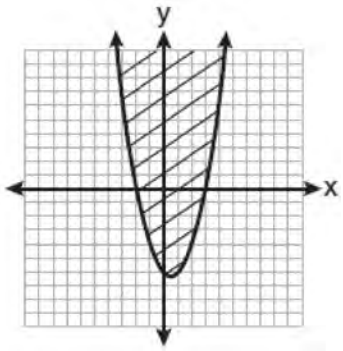
94 Max solves a quadratic equation by completing the square. He shows a correct step:

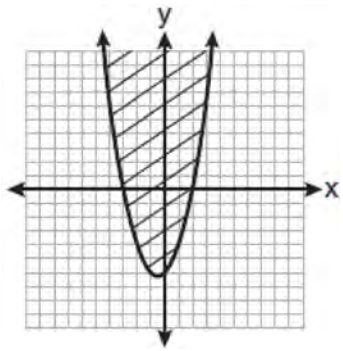
$$(x + 2)^2 = -9$$

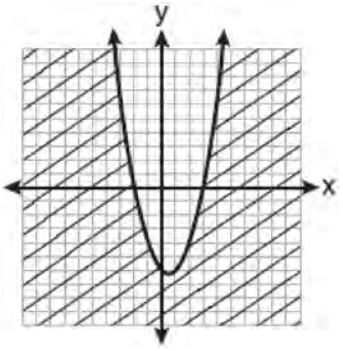
What are the solutions to his equation?
1 $2 \pm 3i$
2 $-2 \pm 3i$
3 $3 \pm 2i$
4 $-3 \pm 2i$

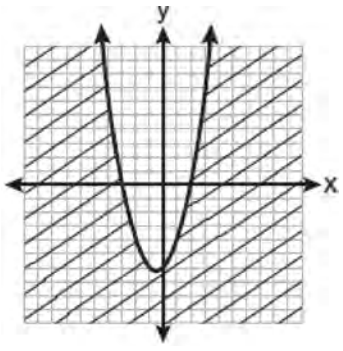
A2.A.4: QUADRATIC INEQUALITIES

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

1


2


3


4


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

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

SYSTEMS

A2.A.3: QUADRATIC-LINEAR SYSTEMS

98 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

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

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

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

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

1 (2, 3)
2 (5, 0)
3 (–5, 10)
4 (–4, 9)

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

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

$$3y - x = 0$$

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

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

POWERS

A2.N.3: OPERATIONS WITH POLYNOMIALS

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

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

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

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

3 $-x^2 - x - 3$

4 $x^2 - x - 3$

105 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.

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

1 $\frac{x^2}{8} - \frac{1}{9}$

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

3 $\frac{x^2}{8} - \frac{x}{6} - \frac{1}{9}$

4 $\frac{x^2}{16} - \frac{x}{6} - \frac{1}{9}$

107 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 $\frac{4}{5}x$

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

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

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

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

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

A2.N.1, A.8-9: NEGATIVE AND FRACTIONAL EXPONENTS

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

1 $-\frac{9}{8}$

2 -1

3 $-\frac{8}{9}$

4 $\frac{8}{9}$

110 If n is a negative integer, then which statement is always true?

1 $6n^{-2} < 4n^{-1}$

2 $\frac{n}{4} > -6n^{-1}$

3 $6n^{-1} < 4n^{-1}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A2.A.12: EVALUATING EXPONENTIAL EXPRESSIONS

120 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.

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

122 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%.

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

1 $5190.33

2 $5796.37

3 $5805.92

4 $5808.08

A2.A.18: EVALUATING LOGARITHMIC EXPRESSIONS

124 The expression $\log_8 64$ is equivalent to

1 8

2 2

3 $\frac{1}{2}$

4 $\frac{1}{8}$

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

1 $\frac{1}{2}$

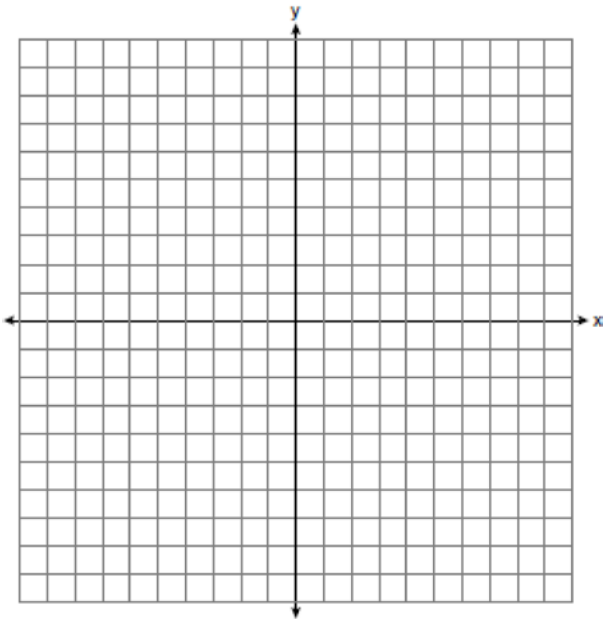
2 2

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

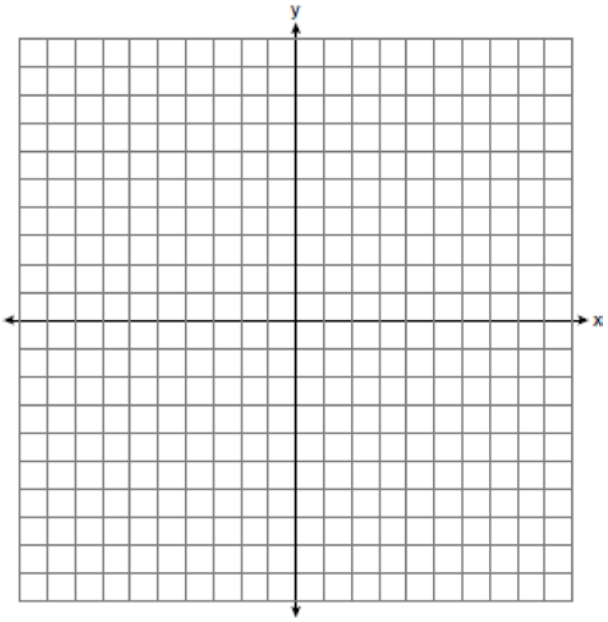
4 -2

A2.A.53: GRAPHING EXPONENTIAL FUNCTIONS

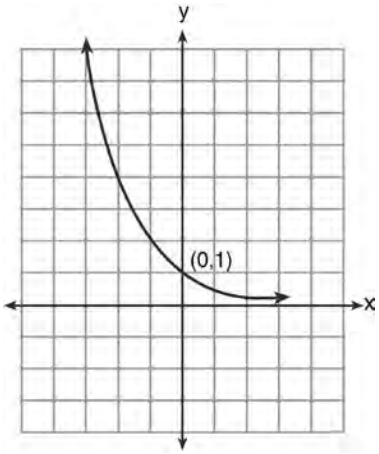
126 The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\frac{1}{2}\right)^x$ and write the equation of this asymptote.



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



128 What is the equation of the graph shown below?



1 $y = 2^x$

2 $y = 2^{-x}$

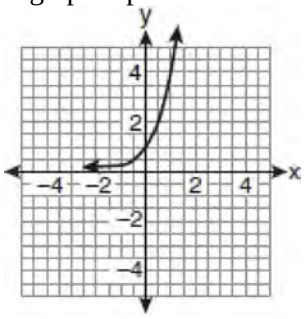
3 $x = 2^y$

4 $x = 2^{-y}$

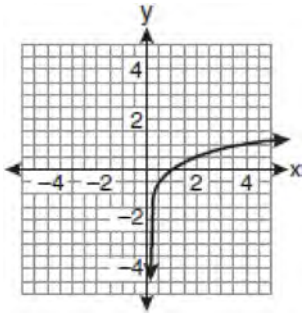
A2.A.54: GRAPHING LOGARITHMIC FUNCTIONS

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

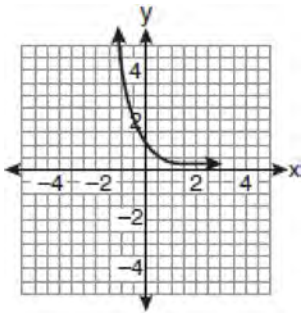
1



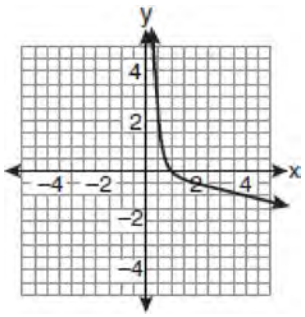
2



3

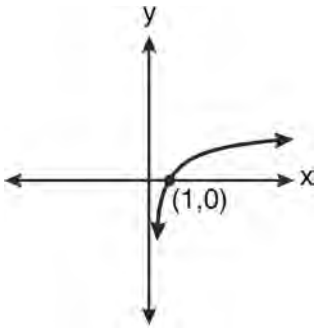


4

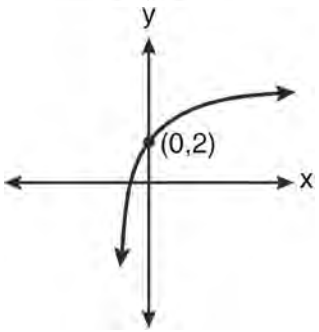


130 Which graph represents the function $\log_2 x = y$?

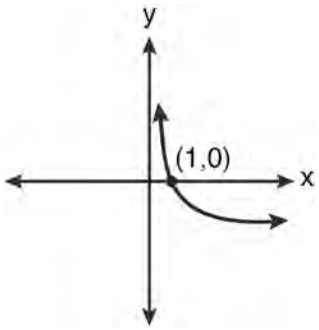
1



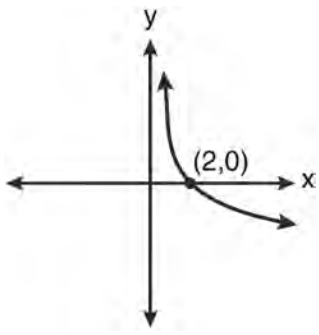
2



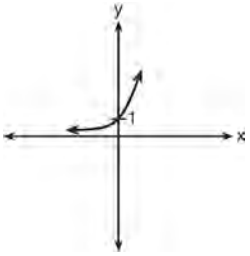
3

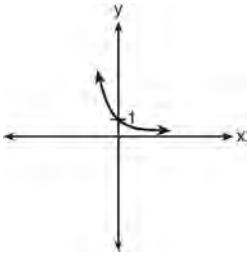


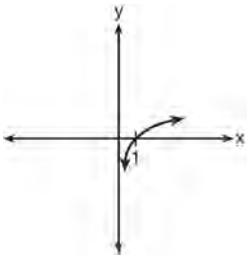
4

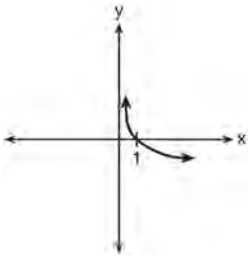


131 Which sketch shows the inverse of $y = a^x$, where $a > 1$?

1 

2 

3 

4 

A2.A.19: PROPERTIES OF LOGARITHMS

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

1 $\log\dfrac{x^2}{y^3z}$

2 $\log\dfrac{x^2z}{y^3}$

3 $\log\dfrac{2x}{3yz}$

4 $\log\dfrac{2xz}{3y}$

133 If $r = \sqrt[3]{\dfrac{A^2B}{C}}$, 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 $\dfrac{2}{3}\log A + \dfrac{1}{3}\log B - \dfrac{1}{3}\log C$

134 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 $\log 6 + 2\log a$

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

1 $\dfrac{p^3}{\sqrt{t^2r}}$

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

3 $\dfrac{p^3t^2}{\sqrt{r}}$

4 $\dfrac{p^3}{t^2\sqrt{r}}$

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

1 $2b - a + 1$

2 $2b - a - 1$

3 $b^2 - a + 10$

4 $\dfrac{2b}{a+1}$

137 The expression $\log 4m^2$ is equivalent to
1 $2(\log 4 + \log m)$
2 $2\log 4 + \log m$
3 $\log 4 + 2\log m$
4 $\log 16 + 2\log m$

A2.A.28: LOGARITHMIC EQUATIONS

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

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

140 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.]

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

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

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

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

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

A2.A.6, 27: EXPONENTIAL EQUATIONS

146 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

147 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

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

149 Susie invests $500 in an account that is compounded continuously at an annual interest rate of 5%, according to the formula $A = Pe^{rt}$, where A is the amount accrued, P is the principal, r is the rate of interest, and t is the time, in years. Approximately how many years will it take for Susie's money to double?
1 1.4
2 6.0
3 13.9
4 14.7

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

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

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

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

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

155 Which value of k satisfies the equation $8^{3k+4} = 4^{2k-1}$?
1 −1
2 $-\frac{9}{4}$
3 −2
4 $-\frac{14}{5}$

A2.A.36: BINOMIAL EXPANSIONS

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

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

158 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

159 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 $2x^4y^2$

160 What is the middle term in the expansion of $\left(\frac{x}{2} - 2y\right)^6$?
1 $20x^3y^3$
2 $-\frac{15}{4}x^4y^2$
3 $-20x^3y^3$
4 $\frac{15}{4}x^4y^2$

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

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

A2.A.26, 50: SOLVING POLYNOMIAL EQUATIONS

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

163 Which values of x are solutions of the equation $x^3 + x^2 - 2x = 0$?

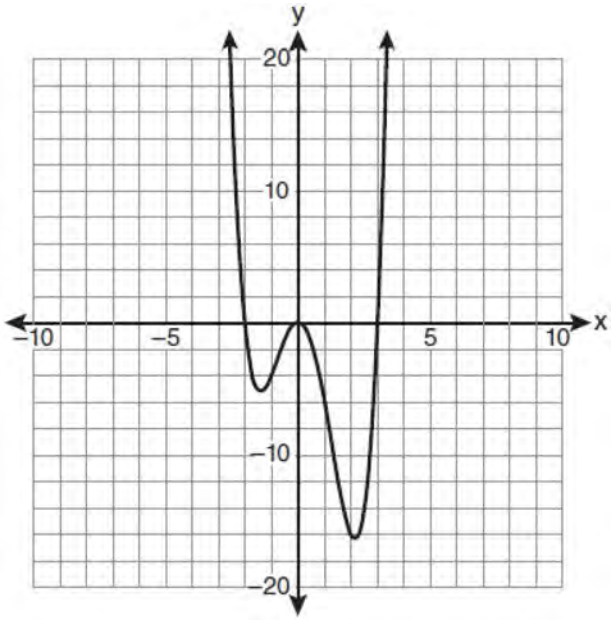
1 $0, 1, 2$
2 $0, 1, -2$
3 $0, -1, 2$
4 $0, -1, -2$

164 What is the solution set of the equation $3x^5 - 48x = 0$?

1 $\{0, \pm 2\}$
2 $\{0, \pm 2, 3\}$
3 $\{0, \pm 2, \pm 2i\}$
4 $\{\pm 2, \pm 2i\}$

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

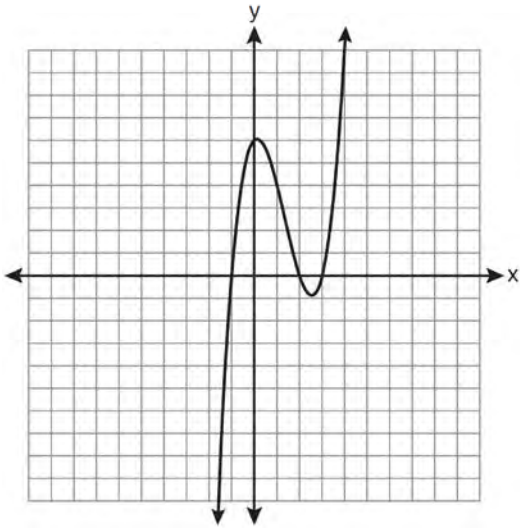
166 The graph of $y = f(x)$ is shown below.



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

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

167 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

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

RADICALS

A2.N.4: OPERATIONS WITH IRRATIONAL EXPRESSIONS

169 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

A2.A.13: SIMPLIFYING RADICALS

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

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

A2.N.2, A.14: OPERATIONS WITH RADICALS

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

173 The sum of $\sqrt[3]{6a^4b^2}$ and $\sqrt[3]{162a^4b^2}$, expressed in simplest radical form, is
1 $\sqrt[6]{168a^8b^4}$
2 $2a^2b\sqrt[3]{21a^2b}$
3 $4a\sqrt[3]{6ab^2}$
4 $10a^2b\sqrt[3]{8}$

174 The expression $\left(\sqrt[3]{27x^2}\right)\left(\sqrt[3]{16x^4}\right)$ is equivalent to
1 $12x^2\sqrt[3]{2}$
2 $12x\sqrt[3]{2x}$
3 $6x\sqrt[3]{2x^2}$
4 $6x^2\sqrt[3]{2}$

175 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 $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

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

A2.N.5, A.15: RATIONALIZING DENOMINATORS

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

178 Which expression is equivalent to $\frac{\sqrt{3}+5}{\sqrt{3}-5}$?

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

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

3 $\frac{14+5\sqrt{3}}{14}$

4 $\frac{17+5\sqrt{3}}{14}$

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

1 $\frac{4\sqrt{13}}{5\sqrt{13}-13}$

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

3 $\frac{5+\sqrt{13}}{3}$

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

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

1 $\frac{7+\sqrt{11}}{38}$

2 $\frac{7-\sqrt{11}}{38}$

3 $\frac{7+\sqrt{11}}{60}$

4 $\frac{7-\sqrt{11}}{60}$

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

1 $\frac{1}{a\sqrt{b}}$

2 $\frac{\sqrt{b}}{ab}$

3 $\frac{\sqrt{3b}}{ab}$

4 $\frac{\sqrt{3}}{a}$

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

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

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

3 $2\sqrt{x-2}$

4 $2\sqrt{x+2}$

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

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

2 $-\sqrt{x}$

3 $\frac{x+\sqrt{x}}{1-x}$

4 $\frac{x+\sqrt{x}}{x-1}$

A2.A.22: SOLVING RADICALS

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

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

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

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

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

A2.A.10-11: EXPONENTS AS RADICALS

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

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

191 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 $4x^8y^{28}$

A2.N.6: SQUARE ROOTS OF NEGATIVE NUMBERS

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

A2.N.7: IMAGINARY NUMBERS

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

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

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

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

A2.N.8: CONJUGATES OF COMPLEX NUMBERS

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

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

199 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 $-\frac{1}{2} - \frac{3}{2}i$

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

A2.N.9: MULTIPLICATION AND DIVISION OF COMPLEX NUMBERS

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

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

203 If $x = 3i$, $y = 2i$, and $z = m + i$, the expression xy^2z equals
1 $-12 - 12mi$
2 $-6 - 6mi$
3 $12 - 12mi$
4 $6 - 6mi$

RATIONALS

A2.A.16: MULTIPLICATION AND DIVISION OF RATIONALS

204 Perform the indicated operations and simplify completely:

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

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

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

A2.A.16: ADDITION AND SUBTRACTION OF RATIONALS

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

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

2 $\frac{3y-9}{2y-6}$

3 $\frac{3}{2}$

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

A2.A.23: SOLVING RATIONALS AND RATIONAL INEQUALITIES

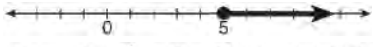
208 Solve for x: $\frac{4x}{x-3}=2+\frac{12}{x-3}$

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

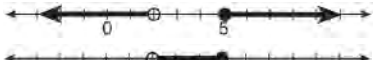
210 Solve the equation below algebraically, and express the result in simplest radical form:

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

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

1 

2 

3 

4 

A2.A.17: COMPLEX FRACTIONS

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

1 $x-1$

2 $x-2$

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

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

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

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

1 $\frac{1}{2}$

2 $\frac{x}{x+2}$

3 $\frac{x}{3}$

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

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

1 $\frac{c+1}{d-1}$

2 $\frac{a+b}{d-b}$

3 $\frac{ac+b}{cd-b}$

4 $\frac{ac+1}{cd-1}$

A2.A.5: INVERSE VARIATION

216 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.

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

1 25
2 15
3 9
4 4

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

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

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

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

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

1 8
2 2
3 -8
4 -2

FUNCTIONS

A2.A.40-41: FUNCTIONAL NOTATION

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

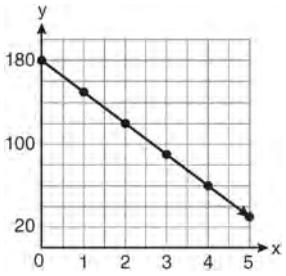
222 If $f(x) = \frac{x}{x^2 - 16}$, what is the value of $f(-10)$?

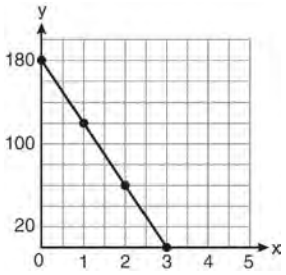
1 $-\frac{5}{2}$
2 $-\frac{5}{42}$
3 $\frac{5}{58}$
4 $\frac{5}{18}$

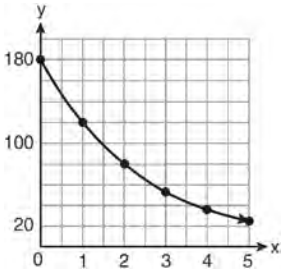
223 If $g(x) = \left(ax\sqrt{1-x}\right)^2$, express $g(10)$ in simplest form.

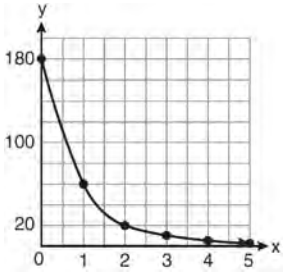
A2.A.52: FAMILIES OF FUNCTIONS

224 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 

A2.A.52: PROPERTIES OF GRAPHS OF FUNCTIONS AND RELATIONS

225 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 $(e, 1)$.

A2.A.52: IDENTIFYING THE EQUATION OF A GRAPH

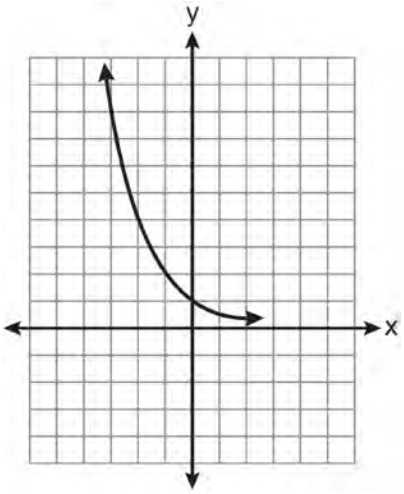
226 Four points on the graph of the function f(x) are shown below.

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

Which equation represents f(x)?

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

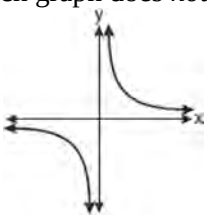
227 Which equation is represented by the graph below?

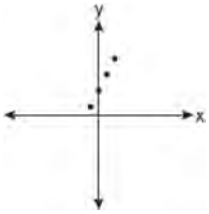


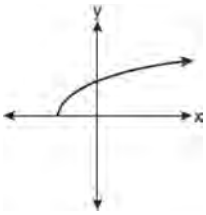
1 $y = 5^x$
2 $y = 0.5^x$
3 $y = 5^{-x}$
4 $y = 0.5^{-x}$

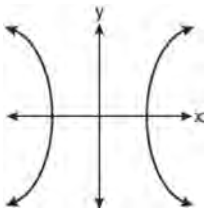
A2.A.38, 43: DEFINING FUNCTIONS

228 Which graph does *not* represent a function?

1 

2 

3 

4 

229 Which relation is *not* a function?

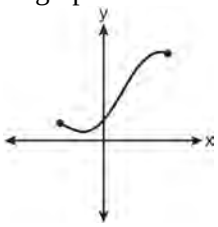
1 $(x-2)^2 + y^2 = 4$

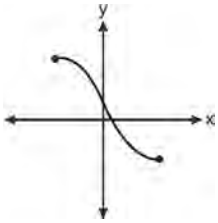
2 $x^2 + 4x + y = 4$

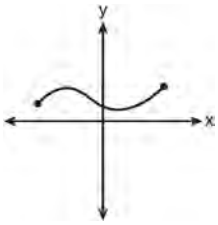
3 $x + y = 4$

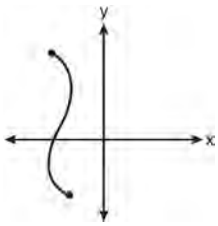
4 $xy = 4$

230 Which graph does *not* represent a function?

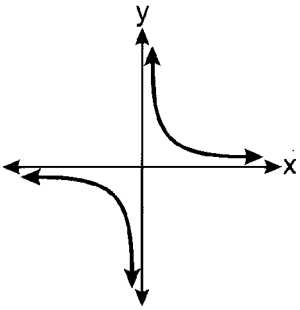
1 

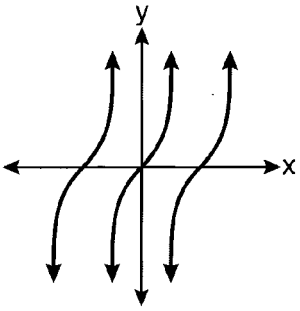
2 

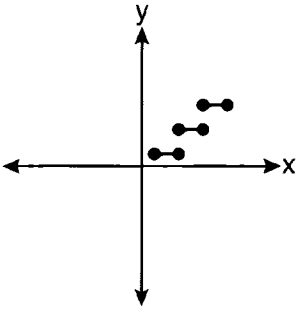
3 

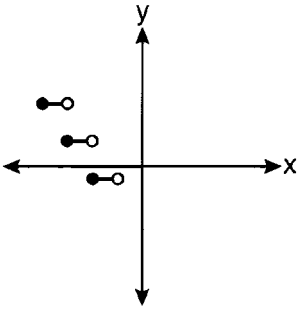
4 

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

1 

2 

3 

4 

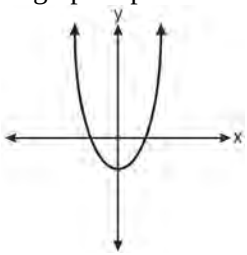
232 Given the relation $\{(8,2),(3,6),(7,5),(k,4)\}$, which value of k will result in the relation *not* being a function?

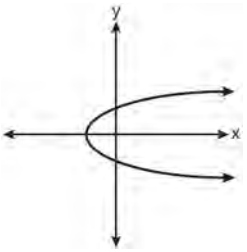
1 1
2 2
3 3
4 4

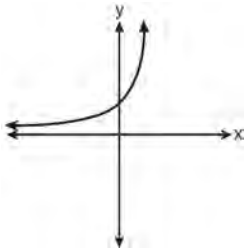
233 Which function is *not* one-to-one?

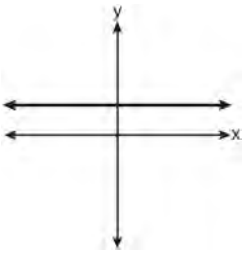
1 $\{(0,1),(1,2),(2,3),(3,4)\}$
2 $\{(0,0),(1,1),(2,2),(3,3)\}$
3 $\{(0,1),(1,0),(2,3),(3,2)\}$
4 $\{(0,1),(1,0),(2,0),(3,2)\}$

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

1 

2 

3 

4 

235 Which function is one-to-one?

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

236 Which function is one-to-one?

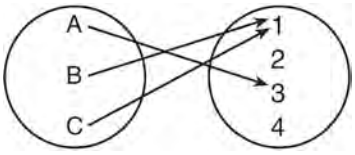
1 $k(x) = x^2 + 2$

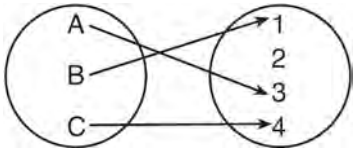
2 $g(x) = x^3 + 2$

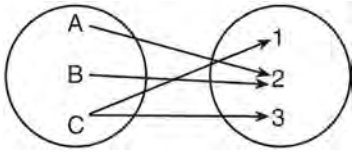
3 $f(x) = |x| + 2$

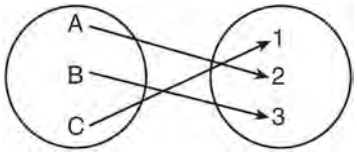
4 $j(x) = x^4 + 2$

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

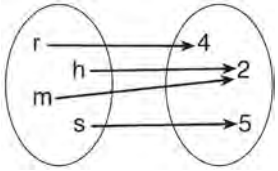
1 

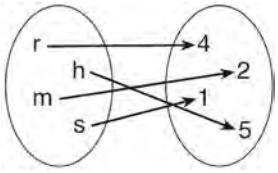
2 

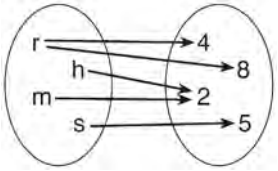
3 

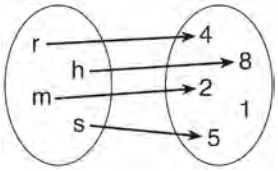
4 

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

1 

2 

3 

4 

A2.A.39, 51: DOMAIN AND RANGE

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

1 $(-\infty, \infty)$

2 $(2, \infty)$

3 $[2, \infty)$

4 $[3, \infty)$

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

1 $y \geq -4$

2 $y \geq 4$

3 $y = 7$

4 $y \geq 7$

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

1 $\{x | x \geq 3\}$

2 $\{y | y \geq 2\}$

3 $\{x | x \in \text{real numbers}\}$

4 $\{y | y \in \text{real numbers}\}$

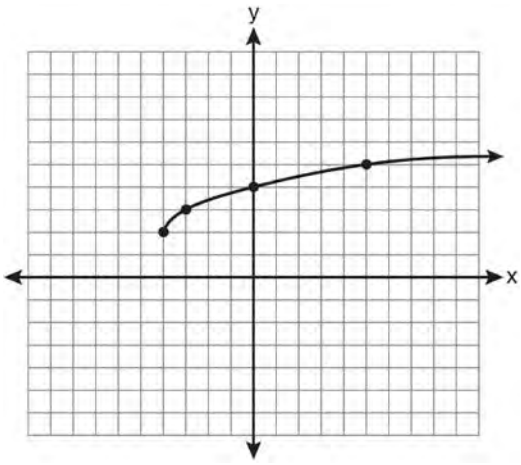
242 If $f(x) = \sqrt{9 - x^2}$, what are its domain and range?

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

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

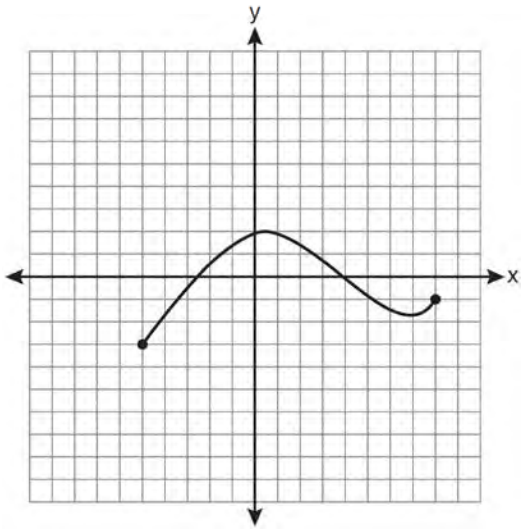
1 $\{x|x > 4\}$ and $\{y|y > 0\}$
2 $\{x|x \ge 4\}$ and $\{y|y > 0\}$
3 $\{x|x > 4\}$ and $\{y|y \ge 0\}$
4 $\{x|x \ge 4\}$ and $\{y|y \ge 0\}$

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



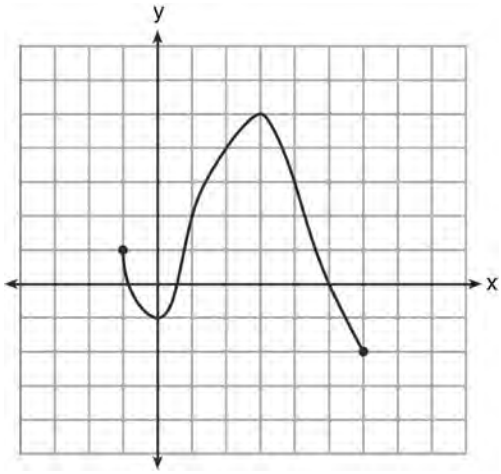
1 $\{x|x > -4\}$; $\{y|y > 2\}$
2 $\{x|x \ge -4\}$; $\{y|y \ge 2\}$
3 $\{x|x > 2\}$; $\{y|y > -4\}$
4 $\{x|x \ge 2\}$; $\{y|y \ge -4\}$

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



State the domain and range of this function.

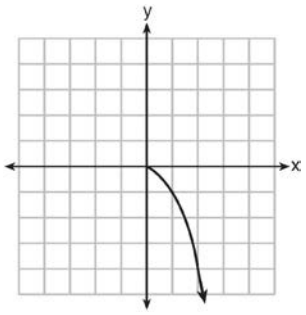
246 What is the domain of the function shown below?



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

Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic

247 What is the range of the function shown below?



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

A2.A.42: COMPOSITIONS OF FUNCTIONS

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

249 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 $x^2 + 6x - 5$

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

251 If $f(x) = 4x - x^2$ and $g(x) = \frac{1}{x}$, then $(f \circ g)\left(\frac{1}{2}\right)$ is equal to
1 $\frac{4}{7}$
2 −2
3 $\frac{7}{2}$
4 4

252 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 $3\sin^2 x$

253 If $g(x) = \frac{1}{2}x + 8$ and $h(x) = \frac{1}{2}x - 2$, what is the value of $g(h(-8))$?
1 0
2 9
3 5
4 4

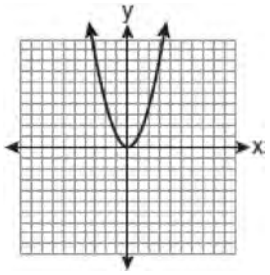
A2.A.44: INVERSE OF FUNCTIONS

254 Which two functions are inverse functions of each other?
1 $f(x) = \sin x$ and $g(x) = \cos(x)$
2 $f(x) = 3 + 8x$ and $g(x) = 3 - 8x$
3 $f(x) = e^x$ and $g(x) = \ln x$
4 $f(x) = 2x - 4$ and $g(x) = -\frac{1}{2}x + 4$

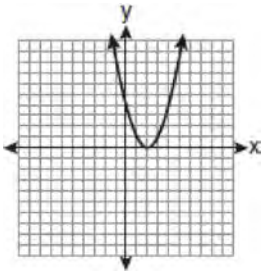
255 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

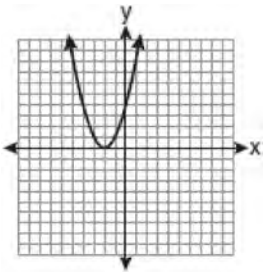
A2.A.46: TRANSFORMATIONS WITH FUNCTIONS AND RELATIONS

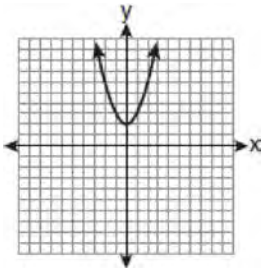
256 The graph below shows the function f(x).

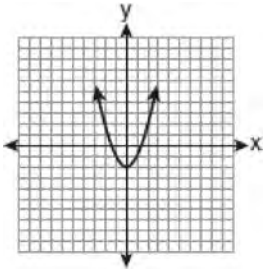


Which graph represents the function f($x + 2$)?

1


2


3


4


257 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 $(-6, -3)$

SEQUENCES AND SERIES

A2.A.29-33: SEQUENCES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1 $\frac{3}{4}$
2 $\frac{64}{81}$
3 $\frac{4}{3}$
4 $\frac{37}{3}$

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

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

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

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

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

268 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

269 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 $16384\sqrt{10}$

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

$$a_1 = -3$$
$$a_n = a_{(n-1)} - n$$

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

A2.N.10, A.34: SIGMA NOTATION

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

1 12
2 22
3 24
4 26

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

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

1 -38
2 -12
3 26
4 62

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

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

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

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

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

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

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

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

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

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

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

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

1 $\sum_{n=5}^{43}n$

2 $\sum_{n=1}^{20}(2n + 3)$

3 $\sum_{n=4}^{24}(2n - 3)$

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

A2.A.35: SERIES

281 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

282 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

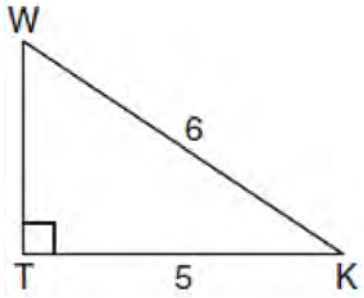
283 Determine the sum of the first twenty terms of the sequence whose first five terms are 5, 14, 23, 32, 41.

284 The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \ldots$ is
1 $-13,107$
2 $-21,845$
3 $-39,321$
4 $-65,535$

TRIGONOMETRY

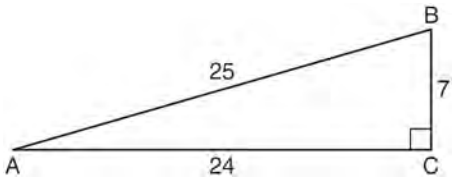
A2.A.55: TRIGONOMETRIC RATIOS

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



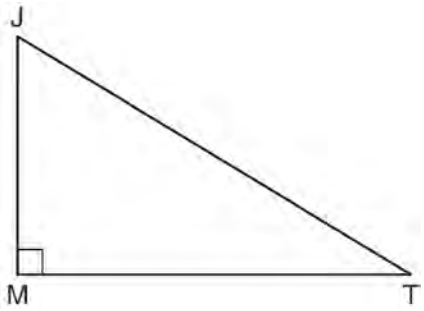
What is the measure of $\angle K$, to the *nearest minute*?
1 33°33'
2 33°34'
3 33°55'
4 33°56'

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



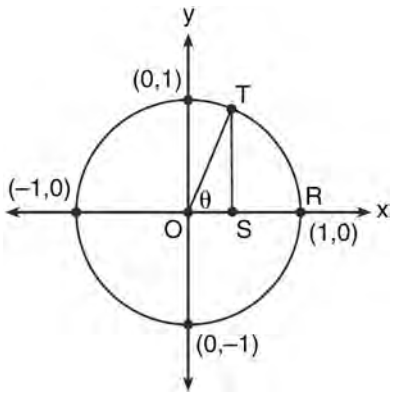
1 $\frac{25}{24}$
2 $\frac{25}{7}$
3 $\frac{24}{7}$
4 $\frac{7}{24}$

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



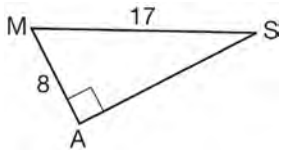
What is the value of $\cot J$?
1 $\frac{\sqrt{3}}{3}$
2 2
3 $\sqrt{3}$
4 $\frac{2\sqrt{3}}{3}$

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



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

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



1 28°1'
2 28°4'
3 61°56'
4 61°93'

A2.M.1-2: RADIAN MEASURE

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

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

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

292 What is the number of degrees in an angle whose radian measure is $\frac{11\pi}{12}$?

1 150
2 165
3 330
4 518

293 What is the radian measure of an angle whose measure is –420°?

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

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

295 What is the number of degrees in an angle whose measure is 2 radians?

1 $\frac{360}{\pi}$
2 $\frac{\pi}{360}$
3 360
4 90

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

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

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

1 576
2 288
3 225
4 113

299 Approximately how many degrees does five radians equal?

1 286

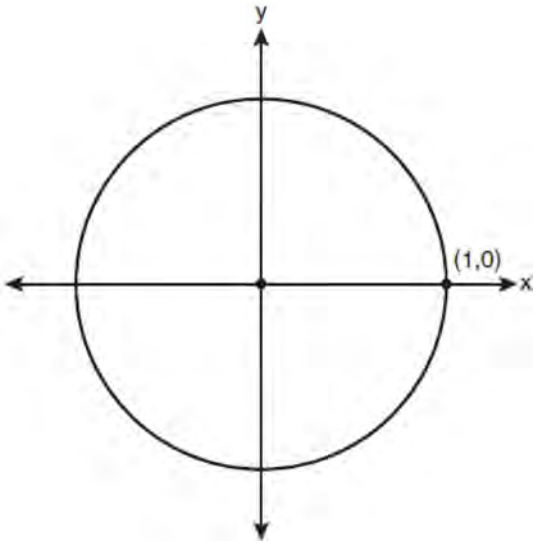
2 900

3 $\frac{\pi}{36}$

4 5π

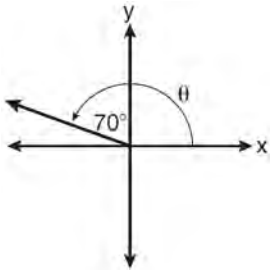
A2.A.60: UNIT CIRCLE

300 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 $\sin 240°$.

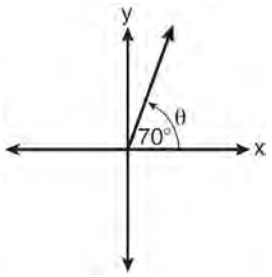


301 In which graph is θ coterminal with an angle of –70°?

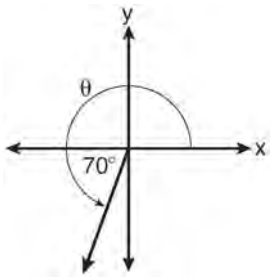
1



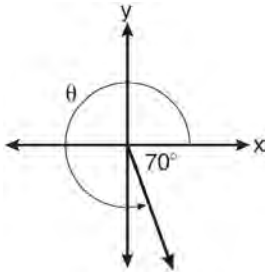
2



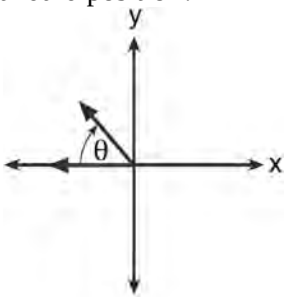
3

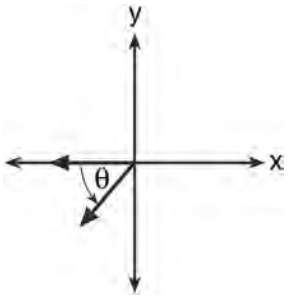


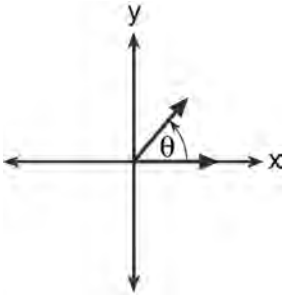
4

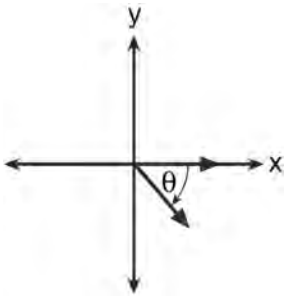


302 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?

1 

2 

3 

4 

A2.A.60: FINDING THE TERMINAL SIDE OF AN ANGLE

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

A2.A.56, 62, 66: DETERMINING TRIGONOMETRIC FUNCTIONS

304 In the interval $0° \le x < 360°$, $\tan x$ is undefined when x equals
1 0º and 90º
2 90º and 180º
3 180º and 270º
4 90º and 270º

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

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

307 The value of $\tan 126°43'$ to the *nearest ten-thousandth* is
1 −1.3407
2 −1.3408
3 −1.3548
4 −1.3549

308 Which expression, when rounded to three decimal places, is equal to −1.155?
1 $\sec\left(\frac{5\pi}{6}\right)$
2 $\tan(49°20')$
3 $\sin\left(-\frac{3\pi}{5}\right)$
4 $\csc(-118°)$

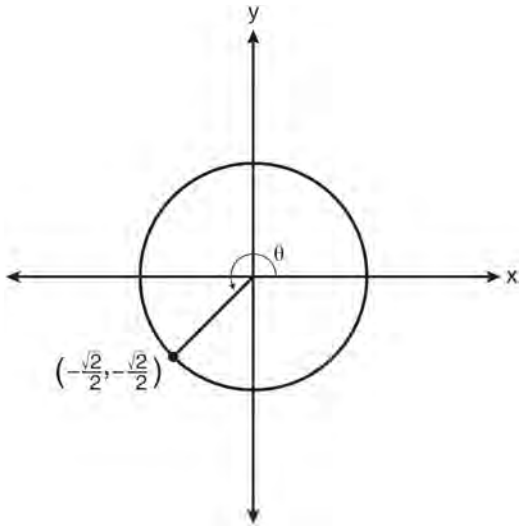
309 The value of $\csc 138°23'$ rounded to four decimal places is
1 −1.3376
2 −1.3408
3 1.5012
4 1.5057

A2.A.64: USING INVERSE TRIGONOMETRIC FUNCTIONS

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

1 $-30°$
2 $60°$
3 $150°$
4 $240°$

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



What is m$\angle\theta$?

1 45
2 135
3 225
4 240

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

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

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

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

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

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

A2.A.57: REFERENCE ANGLES

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

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

A2.A.61: ARC LENGTH

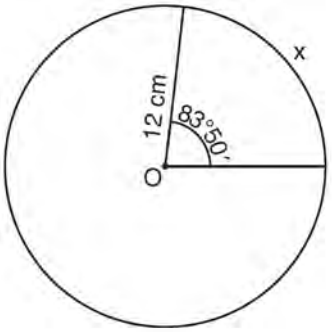
316 A circle has a radius of 4 inches. In inches, what is the length of the arc intercepted by a central angle of 2 radians?

1 2π
2 2
3 8π
4 8

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

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

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



A2.A.58-59: COFUNCTION AND RECIPROCAL TRIGONOMETRIC FUNCTIONS

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

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

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

1 $\cos^2\theta$
2 $\sin^2\theta$
3 $\sec^2\theta$
4 $\csc^2\theta$

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

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

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

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

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

A2.A.67: PROVING TRIGONOMETRIC IDENTITIES

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

327 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 $\cos x + \sin x$

A2.A.76: ANGLE SUM AND DIFFERENCE IDENTITIES

328 The expression $\cos 4x \cos 3x + \sin 4x \sin 3x$ is equivalent to
1 $\sin x$
2 $\sin 7x$
3 $\cos x$
4 $\cos 7x$

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

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

331 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 $-\frac{63}{65}$

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

333 The expression $\sin(\theta + 90)°$ is equivalent to
1 $-\sin\theta$
2 $-\cos\theta$
3 $\sin\theta$
4 $\cos\theta$

A2.A.77: DOUBLE AND HALF ANGLE IDENTITIES

334 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 $-\cos^2\theta - 1$

335 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 $-\frac{4\sqrt{5}}{9}$

336 What is a positive value of $\tan\frac{1}{2}x$, when $\sin x = 0.8$?
1 0.5
2 0.4
3 0.33
4 0.25

337 If $\sin A = \frac{1}{3}$, what is the value of $\cos 2A$?
1 $-\frac{2}{3}$
2 $\frac{2}{3}$
3 $-\frac{7}{9}$
4 $\frac{7}{9}$

A2.A.68: TRIGONOMETRIC EQUATIONS

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

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

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

341 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 $\{60°, 300°\}$

342 What is the solution set of the equation $-\sqrt{2}\sec x = 2$ when $0° \le x < 360°$?
1 $\{45°, 135°, 225°, 315°\}$
2 $\{45°, 315°\}$
3 $\{135°, 225°\}$
4 $\{225°, 315°\}$

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

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

A2.A.69: PROPERTIES OF TRIGONOMETRIC FUNCTIONS

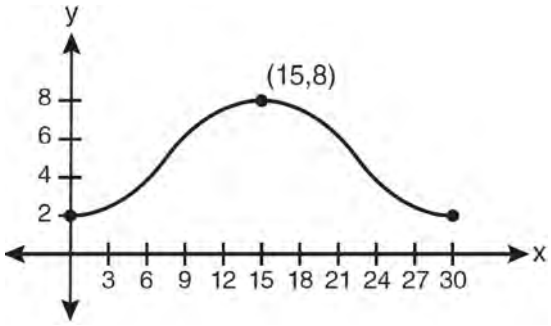
345 What is the period of the function $y = \frac{1}{2}\sin\left(\frac{x}{3} - \pi\right)$?
1 $\frac{1}{2}$
2 $\frac{1}{3}$
3 $\frac{2}{3}\pi$
4 6π

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

347 Which equation represents a graph that has a period of 4π?
1 $y = 3\sin\frac{1}{2}x$
2 $y = 3\sin 2x$
3 $y = 3\sin\frac{1}{4}x$
4 $y = 3\sin 4x$

A2.A.72: IDENTIFYING THE EQUATION OF A TRIGONOMETRIC GRAPH

348 Which equation is graphed in the diagram below?



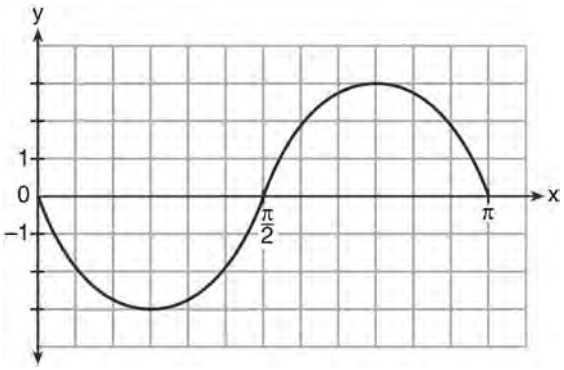
1 $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$

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

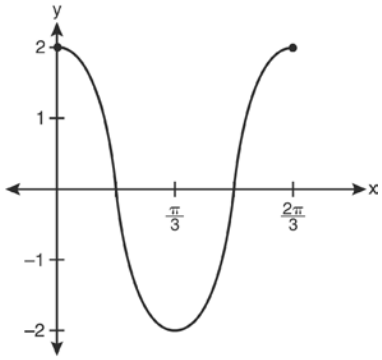
3 $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$

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

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



350 Which equation is represented by the graph below?



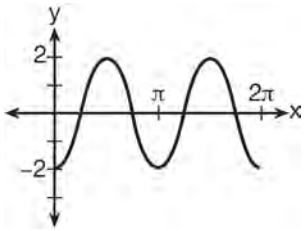
1 $y = 2\cos 3x$

2 $y = 2\sin 3x$

3 $y = 2\cos\frac{2\pi}{3}x$

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

351 Which equation represents the graph below?



1 $y = -2\sin 2x$

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

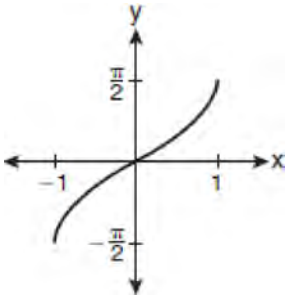
3 $y = -2\cos 2x$

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

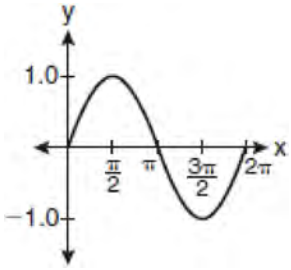
A2.A.65, 70-71: GRAPHING TRIGONOMETRIC FUNCTIONS

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

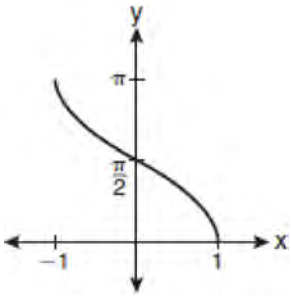
1



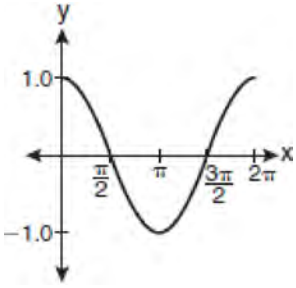
2



3

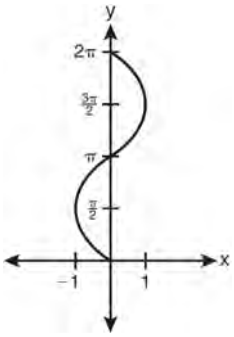


4

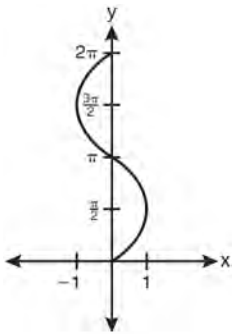


353 Which graph shows $y = \cos^{-1}x$?

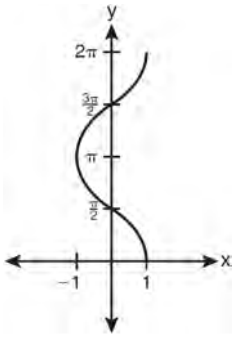
1



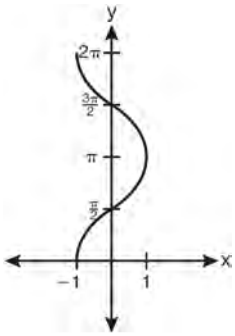
2



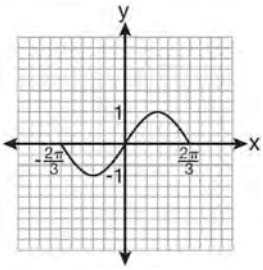
3

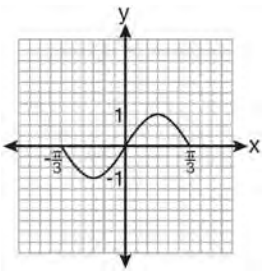


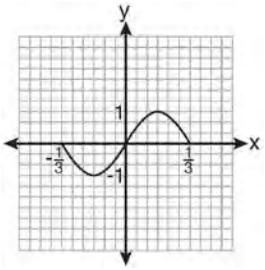
4

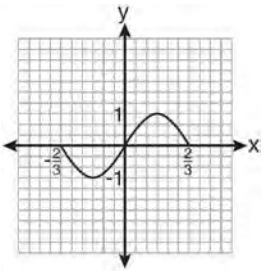


354 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?

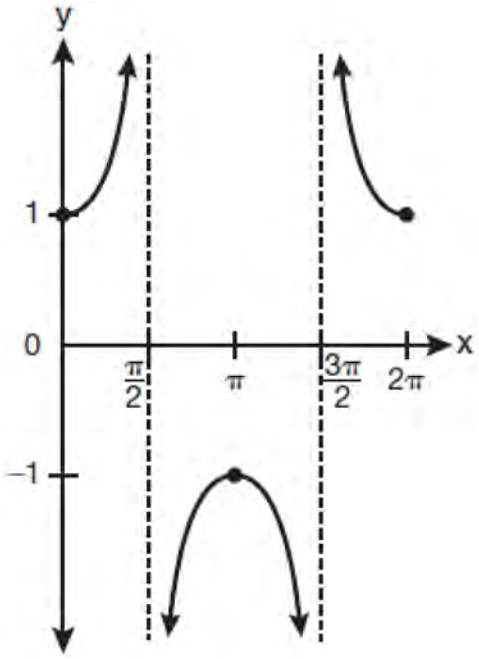
1 

2 

3 

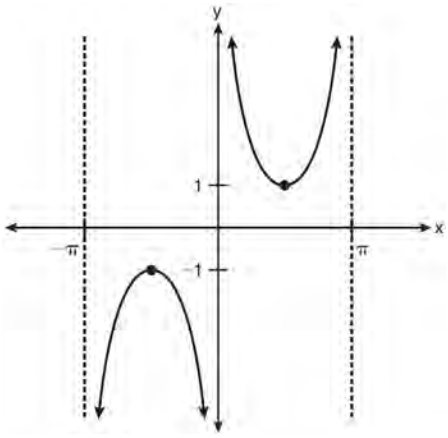
4 

355 Which equation is represented by the graph below?



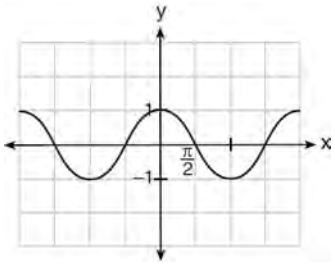
1 $y = \cot x$
2 $y = \csc x$
3 $y = \sec x$
4 $y = \tan x$

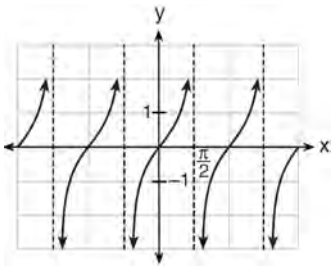
356 Which equation is sketched in the diagram below?

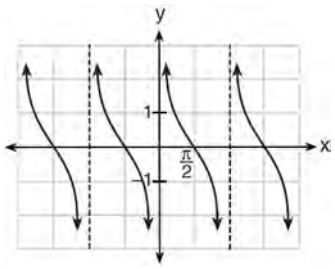


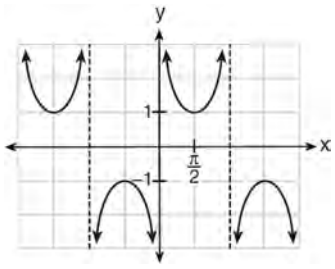
1 $y = \csc x$
2 $y = \sec x$
3 $y = \cot x$
4 $y = \tan x$

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

1 

2 

3 

4 

A2.A.63: DOMAIN AND RANGE

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

1 $\{x|0 \le x \le \pi\}$

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

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

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

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

1 $-\frac{\pi}{2} < x < \frac{\pi}{2}$

2 $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$

3 $0 \le x \le \pi$

4 $\frac{\pi}{2} \le x \le \frac{3\pi}{2}$

A2.A.74: USING TRIGONOMETRY TO FIND AREA

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

1 52
2 78
3 90
4 156

361 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*.

362 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

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

1 11.4
2 14.1
3 22.7
4 28.1

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

365 The area of triangle ABC is 42. If $AB = 8$ and $m\angle B = 61$, the length of $\overline{BC}$ is approximately
1 5.1
2 9.2
3 12.0
4 21.7

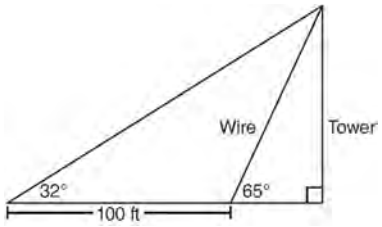
366 A ranch in the Australian Outback is shaped like triangle ACE, with $m\angle A = 42$, $m\angle E = 103$, and $AC = 15$ miles. Find the area of the ranch, to the *nearest square mile*.

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

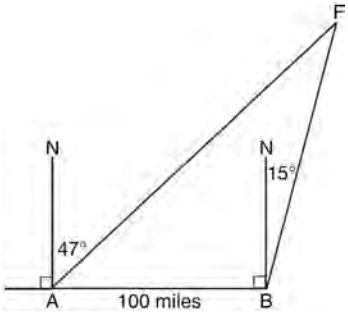
A2.A.73: LAW OF SINES

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

369 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*.



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



371 In ΔPQR, p equals
1 $\frac{r\sin P}{\sin Q}$
2 $\frac{r\sin P}{\sin R}$
3 $\frac{r\sin R}{\sin P}$
4 $\frac{q\sin R}{\sin Q}$

A2.A.75: LAW OF SINES-THE AMBIGUOUS CASE

372 In ΔABC, $m\angle A = 74$, $a = 59.2$, 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

373 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

374 Given ΔABC 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

375 In ΔMNP, $m = 6$ and $n = 10$. Two distinct triangles can be constructed if the measure of angle M is
1 35
2 40
3 45
4 50

376 In ΔKLM, $KL = 20$, $LM = 13$, and $m\angle K = 40$. The measure of $\angle M$?
1 must be between 0° and 90°
2 must equal 90°
3 must be between 90° and 180°
4 is ambiguous

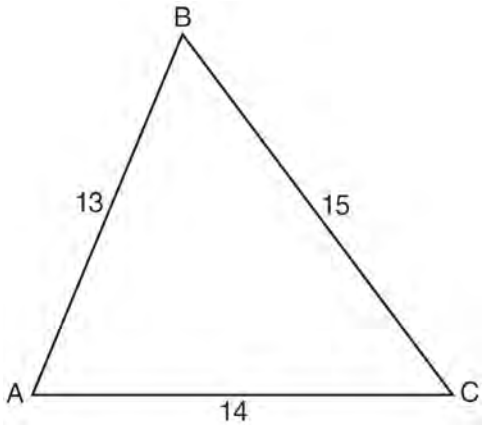
377 In ΔDEF, $d = 5$, $e = 8$, and $m\angle D = 32$. How many distinct triangles can be drawn given these measurements?
1 1
2 2
3 3
4 0

A2.A.73: LAW OF COSINES

378 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.

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

380 In ΔABC, $a = 15$, $b = 14$, 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

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

A2.A.73: VECTORS

382 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.

383 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.

CONICS

A2.A.47, 49: EQUATIONS OF CIRCLES

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

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

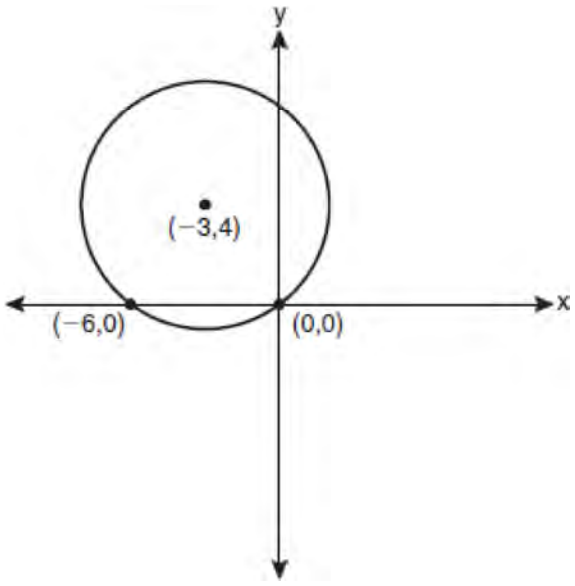
1 $(-8,-3)$

2 $(-8,3)$

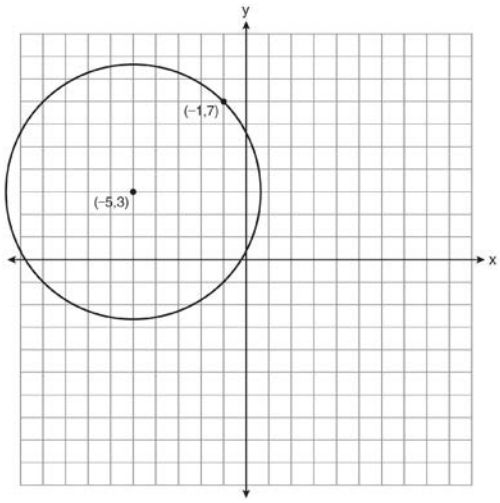
3 $(8,-3)$

4 $(8,3)$

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

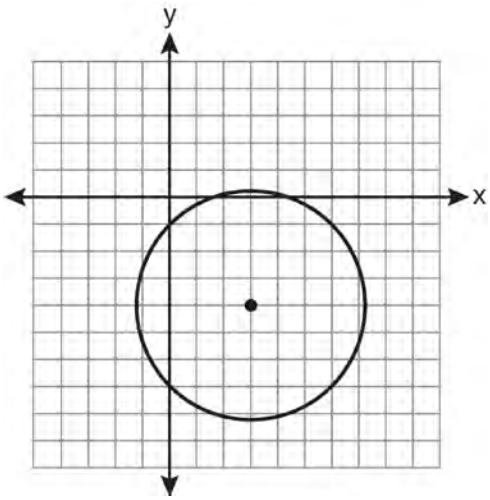


387 A circle shown in the diagram below has a center of $(-5,3)$ and passes through point $(-1,7)$.



Write an equation that represents the circle.

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



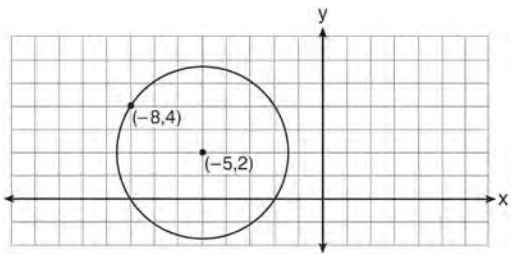
1 $(x-3)^2 + (y+4)^2 = 16$

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

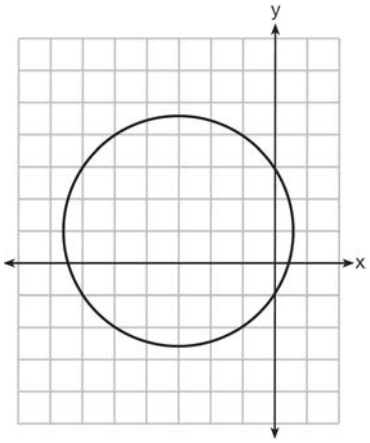
3 $(x+3)^2 + (y-4)^2 = 16$

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

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



390 Which equation is represented by the graph below?



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

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

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

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

Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic
Answer Section

1 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

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

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

4 ANS: 2 PTS: 2 REF: 061301a2 STA: A2.S.1
TOP: Analysis of Data

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

6 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

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

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

9 ANS: 4

$$\frac{4 \cdot 0 + 6 \cdot 1 + 10 \cdot 2 + 0 \cdot 3 + 4k + 2 \cdot 5}{4 + 6 + 10 + 0 + k + 2} = 2$$

$$\frac{4k + 36}{k + 22} = 2$$

$$4k + 36 = 2k + 44$$

$$2k = 8$$

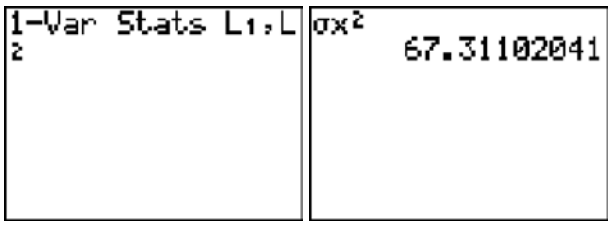
$$k = 4$$

PTS: 2 REF: 061221a2 STA: A2.S.3 TOP: Average Known with Missing Data

10 ANS:
7.4

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

11 ANS: 3



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

12 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

13 ANS:

Ordered, the heights are 71, 71, 72, 74, 74, 75, 78, 79, 79, 83. $Q_1 = 72$ and $Q_3 = 79$. $79 - 72 = 7$.

PTS: 2 REF: 011331a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

14 ANS:

$\sigma_x \approx 6.2$. 6 scores are within a population standard deviation of the mean. $Q_3 - Q_1 = 41 - 37 = 4$

$\bar{x} \approx 38.2$

PTS: 4 REF: 061338a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced

15 ANS:

$Q_1 = 3.5$ and $Q_3 = 10.5$. $10.5 - 3.5 = 7$.

PTS: 2 REF: 011430a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

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

17 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

18 ANS:

$y = 10.596(1.586)^x$

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

19 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

20 ANS:

$y = 180.377(0.954)^x$

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

21 ANS:

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

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

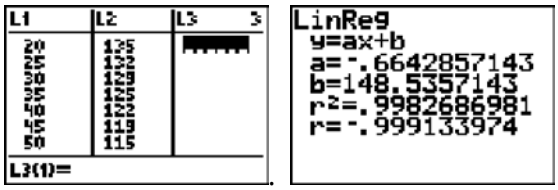
22 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8
TOP: Correlation Coefficient

23 ANS: 1

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

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

24 ANS: 1



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

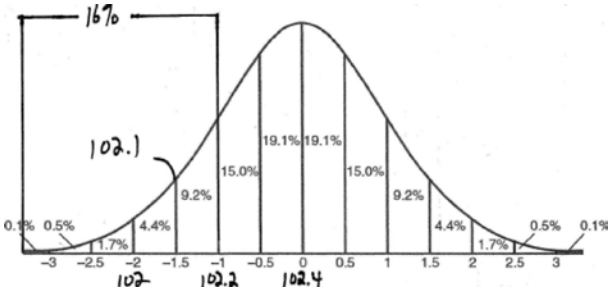
25 ANS: 2

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

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

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

27 ANS: 1



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

28 ANS: 3

$68\% \times 50 = 34$

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

29 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

30 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

31 ANS: 3
$34.1\% + 19.1\% = 53.2\%$

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

32 ANS: 2
$\bar{x} \pm \sigma$

153 ± 22

131 – 175

PTS: 2 REF: 011307a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

33 ANS: 2
Top 6.7% = 1.5 s.d. $+ \sigma = 1.5(104) + 576 = 732$

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

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

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

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

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

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

37 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

38 ANS: 1

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

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

39 ANS:

$\frac{{}_{10}P_{10}}{3! \cdot 3! \cdot 2!} = \frac{3,628,800}{72} = 50,400$

PTS: 2 REF: 061330a2 STA: A2.S.10 TOP: Permutations

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

41 ANS: 2

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

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

42 ANS: 1

${}_{10}C_4 = 210$

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

43 ANS:

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

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

44 ANS: 4

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

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

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

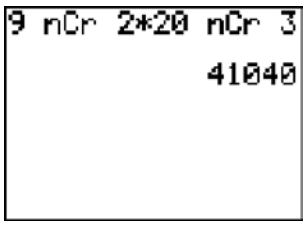
46 ANS: 1 PTS: 2 REF: 011117a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

47 ANS: 1 PTS: 2 REF: 011310a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

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

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

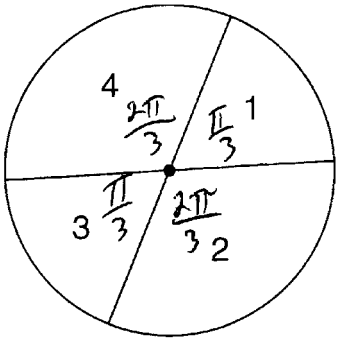
50 ANS:



41,040.

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

51 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

52 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

53 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

54 ANS:

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

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

55 ANS:

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

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

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

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

56 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

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

58 ANS:

$${}_7C_3\left(\frac{1}{4}\right)^3\left(\frac{3}{4}\right)^4 = 35\left(\frac{1}{64}\right)\left(\frac{81}{256}\right) = \frac{2835}{16384} \approx 0.173$$

PTS: 2 REF: 061335a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

59 ANS:

$${}_5C_4 \cdot 0.28^4 \cdot 0.72^1 + {}_5C_5 \cdot 0.28^5 \cdot 0.72^0 \approx 0.024$$

PTS: 4 REF: 011437a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

60 ANS: 1

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

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

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

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

61 ANS: 1

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

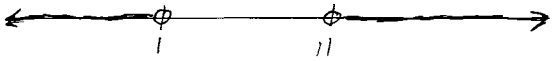
$6x \le 12 \qquad 6x \ge 2$

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

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

62 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

63 ANS: 3

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

64 ANS:

$3 - 2x \ge 7$ or $3 - 2x \le -7$

$-2x \ge 4 \qquad -2x \le -10$

$x \le -2 \qquad x \ge 5$

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

65 ANS: 1

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

$2x > 6 \qquad 2x > -4$

$x > 3 \qquad x < -2$

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

66 ANS:

$-4x + 5 < 13$ $-4x + 5 > -13$ $-2 < x < 4.5$

$-4x < 8$ $-4x > -18$

$x > -2$ $x < 4.5$

PTS: 2 REF: 011432a2 STA: A2.A.1 TOP: Absolute Value Inequalities

67 ANS:

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

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

68 ANS: 2

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

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

69 ANS:

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

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

70 ANS:

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

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

71 ANS: 3

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

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

72 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

73 ANS:

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

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

74 ANS: 3

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

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

75 ANS: 3

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

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

76 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

77 ANS: 4

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

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

78 ANS:

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

PTS: 2 REF: 081028a2 STA: A2.A.7 TOP: Factoring Polynomials
KEY: multiple variables

79 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

80 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

81 ANS: 3

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

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

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

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

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

82 ANS: 4

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

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

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

PTS: 2 REF: 011426a2 STA: A2.A.7 TOP: Factoring by Grouping

83 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

84 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

85 ANS:

$$\frac{2 \pm \sqrt{(-2)^2 - 4(6)(-3)}}{2(6)} = \frac{2 \pm \sqrt{76}}{12} = \frac{2 \pm \sqrt{4}\sqrt{19}}{12} = \frac{2 \pm 2\sqrt{19}}{12} = \frac{1 \pm \sqrt{19}}{6}$$

PTS: 2 REF: 011332a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

86 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

87 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

88 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

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

90 ANS: 2

$b^2 - 4ac = (-9)^2 - 4(2)(4) = 81 - 32 = 49$

PTS: 2 REF: 011411a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

91 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

92 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

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

94 ANS: 2

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

$x+2 = \pm\sqrt{-9}$

$x = -2 \pm 3i$

PTS: 2 REF: 011408a2 STA: A2.A.24 TOP: Completing the Square

95 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

96 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

97 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

98 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

99 ANS:

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

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

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

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

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

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

100 ANS: 3

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

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

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

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

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

$x^2 + x - 20 = 0$

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

$x = -5, 4$

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

101 ANS: 4

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

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

$-8y^2 = -32$

$y^2 = 4$

$y = \pm 2$

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

102 ANS:

$x(x+3) = 10$

$x^2 + 3x - 10 = 0$

$(x+5)(x-2) = 0$

$x = -5, 2$

PTS: 2 REF: 011431a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

103 ANS:

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

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

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

105 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

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

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

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

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

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

109 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

110 ANS: 3

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

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

$6 > 4$

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

111 ANS: 2

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

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

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

113 ANS: 1 PTS: 2 REF: 011402a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

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

115 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

116 ANS:

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

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

117 ANS: 2

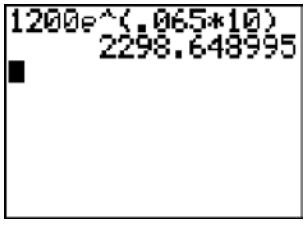
$$\frac{x^{-1}+1}{x+1} = \frac{\frac{1}{x}+1}{x+1} = \frac{\frac{1+x}{x}}{x+1} = \frac{1}{x}$$

PTS: 2 REF: 011211a2 STA: A2.A.9 TOP: Negative Exponents

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

119 ANS: 1 PTS: 2 REF: 061324a2 STA: A2.A.9
TOP: Negative Exponents

120 ANS:



2,298.65.

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

121 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

122 ANS:

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

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

123 ANS: 3

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

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

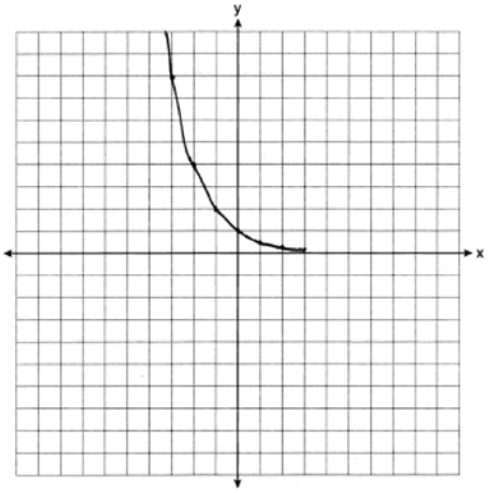
124 ANS: 2

$8^2 = 64$

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

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

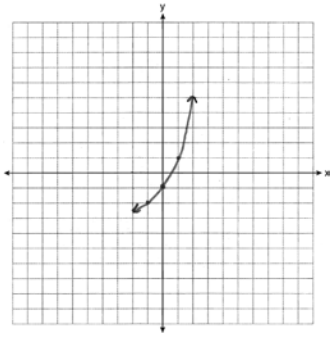
126 ANS:



$y = 0$

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

127 ANS:



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

128 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.53
TOP: Graphing Exponential Functions

129 ANS: 2

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

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

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

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

132 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

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

134 ANS: 2

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

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

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

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

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

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

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

136 ANS: 2

$\log 9 - \log 20$

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

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

$2b - (1 + a)$

$2b - a - 1$

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

137 ANS: 3

$\log 4m^2 = \log 4 + \log m^2 = \log 4 + 2\log m$

PTS: 2 REF: 061321a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs

138 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

139 ANS:

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

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

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

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

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

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

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

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

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

140 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

141 ANS: 3

$x = 5^4 = 625$

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

142 ANS:

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

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

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

143 ANS:

$$(x+4)^2 = 17x - 4$$
$$x^2 + 8x + 16 = 17x - 4$$
$$x^2 - 9x + 20 = 0$$
$$(x-4)(x-5) = 0$$
$$x = 4, 5$$

PTS: 4 REF: 011336a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

144 ANS:

$$2x - 1 = 27^{\frac{4}{3}}$$
$$2x - 1 = 81$$
$$2x = 82$$
$$x = 41$$

PTS: 2 REF: 061329a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

145 ANS:

$\log_{(x+3)}(2x+3)(x+5) = 2$ -6 is extraneous

$$(x+3)^2 = (2x+3)(x+5)$$
$$x^2 + 6x + 9 = 2x^2 + 13x + 15$$
$$x^2 + 7x + 6 = 0$$
$$(x+6)(x+1) = 0$$
$$x = -1$$

PTS: 6 REF: 011439a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: applying properties of logarithms

146 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

147 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

148 ANS:

$$30700 = 50e^{3t}$$

$$614 = e^{3t}$$

$$\ln 614 = \ln e^{3t}$$

$$\ln 614 = 3t \ln e$$

$$\ln 614 = 3t$$

$$2.14 \approx t$$

PTS: 2 REF: 011333a2 STA: A2.A.6 TOP: Exponential Growth

149 ANS: 3

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

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

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

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

$$13.9 \approx t$$

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

150 ANS: 3

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

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

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

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

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

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

151 ANS: 4

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

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

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

$6x + 2 = 3x + 6$

$3x = 4$

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

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

152 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

153 ANS: 2

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

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

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

$4x + 10 = 9x$

$10 = 5x$

$2 = x$

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

154 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

155 ANS: 4

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

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

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

$9k + 12 = 4k - 2$

$5k = -14$

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

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

156 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

157 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

158 ANS: 1

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

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

159 ANS: 3

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

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

160 ANS: 3

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

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

161 ANS: 3

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

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

162 ANS:

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

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

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

$4x^2 - 9 = 0$ or $2x + 1 = 0$

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

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

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

163 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

164 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

165 ANS:

$x^4 + 4x^3 + 4x^2 + 16x = 0$

$x(x^3 + 4x^2 + 4x + 16) = 0$

$x(x^2(x + 4) + 4(x + 4)) = 0$

$x(x^2 + 4)(x + 4) = 0$

$x = 0, \pm 2i, -4$

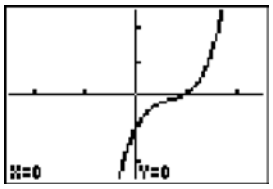
PTS: 6 REF: 061339a2 STA: A2.A.26 TOP: Solving Polynomial Equations

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

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

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

168 ANS: 4



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

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

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

170 ANS:

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

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

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

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

172 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

173 ANS: 3

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

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

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

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

174 ANS: 4

$\left(\sqrt[3]{27x^2}\right)\left(\sqrt[3]{16x^4}\right) = \sqrt[3]{3^3 \cdot 2^4 \cdot x^6} = 3 \cdot 2 \cdot x^2\sqrt[3]{2} = 6x^2\sqrt[3]{2}$

PTS: 2 REF: 011421a2 STA: A2.N.2 TOP: Operations with Radicals

175 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

176 ANS:

$\frac{\sqrt{108x^5y^8}}{\sqrt{6xy^5}} = \sqrt{18x^4y^3} = 3x^2y\sqrt{2y}$

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

177 ANS:

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

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

178 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

179 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

180 ANS: 1

$$\frac{1}{7-\sqrt{11}} \cdot \frac{7+\sqrt{11}}{7+\sqrt{11}} = \frac{7+\sqrt{11}}{49-11} = \frac{7+\sqrt{11}}{38}$$

PTS: 2 REF: 011404a2 STA: A2.N.5 TOP: Rationalizing Denominators

181 ANS: 3

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

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

182 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

183 ANS: 4

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

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

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

185 ANS: 3

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

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

$0 = x^2 + x - 12$

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

$x = -4 \quad x = 3$

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

186 ANS:

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

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

$2x - 5 = 9$

$2x = 14$

$x = 7$

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

187 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

188 ANS:

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

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

$0 = 15x^2 - 25x + 10$

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

$0 = (3x-2)(x-1)$

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

$-4\left(\frac{2}{3}\right) + 3 \geq 0$

$\frac{1}{3} \geq 0$

$-4(1) + 3 < 0$

1 is extraneous

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

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

190 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

191 ANS: 1

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

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

192 ANS: 3

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

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

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

194 ANS: 1

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

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

195 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

196 ANS:

$4xi + 5yi^8 + 6xi^3 + 2yi^4 = 4xi + 5y - 6xi + 2y = 7y - 2xi$

PTS: 2 REF: 011433a2 STA: A2.N.7 TOP: Imaginary Numbers

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

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

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

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

201 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

202 ANS: 4

$(x + i)^2 - (x - i)^2 = x^2 + 2xi + i^2 - (x^2 - 2xi + i^2) = 4xi$

PTS: 2 REF: 011327a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

203 ANS: 3

$(3i)(2i)^2(m+i)$

$(3i)(4i^2)(m+i)$

$(3i)(-4)(m+i)$

$(-12i)(m+i)$

$-12mi-12i^2$

$-12mi+12$

PTS: 2 REF: 061319a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

204 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

205 ANS:

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

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

206 ANS: 4

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

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

207 ANS: 3

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

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

208 ANS:

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

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

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

$$4 \neq 2$$

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

209 ANS:

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

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

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

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

$$3x = 1$$

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

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

210 ANS:

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

$13 = 10x - x^2$

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

PTS: 4 REF: 061336a2 STA: A2.A.23 TOP: Solving Rationals
KEY: irrational and complex solutions

211 ANS: 3

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

$\frac{-6(1)+30}{1-2} = \frac{24}{-1} = -24$, which is less than 0. If $x=3$, $\frac{-6(3)+30}{3-2} = \frac{12}{1} = 12$, which is greater than 0. If $x=6$, $\frac{-6(6)+30}{6-2} = \frac{-6}{4} = -\frac{3}{2}$, which is less than 0.

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

212 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

213 ANS:

$$\frac{\frac{1}{2}-\frac{4}{d}}{\frac{1}{d}+\frac{3}{2d}} = \frac{\frac{d-8}{2d}}{\frac{2d+3d}{2d^2}} = \frac{d-8}{2d} \times \frac{2d^2}{5d} = \frac{d-8}{5}$$

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

214 ANS: 2

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

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

215 ANS: 3

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

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

216 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

217 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

218 ANS: 1

$20(-2) = x(-2x + 2)$

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

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

$x^2 - x - 20 = 0$

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

$x = -4, 5$

PTS: 2 REF: 011321a2 STA: A2.A.5 TOP: Inverse Variation

219 ANS: 2

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

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

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

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

220 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

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

221 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

222 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

223 ANS:

$g(10) = \left(a(10)\sqrt{1-x} \right)^2 = 100a^2(-9) = -900a^2$

PTS: 2 REF: 061333a2 STA: A2.A.41 TOP: Functional Notation

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

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

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

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

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

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

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

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

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

233 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

234 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

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

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

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

238 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43
TOP: Defining Functions

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

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

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

242 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
243 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
244 ANS: 2 PTS: 2 REF: 081003a2 STA: A2.A.51
TOP: Domain and Range
245 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
246 ANS: 1 PTS: 2 REF: 061202a2 STA: A2.A.51
TOP: Domain and Range

Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic
Answer Section

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

248 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

249 ANS: 2

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

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

250 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

251 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

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

253 ANS: 3

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

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

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

255 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

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

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

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

259 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

260 ANS: 4

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

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

261 ANS:

$\frac{31-19}{7-4} = \frac{12}{3} = 4$ $x + (4-1)4 = 19$ $a_n = 7 + (n-1)4$

$x + 12 = 19$

$x = 7$

PTS: 2 REF: 011434a2 STA: A2.A.29 TOP: Sequences

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

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

264 ANS: 1

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

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

265 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

266 ANS: 3

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

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

267 ANS: 2

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

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

268 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

269 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

270 ANS:

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

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

271 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

272 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

273 ANS:

230. $10 + (1^3 - 1) + (2^3 - 1) + (3^3 - 1) + (4^3 - 1) + (5^3 - 1) = 10 + 0 + 7 + 26 + 63 + 124 = 230$

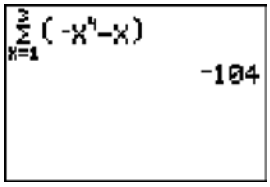
PTS: 2 REF: 011131a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

274 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

275 ANS:

-104. 

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

276 ANS: 4

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

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

$46 - 12x$

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

277 ANS: 4

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

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

$4a^2 - 20a + 30$

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

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

279 ANS:

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

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

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

281 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

282 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

283 ANS:

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

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

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

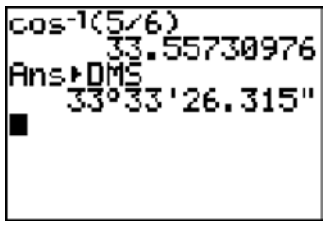
PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

284 ANS: 3

$S_8 = \frac{3(1-(-4)^8)}{1-(-4)} = \frac{196,605}{5} = -39,321$

PTS: 2 REF: 061304a2 STA: A2.A.35 TOP: Summations
KEY: geometric

285 ANS: 1



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

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

$K \approx 33°33'$

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

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

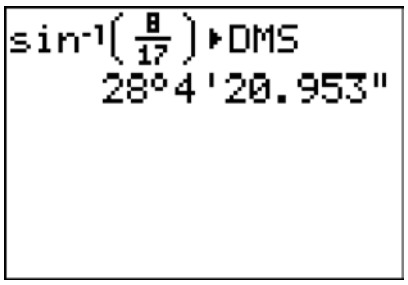
287 ANS: 1

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

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

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

289 ANS: 2



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

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

$S \approx 28°4'$

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

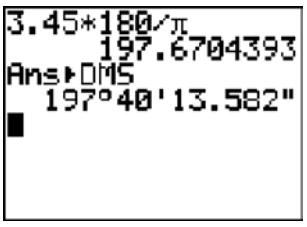
290 ANS: 3

$2\pi \cdot \frac{5}{12} = \frac{10\pi}{12} = \frac{5\pi}{6}$

PTS: 2 REF: 061125a2 STA: A2.M.1 TOP: Radian Measure

291 ANS:

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



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

292 ANS: 2

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

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

293 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

294 ANS:

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

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

295 ANS: 1

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

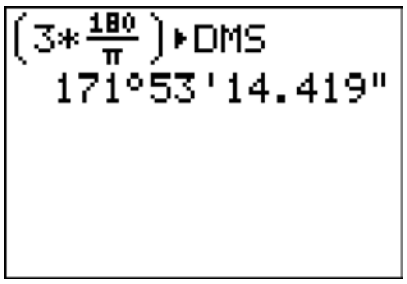
PTS: 2 REF: 011220a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

296 ANS:

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

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

297 ANS:



$3 \times \frac{180}{\pi} \approx 171.89° \approx 171°53'$.

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

298 ANS: 2

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

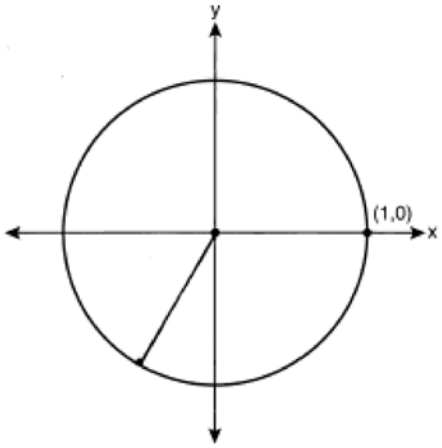
PTS: 2 REF: 061302a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

299 ANS: 1

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

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

300 ANS:



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

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

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

302 ANS: 4 PTS: 2 REF: 061206a2 STA: A2.A.60
TOP: Unit Circle

303 ANS: 3
If $\csc P > 0$, $\sin P > 0$. If $\cot P < 0$ and $\sin P > 0$, $\cos P < 0$

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

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

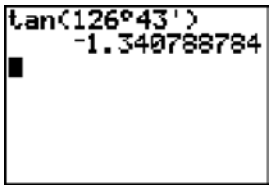
305 ANS:
$$\frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} = \frac{\sqrt{6}}{4}$$

PTS: 2 REF: 061331a2 STA: A2.A.56 TOP: Determining Trigonometric Functions
KEY: degrees, common angles

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

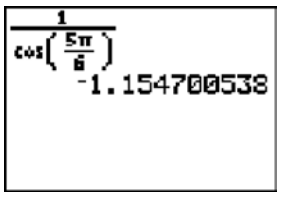
PTS: 2 REF: fall0933a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

307 ANS: 2



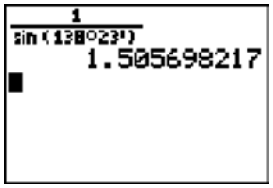
PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

308 ANS: 1



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

309 ANS: 4



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

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

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

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

313 ANS: 2

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

$\frac{\sqrt{3}}{k} = \cos 30$

$k = 2$

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

314 ANS: 2

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

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

315 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

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

316 ANS: 4

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

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

317 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

318 ANS:

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

PTS: 2 REF: 011435a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

319 ANS: 3

Cofunctions tangent and cotangent are complementary

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

320 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

321 ANS:

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

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

322 ANS:

$$a + 15 + 2a = 90$$
$$3a + 15 = 90$$
$$3a = 75$$
$$a = 25$$

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

323 ANS:

$$\frac{\cot x \sin x}{\sec x} = \frac{\frac{\cos x}{\sin x}\sin x}{\frac{1}{\cos x}} = \cos^2 x$$

PTS: 2 REF: 061334a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

324 ANS:

$$\sec\theta \sin\theta \cot\theta = \frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta} = 1$$

PTS: 2 REF: 011428a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

325 ANS:

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

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

326 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

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

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

329 ANS:

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

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

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

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

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

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

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

330 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

331 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

332 ANS: 1

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

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

333 ANS: 4

$$\sin(\theta + 90) = \sin\theta \cdot \cos 90 + \cos\theta \cdot \sin 90 = \sin\theta \cdot (0) + \cos\theta \cdot (1) = \cos\theta$$

PTS: 2 REF: 061309a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: identities

334 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

335 ANS: 3

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

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

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

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

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

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

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

336 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

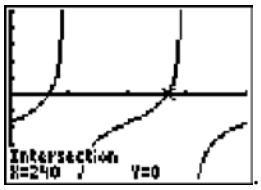
337 ANS: 4

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

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

338 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

339 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

340 ANS:
45, 225 $2\tan C - 3 = 3\tan C - 4$

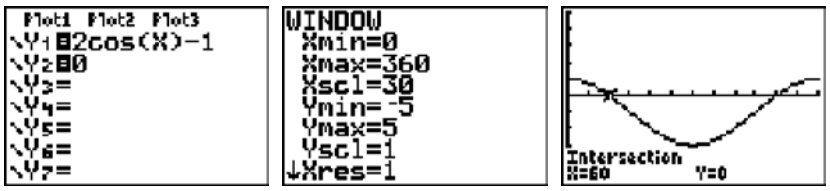
$1 = \tan C$

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

$C = 45, 225$

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

341 ANS: 4



$2\cos\theta = 1$

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

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

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

342 ANS: 3

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

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

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

$x = 135, 225$

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

343 ANS:

$5\csc\theta = 8$

$\csc\theta = \frac{8}{5}$

$\sin\theta = \frac{5}{8}$

$\theta \approx 141$

PTS: 2 REF: 061332a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

344 ANS:

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

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

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

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

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

345 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

346 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

347 ANS: 1

$\frac{2\pi}{b} = 4\pi$

$b = \frac{1}{2}$

PTS: 2 REF: 011425a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

348 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

349 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

350 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

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

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

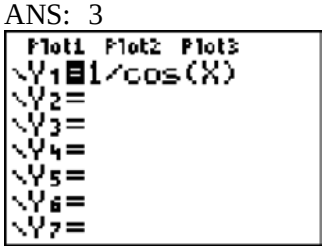
353 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

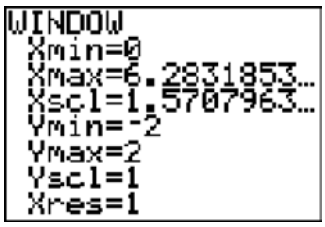
354 ANS: 3

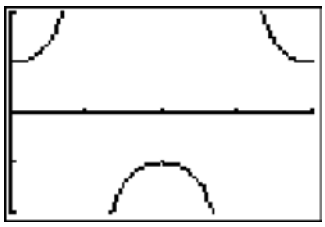
$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$

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

355 ANS: 3

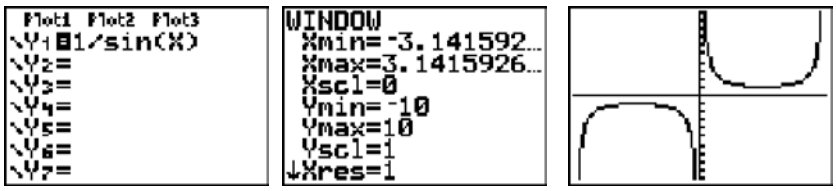






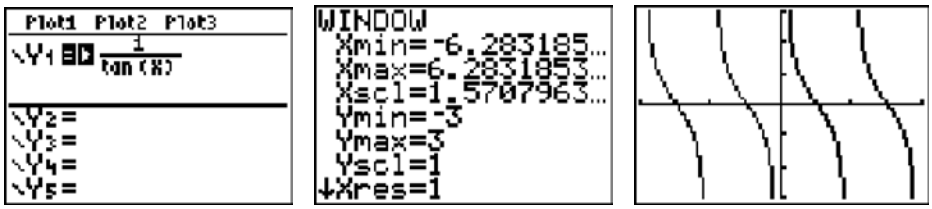
PTS: 2 REF: 061020a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

356 ANS: 1



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

357 ANS: 3



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

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

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

360 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

361 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

362 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

363 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

364 ANS:

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

PTS: 2 REF: 061234a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

365 ANS: 3

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

$42 \approx 3.5a$

$12 \approx a$

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

366 ANS:

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

$a \approx 10.3$

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

367 ANS:

$K = ab\sin C = 6 \cdot 6\sin 50 \approx 27.6$

PTS: 2 REF: 011429a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

368 ANS:

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

$B = \sin^{-1}\dfrac{10\sin 32}{12} \approx 26.2$ $c = \dfrac{12\sin 121.8}{\sin 32} \approx 19.2$

PTS: 4 REF: 011137a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

369 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

370 ANS:

$\frac{100}{\sin 32} = \frac{b}{\sin 105}$. $\frac{100}{\sin 32} = \frac{a}{\sin 43}$

$b \approx 182.3$ $a \approx 128.7$

PTS: 4 REF: 011338a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

371 ANS: 2 PTS: 2 REF: 061322a2 STA: A2.A.73
TOP: Law of Sines KEY: modeling

372 ANS: 3

$\frac{59.2}{\sin 74} = \frac{60.3}{\sin C}$ $180 - 78.3 = 101.7$

$C \approx 78.3$

PTS: 2 REF: 081006a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

373 ANS: 2

$\frac{10}{\sin 35} = \frac{13}{\sin B}$. $35 + 48 < 180$

$B \approx 48, 132$ $35 + 132 < 180$

PTS: 2 REF: 011113a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

374 ANS: 1

$\frac{9}{\sin A} = \frac{10}{\sin 70}$. $58° + 70°$ is possible. $122° + 70°$ is not possible.

$A = 58$

PTS: 2 REF: 011210a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

375 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

376 ANS: 4

$\frac{13}{\sin 40} = \frac{20}{\sin M}$. $81 + 40 < 180$. $(180 - 81) + 40 < 180$

$M \approx 81$

PTS: 2 REF: 061327a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

377 ANS: 2

$\frac{5}{\sin 32} = \frac{8}{\sin E}$ $\quad 57.98 + 32 < 180$

$E \approx 57.98$ $\quad (180 - 57.98) + 32 < 180$

PTS: 2 REF: 011419a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

378 ANS:

33. $a = \sqrt{10^2 + 6^2 - 2(10)(6)\cos 80} \approx 10.7$. $\angle C$ is opposite the shortest side. $\frac{6}{\sin C} = \frac{10.7}{\sin 80}$

$C \approx 33$

PTS: 6 REF: 061039a2 STA: A2.A.73 TOP: Law of Cosines
KEY: advanced

379 ANS: 4

$7^2 = 3^2 + 5^2 - 2(3)(5)\cos A$

$49 = 34 - 30\cos A$

$15 = -30\cos A$

$-\frac{1}{2} = \cos A$

$120 = A$

PTS: 2 REF: 081017a2 STA: A2.A.73 TOP: Law of Cosines
KEY: angle, without calculator

380 ANS: 1

$13^2 = 15^2 + 14^2 - 2(15)(14)\cos C$

$169 = 421 - 420\cos C$

$-252 = -420\cos C$

$\frac{252}{420} = \cos C$

$53 \approx C$

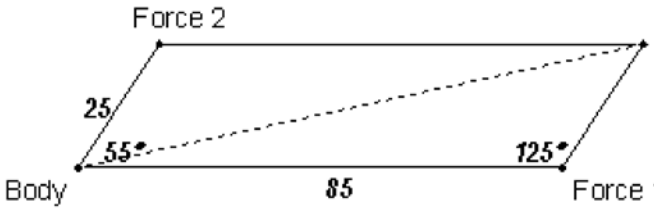
PTS: 2 REF: 061110a2 STA: A2.A.73 TOP: Law of Cosines
KEY: find angle

381 ANS:

$\sqrt{27^2 + 32^2 - 2(27)(32)\cos 132} \approx 54$

PTS: 4 REF: 011438a2 STA: A2.A.73 TOP: Law of Cosines
KEY: applied

382 ANS:



101.43, 12.

$r^2 = 25^2 + 85^2 - 2(25)(85)\cos 125.$

$r^2 \approx 10287.7$

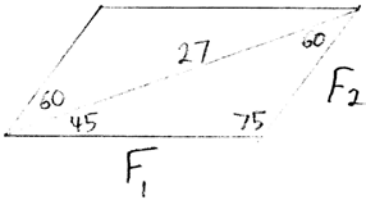
$r \approx 101.43$

$\frac{2.5}{\sin x} = \frac{101.43}{\sin 125}$

$x \approx 12$

PTS: 6 REF: fall0939a2 STA: A2.A.73 TOP: Vectors

383 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

384 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

385 ANS: 3

$x^2 + y^2 - 16x + 6y + 53 = 0$

$x^2 - 16x + 64 + y^2 + 6y + 9 = -53 + 64 + 9$

$(x-8)^2 + (y+3)^2 = 20$

PTS: 2 REF: 011415a2 STA: A2.A.47 TOP: Equations of Circles

386 ANS:

$(x+3)^2 + (y-4)^2 = 25$

PTS: 2 REF: fall0929a2 STA: A2.A.49 TOP: Writing Equations of Circles

387 ANS:
$(x+5)^2+(y-3)^2=32$

PTS: 2 REF: 081033a2 STA: A2.A.49 TOP: Writing Equations of Circles
388 ANS: 2 PTS: 2 REF: 011126a2 STA: A2.A.49
TOP: Equations of Circles
389 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
390 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles