JMAP
REGENTS BY PERFORMANCE INDICATOR: TOPIC

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

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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

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

A2.S.3: AVERAGE KNOWN WITH MISSING DATA

9 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 $17 = \frac{446 + 16x}{26 + x}$

10 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

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

Statistics Class Averages

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

What is the population variance for this set of data?
1 8.2
2 8.3
3 67.3
4 69.3

12 The 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*.

13 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.

14 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.

15 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?

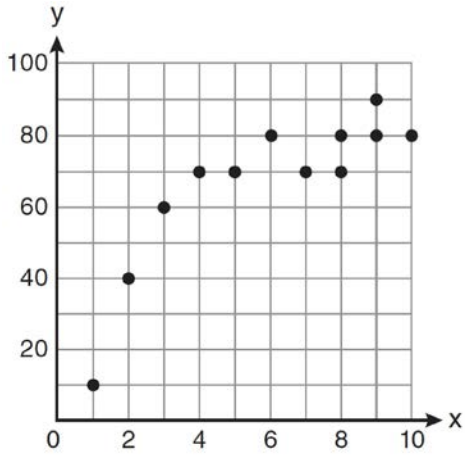
16 The following is a list of the individual points scored by all twelve members of the Webster High School basketball team at a recent game:

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

17 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

18 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.

19 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.*

20 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.

21 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 ^{o}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.*

22 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.

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

Concentration of Ozone

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

A2.S.8: CORRELATION COEFFICIENT

24 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

25 Which calculator output shows the strongest linear relationship between *x* and *y*?

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

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

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

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

26 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

27 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

28 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

29 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

30 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

31 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.

32 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.

33 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%

34 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

35 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

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

PROBABILITY

A2.S.10: PERMUTATIONS

37 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 $\frac{8!}{2!\cdot 2!}$

38 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.

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

40 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

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

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

43 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 $\frac{11!}{2!\cdot 2!\cdot 2!}$

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

1 $\frac{12!}{3!}$

2 $\frac{12!}{6!}$

3 $\frac{{}_{12}P_{12}}{8}$

4 $\frac{{}_{12}P_{12}}{6!}$

A2.S.11: COMBINATIONS

45 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

46 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

47 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.

48 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

49 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 ${}_{20}P_3$

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

51 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 ${}_8C_5$

52 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?

53 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

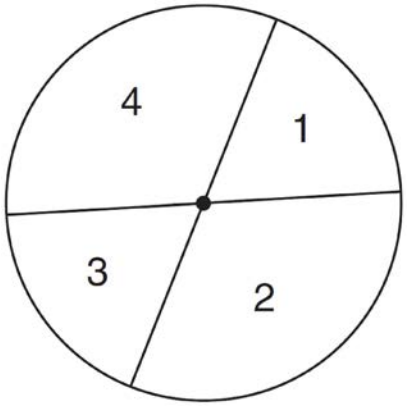
54 A committee of 5 members is to be randomly selected from a group of 9 teachers and 20 students. Determine how many different committees can be formed if 2 members must be teachers and 3 members must be students.

55 A school math team consists of three juniors and five seniors. How many different groups can be formed that consist of one junior and two seniors?

1 13
2 15
3 30
4 60

A2.S.13: GEOMETRIC PROBABILITY

56 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

57 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?

58 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.

59 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.

60 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.

61 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 $\frac{225}{512}$

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

63 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.

64 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.

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

ABSOLUTE VALUE

A2.A.1: ABSOLUTE VALUE EQUATIONS AND INEQUALITIES

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

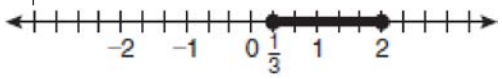
1 $\varnothing$

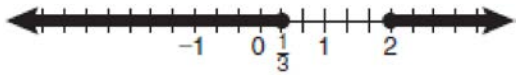
2 $\{0\}$

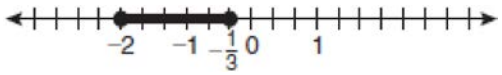
3 $\left\{\frac{1}{2}\right\}$

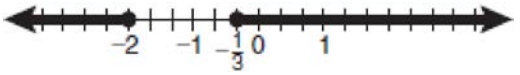
4 $\left\{0, \frac{1}{2}\right\}$

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

1 

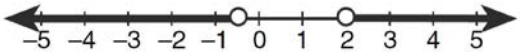
2 

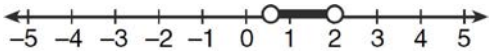
3 

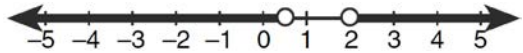
4 

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

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

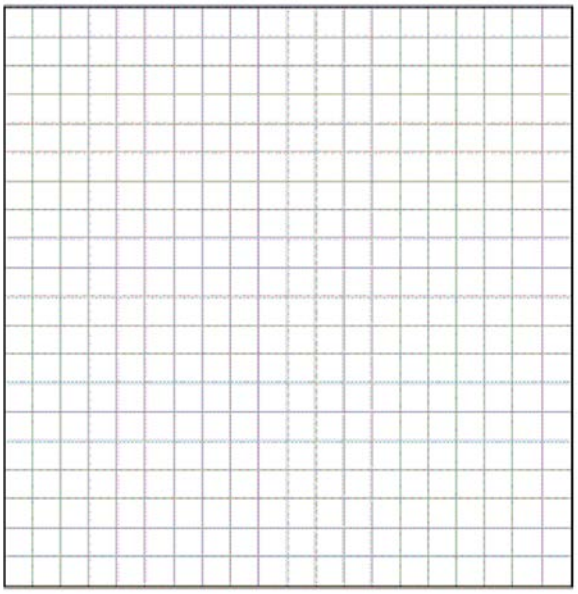
1 

2 

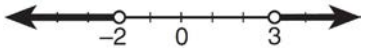
3 

4 

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



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

1 

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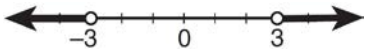
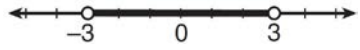
3 

4 

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

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

QUADRATICS

A2.A.20-21: ROOTS OF QUADRATICS

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

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

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

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

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

1 5

2 $\frac{5}{2}$

3 -5

4 $-\frac{5}{2}$

79 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 $4x^2 + 3x - 2 = 0$

80 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 $2x^2 - 6x + 4 = 0$

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

82 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 $4x^2 - 9x - 3 = 0$

83 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

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

85 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 $2x^2(2x + 3)(3x - 2)$

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

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

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

A2.A.7: FACTORING BY GROUPING

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

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

90 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

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

92 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 $\frac{7 \pm \sqrt{73}}{4}$

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

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

A2.A.2: USING THE DISCRIMINANT

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

96 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

97 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

98 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

99 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

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

A2.A.24: COMPLETING THE SQUARE

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

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

103 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

104 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 $-3 \pm 2i$

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

1 $x^2 - 6x + 9 = 25 + 9$

2 $x^2 - 6x - 9 = 25 - 9$

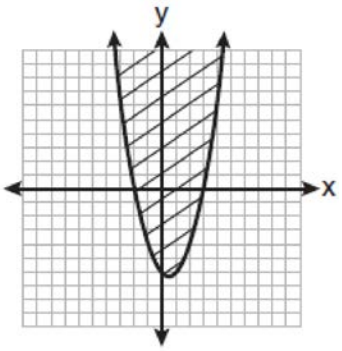
3 $x^2 - 6x + 36 = 25 + 36$

4 $x^2 - 6x - 36 = 25 - 36$

A2.A.4: QUADRATIC INEQUALITIES

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

1



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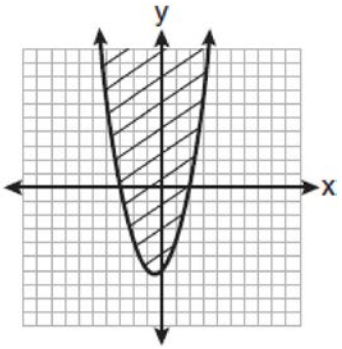

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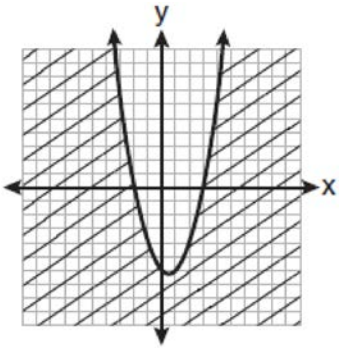

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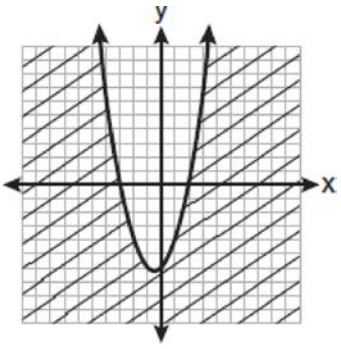


107 The solution set of the inequality $x^2 - 3x > 10$ is
1 $\{x|-2 < x < 5\}$
2 $\{x|0 < x < 3\}$
3 $\{x|x < -2 \text{ or } x > 5\}$
4 $\{x|x < -5 \text{ or } x > 2\}$

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

SYSTEMS

A2.A.3: QUADRATIC-LINEAR SYSTEMS

109 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

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

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

111 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)

112 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)

113 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

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

115 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 $x^2 - x - 3$

116 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.

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

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

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

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

1 $4 - 9x$

2 $4 - 3x$

3 $4 - 12\sqrt{x} + 9x$

4 $4 - 12\sqrt{x} + 6x$

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

121 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 $\frac{8}{9}$

122 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 $4n^{-1} > (6n)^{-1}$

123 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}

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

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

2 $3xy^3$

3 $\frac{3}{xy^3}$

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

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

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

2 $-3x^2$

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

4 $-9x^2$

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

1 $-8a^4$

2 $\frac{16}{a^4}$

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

4 $\frac{1}{16a^4}$

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

1 $\frac{a^6}{b^5}$

2 $\frac{b^5}{a^6}$

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

4 $a^{-2}b^{-1}$

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

1 -1

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

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

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

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

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

1 1

2 $\frac{1}{x}$

3 x

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

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

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

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

3 $3x^4y^5$

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

132 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

133 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.

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

135 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%.

136 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

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

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

A2.A.18: EVALUATING LOGARITHMIC EXPRESSIONS

138 The expression $\log_8 64$ is equivalent to

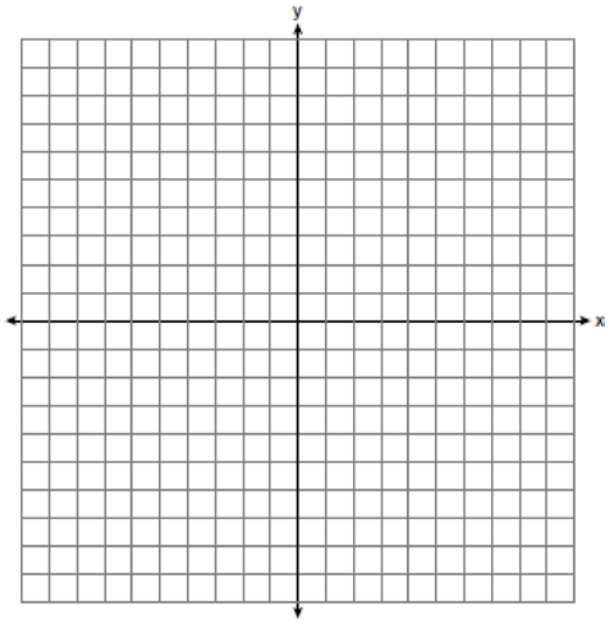
1 8
2 2
3 $\frac{1}{2}$
4 $\frac{1}{8}$

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

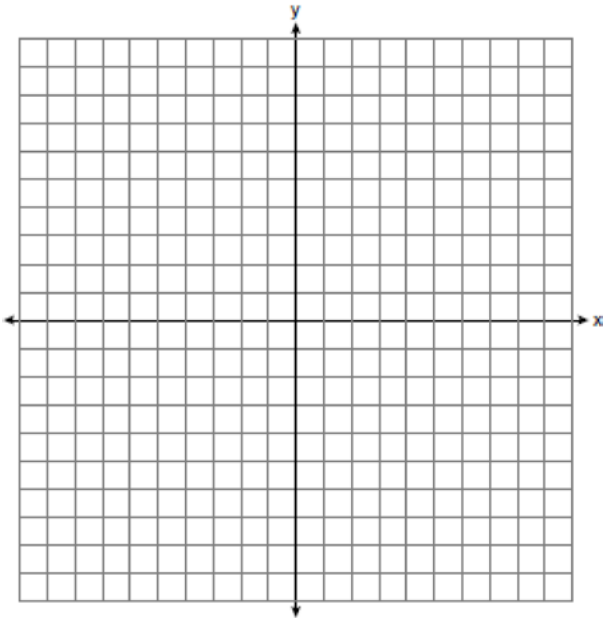
1 $\frac{1}{2}$
2 2
3 $-\frac{1}{2}$
4 -2

A2.A.53: GRAPHING EXPONENTIAL FUNCTIONS

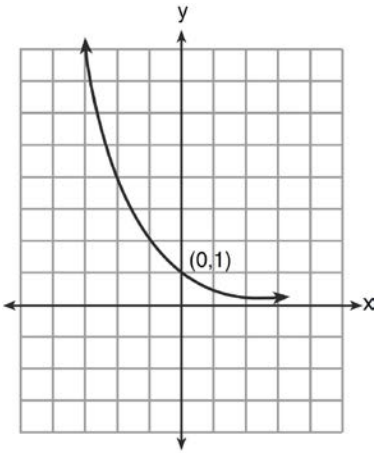
140 The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\frac{1}{2}\right)^x$ and write the equation of this asymptote.



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



142 What is the equation of the graph shown below?



1 $y = 2^x$

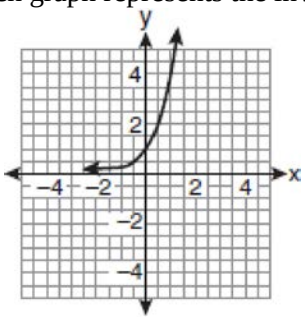
2 $y = 2^{-x}$

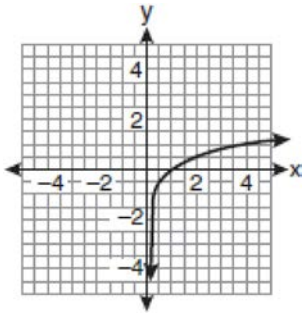
3 $x = 2^y$

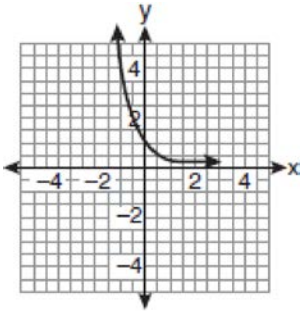
4 $x = 2^{-y}$

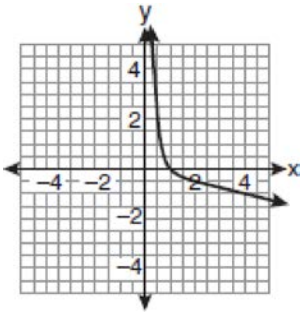
A2.A.54: GRAPHING LOGARITHMIC FUNCTIONS

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

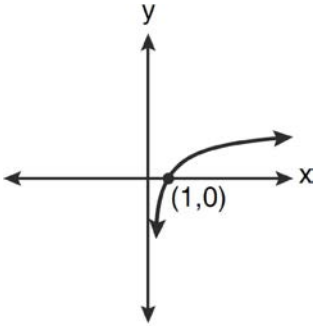
1 

2 

3 

4 

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

1


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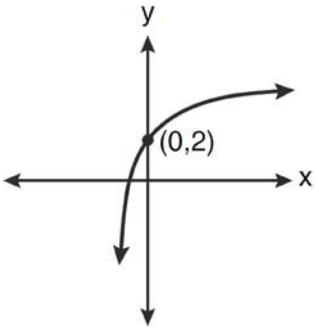

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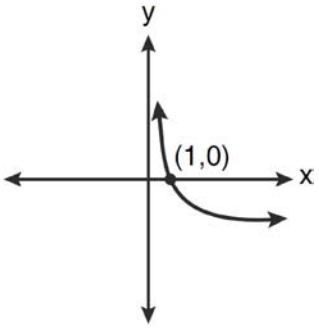
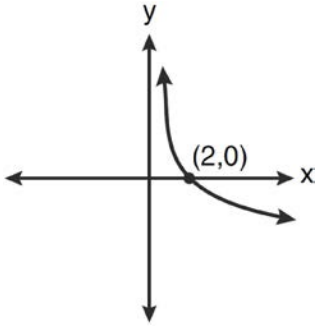
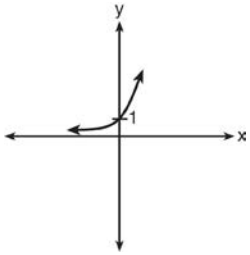


4


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

1


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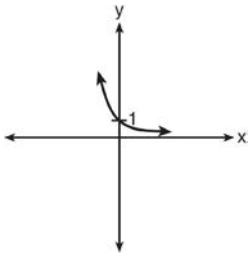

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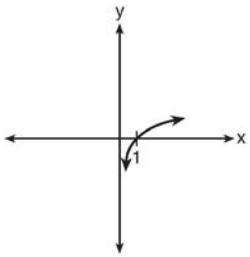

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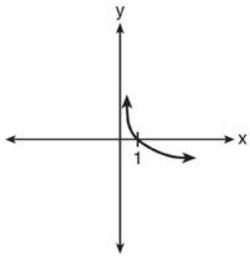


A2.A.19: PROPERTIES OF LOGARITHMS

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

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

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

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

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

147 If $r = \sqrt[3]{\frac{A^2B}{C}}$, then $\log r$ can be represented by

1 $\frac{1}{6}\log A + \frac{1}{3}\log B - \log C$

2 $3(\log A^2 + \log B - \log C)$

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

4 $\frac{2}{3}\log A + \frac{1}{3}\log B - \frac{1}{3}\log C$

148 If $\log x^2 - \log 2a = \log 3a$, then $\log x$ expressed in terms of $\log a$ is equivalent to

1 $\frac{1}{2}\log 5a$

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

3 $\log 6 + \log a$

4 $\log 6 + 2\log a$

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

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

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

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

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

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

1 $2b - a + 1$

2 $2b - a - 1$

3 $b^2 - a + 10$

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

151 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 $\log 16 + 2\log m$

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

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

2 $3\log(2x)$

3 $3\log 2 + 3\log x$

4 $\log 2 + 3\log x$

A2.A.28: LOGARITHMIC EQUATIONS

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

1 6.4

2 2.56

3 $\frac{9}{5}$

4 $\frac{8}{5}$

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

155 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.]

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

1 1.16

2 20

3 625

4 1,024

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

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

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

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

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

A2.A.6, 27: EXPONENTIAL EQUATIONS

162 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

163 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

164 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.

165 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

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

167 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 $\frac{4}{3}$

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

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

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

171 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

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

1 $-720x^2$

2 $-240x$

3 $720x^2$

4 $1,080x^3$

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

174 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

175 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 $2x^4y^2$

176 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 $\frac{15}{4}x^4y^2$

177 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

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

179 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 $0, -1, -2$

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

1 $\{0, \pm 2\}$

2 $\{0, \pm 2, 3\}$

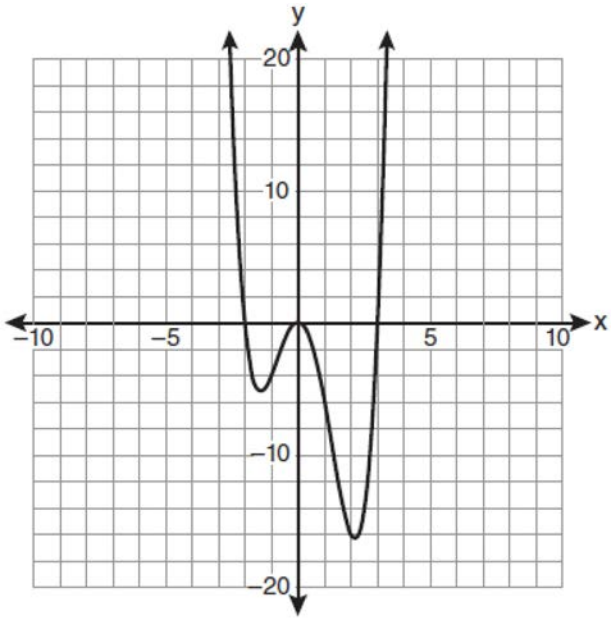
3 $\{0, \pm 2, \pm 2i\}$

4 $\{\pm 2, \pm 2i\}$

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

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

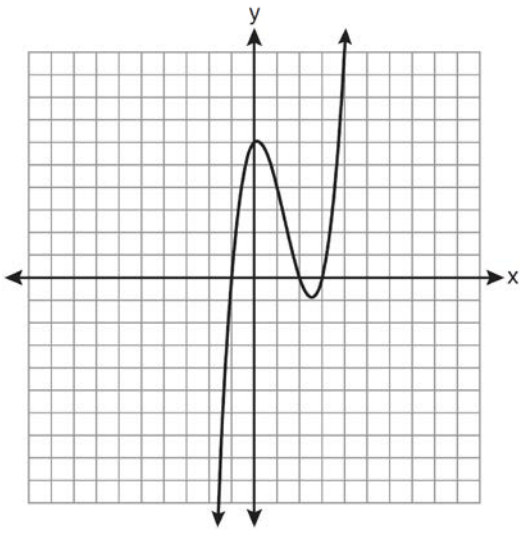
183 The graph of $y = f(x)$ is shown below.



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

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

184 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

185 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

186 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

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

188 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

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

190 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 $10a^2b\sqrt[3]{8}$

191 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 $6x^2\sqrt[3]{2}$

192 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 $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

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

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

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

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

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

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

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

199 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 $2\sqrt{x+2}$

200 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

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

1 $\{1\}$

2 $\{0\}$

3 $\{1,6\}$

4 $\{2,3\}$

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

1 $\{-3,4\}$

2 $\{-4,3\}$

3 $\{3\}$

4 $\{-4\}$

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

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

1 $\{4\}$

2 $\{-5\}$

3 $\{4,5\}$

4 $\{-5,4\}$

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

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

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

2 $\{2,4\}$

3 $\{4\}$

4 $\{\ \}$

A2.A.10-11: EXPONENTS AS RADICALS

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

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

209 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

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

211 Expressed in simplest form, $\sqrt{-18} - \sqrt{-32}$ is
1 $-\sqrt{2}$
2 $-7\sqrt{2}$
3 $-i\sqrt{2}$
4 $7i\sqrt{2}$

A2.N.7: IMAGINARY NUMBERS

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

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

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

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

A2.N.8: CONJUGATES OF COMPLEX NUMBERS

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

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

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

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

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

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

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

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

223 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

224 Perform the indicated operations and simplify completely:

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

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

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

A2.A.16: ADDITION AND SUBTRACTION OF RATIONALS

227 Expressed in simplest form, $\dfrac{3y}{2y - 6} + \dfrac{9}{6 - 2y}$ is equivalent to
1 $\dfrac{-6y^2 + 36y - 54}{(2y - 6)(6 - 2y)}$
2 $\dfrac{3y - 9}{2y - 6}$
3 $\dfrac{3}{2}$
4 $-\dfrac{3}{2}$

A2.A.23: SOLVING RATIONALS AND RATIONAL INEQUALITIES

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

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

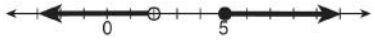
230 Solve the equation below algebraically, and express the result in simplest radical form:

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

231 What is the solution set of the equation $\dfrac{30}{x^2 - 9} + 1 = \dfrac{5}{x - 3}$?
1 $\{2, 3\}$
2 $\{2\}$
3 $\{3\}$
4 $\{\ \}$

232 Which graph represents the solution set of $\dfrac{x + 16}{x - 2} \leq 7$?
1 

2 

3 

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A2.A.17: COMPLEX FRACTIONS

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

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

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

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

1 $\dfrac{1}{2}$
2 $\dfrac{x}{x+2}$
3 $\dfrac{x}{3}$
4 $-\dfrac{x}{x-2}$

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

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

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

A2.A.5: INVERSE VARIATION

238 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.

239 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

240 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 $\dfrac{20}{19}$
3 -5 and 4
4 $-\dfrac{1}{4}$

241 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 $\dfrac{1}{3}$
3 3
4 27

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

242 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

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

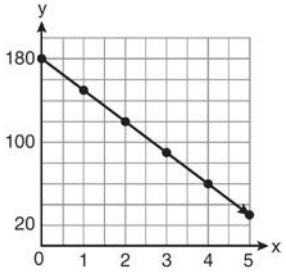
244 If $f(x) = \dfrac{x}{x^2 - 16}$, what is the value of $f(-10)$?

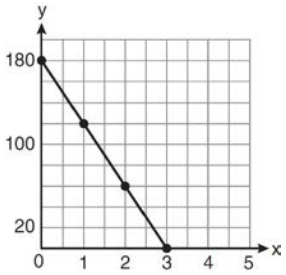
1 $-\dfrac{5}{2}$
2 $-\dfrac{5}{42}$
3 $\dfrac{5}{58}$
4 $\dfrac{5}{18}$

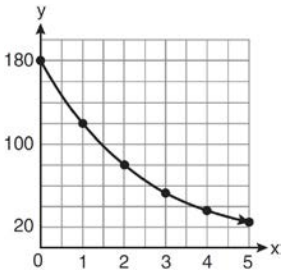
245 If $g(x) = \left(ax\sqrt{1-x}\right)^2$, express $g(10)$ in simplest form.

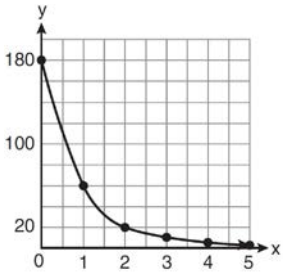
A2.A.52: FAMILIES OF FUNCTIONS

246 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

247 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 $(e, 1)$.

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

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

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

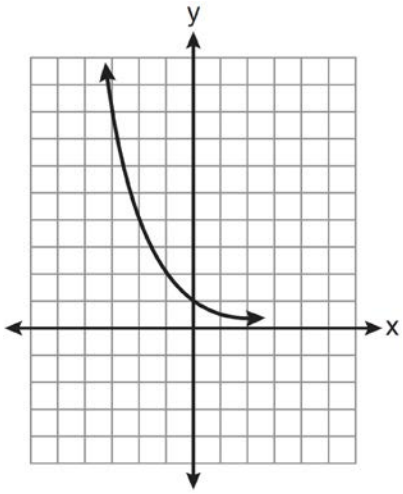
249 Four points on the graph of the function f(x) are shown below.

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

Which equation represents f(x)?

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

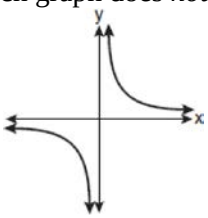
250 Which equation is represented by the graph below?

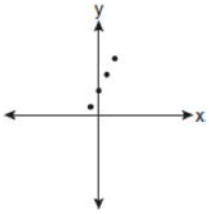


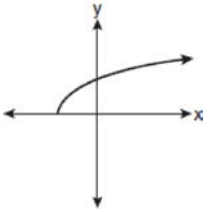
1 $y = 5^x$
2 $y = 0.5^x$
3 $y = 5^{-x}$
4 $y = 0.5^{-x}$

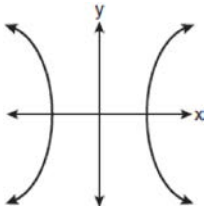
A2.A.38, 43: DEFINING FUNCTIONS

251 Which graph does *not* represent a function?

1 

2 

3 

4 

252 Which relation is *not* a function?

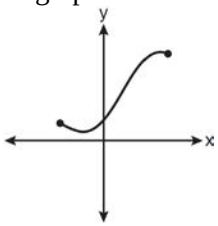
1 $(x-2)^2+y^2=4$

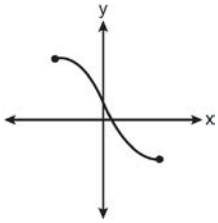
2 $x^2+4x+y=4$

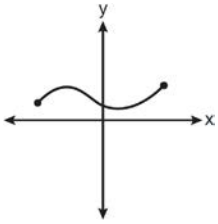
3 $x+y=4$

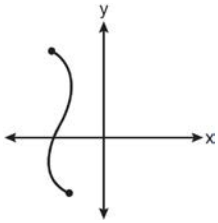
4 $xy=4$

253 Which graph does *not* represent a function?

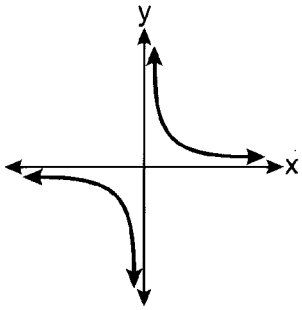
1 

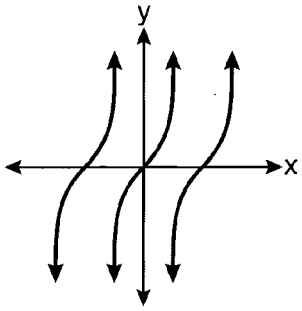
2 

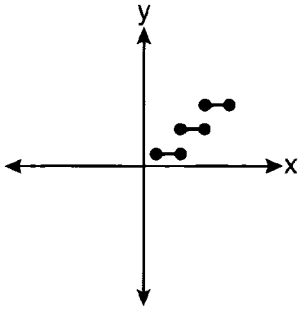
3 

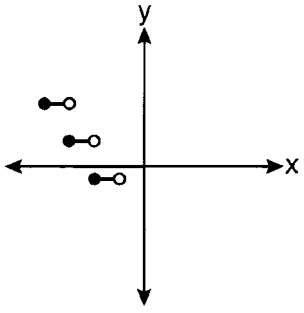
4 

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

1


2


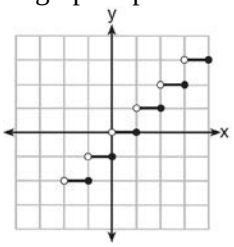
3


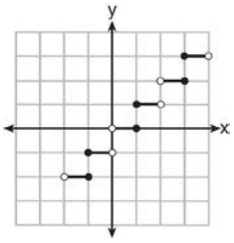
4


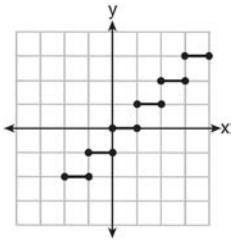
255 Given the relation $\{(8,2),(3,6),(7,5),(k,4)\}$, which value of k will result in the relation *not* being a function?

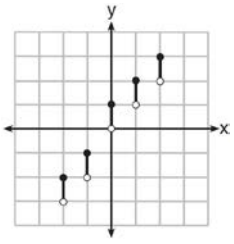
1 1
2 2
3 3
4 4

256 Which graph represents a function?

1


2


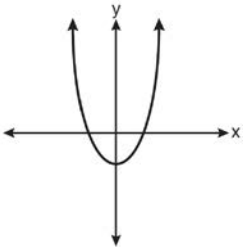
3


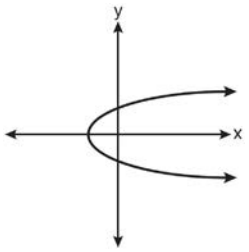
4


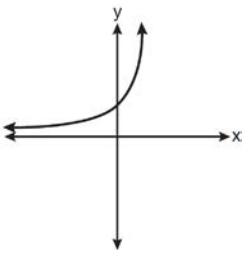
257 Which function is *not* one-to-one?

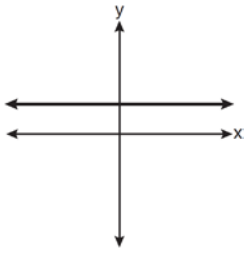
1 $\{(0,1),(1,2),(2,3),(3,4)\}$
2 $\{(0,0),(1,1),(2,2),(3,3)\}$
3 $\{(0,1),(1,0),(2,3),(3,2)\}$
4 $\{(0,1),(1,0),(2,0),(3,2)\}$

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

1 

2 

3 

4 

259 Which function is one-to-one?

1 $f(x) = |x|$

2 $f(x) = 2^x$

3 $f(x) = x^2$

4 $f(x) = \sin x$

260 Which function is one-to-one?

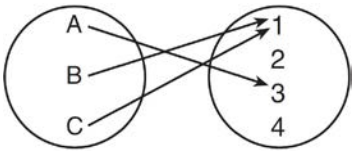
1 $k(x) = x^2 + 2$

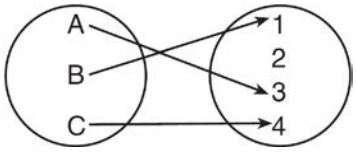
2 $g(x) = x^3 + 2$

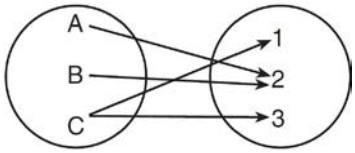
3 $f(x) = |x| + 2$

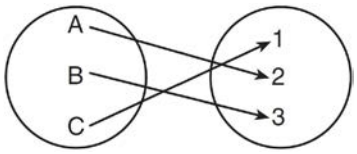
4 $j(x) = x^4 + 2$

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

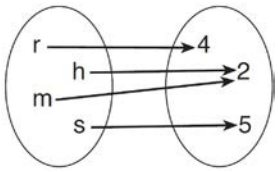
1 

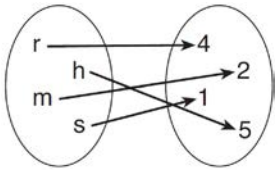
2 

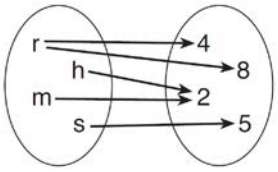
3 

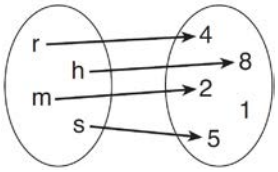
4 

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

1 

2 

3 

4 

A2.A.39, 51: DOMAIN AND RANGE

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

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

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

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

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

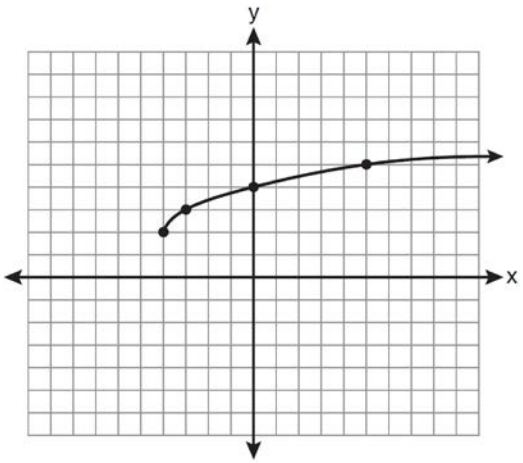
266 If $f(x) = \sqrt{9-x^2}$, what are its domain and range?

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

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

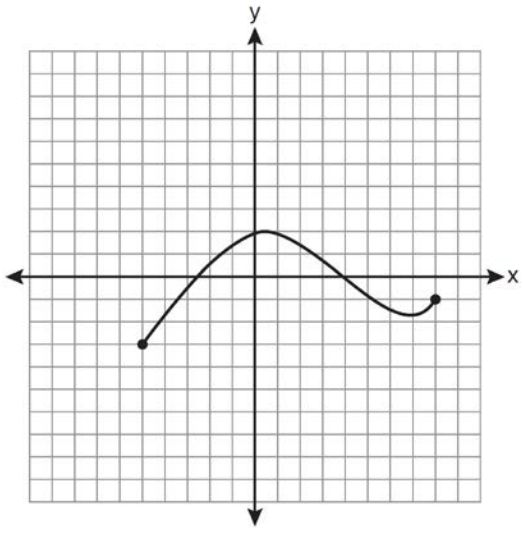
1 $\{x | x > 4\}$ and $\{y | y > 0\}$
2 $\{x | x \geq 4\}$ and $\{y | y > 0\}$
3 $\{x | x > 4\}$ and $\{y | y \geq 0\}$
4 $\{x | x \geq 4\}$ and $\{y | y \geq 0\}$

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



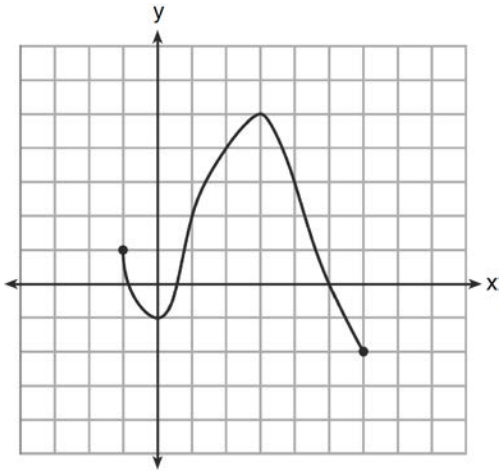
1 $\{x | x > -4\}$; $\{y | y > 2\}$
2 $\{x | x \geq -4\}$; $\{y | y \geq 2\}$
3 $\{x | x > 2\}$; $\{y | y > -4\}$
4 $\{x | x \geq 2\}$; $\{y | y \geq -4\}$

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



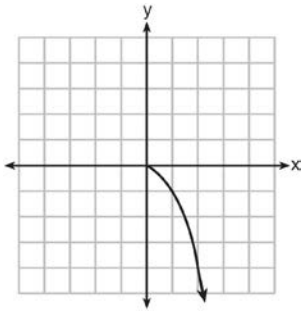
State the domain and range of this function.

270 What is the domain of the function shown below?



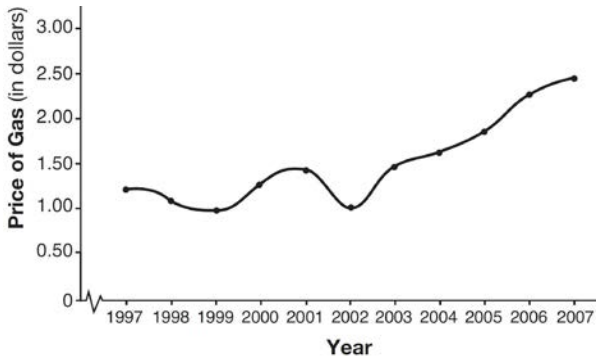
1 $-1 \le x \le 6$
2 $-1 \le y \le 6$
3 $-2 \le x \le 5$
4 $-2 \le y \le 5$

271 What is the range of the function shown below?



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

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



What is the approximate range of this graph?
1 $1997 \le x \le 2007$
2 $1999 \le x \le 2007$
3 $0.97 \le y \le 2.38$
4 $1.27 \le y \le 2.38$

A2.A.42: COMPOSITIONS OF FUNCTIONS

273 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

274 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 $x^2 + 6x - 5$

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

276 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

277 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 $3\sin^2 x$

278 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

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

1 $2x^2 + 17x + 36$

2 $2x^2 + 17x + 66$

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

4 $2x^2 - 3x + 36$

A2.A.44: INVERSE OF FUNCTIONS

280 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 $g(x) = 3 - 8x$

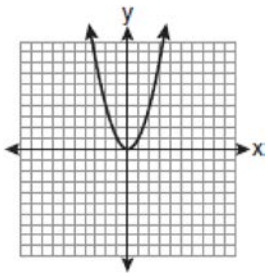
3 $f(x) = e^x$ and $g(x) = \ln x$

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

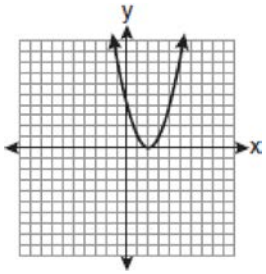
281 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

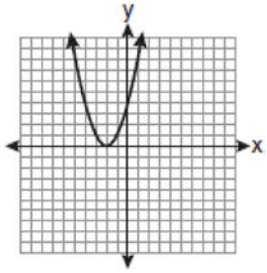
A2.A.46: TRANSFORMATIONS WITH FUNCTIONS AND RELATIONS

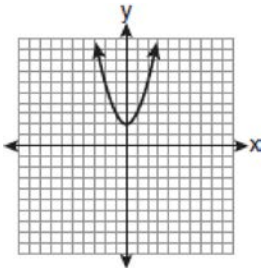
282 The graph below shows the function $f(x)$.

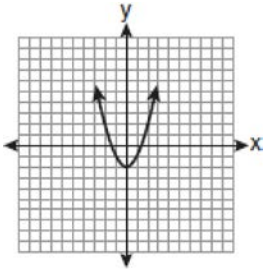


Which graph represents the function $f(x + 2)$?

1


2


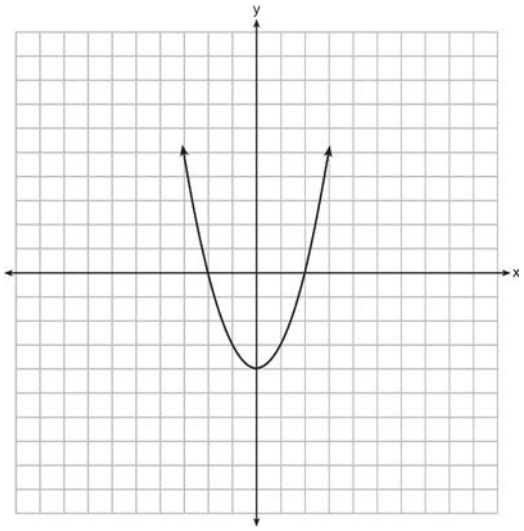
3


4


283 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 $(-6, -3)$

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



SEQUENCES AND SERIES

A2.A.29-33: SEQUENCES

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

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

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

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

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

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

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

291 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 $-2a + 5$

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

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

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

293 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 $\frac{37}{3}$

294 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

295 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 $-\frac{6a^2}{b}$

296 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

297 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 $16384\sqrt{10}$

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

$$a_1 = -3$$

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

299 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

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

1 12
2 22
3 24
4 26

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

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

1 -38
2 -12
3 26
4 62

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

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

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

305 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 $4a^2 - 20a + 30$

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

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

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

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

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

A2.A.35: SERIES

310 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

311 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

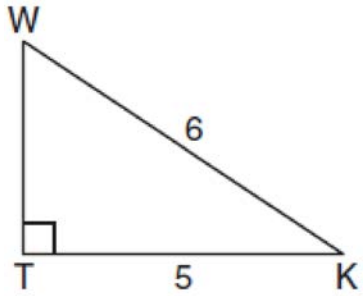
312 Determine the sum of the first twenty terms of the sequence whose first five terms are 5, 14, 23, 32, 41.

313 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

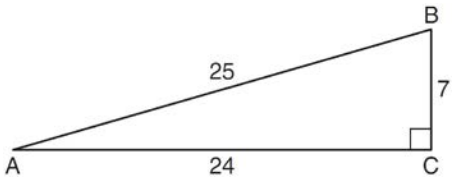
A2.A.55: TRIGONOMETRIC RATIOS

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



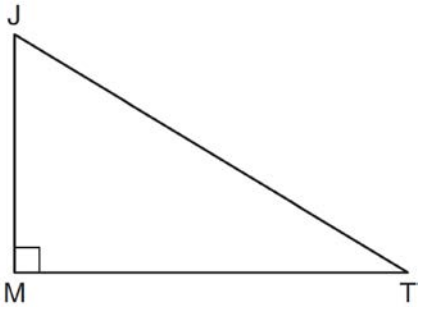
What is the measure of $\angle K$, to the *nearest minute*?
1 33°33'
2 33°34'
3 33°55'
4 33°56'

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



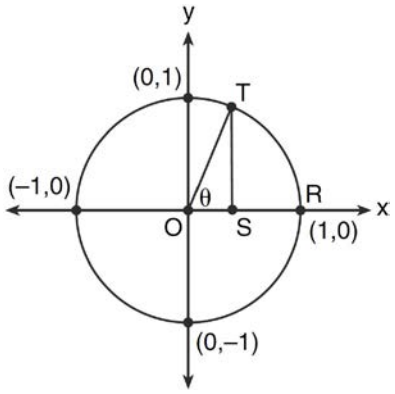
1 $\frac{25}{24}$
2 $\frac{25}{7}$
3 $\frac{24}{7}$
4 $\frac{7}{24}$

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



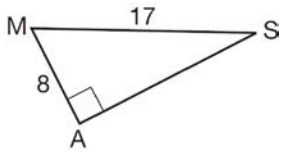
What is the value of $\cot J$?
1 $\frac{\sqrt{3}}{3}$
2 2
3 $\sqrt{3}$
4 $\frac{2\sqrt{3}}{3}$

317 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 $\overline{OS}$

318 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

319 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 $\frac{7\pi}{6}$

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

321 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

322 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 $\frac{7\pi}{3}$

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

324 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

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

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

327 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

328 Approximately how many degrees does five radians equal?

1 286

2 900

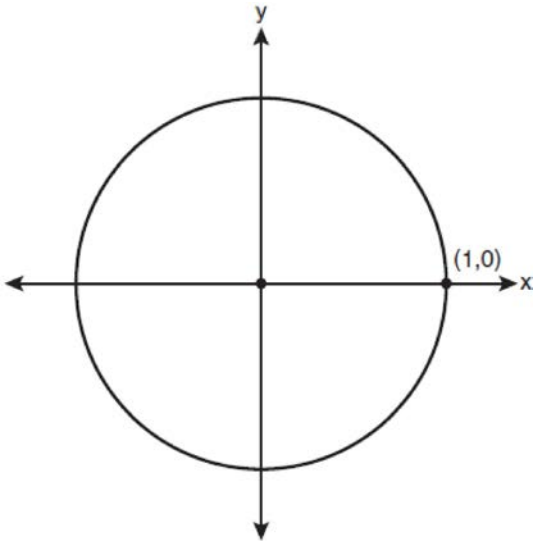
3 $\frac{\pi}{36}$

4 5π

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

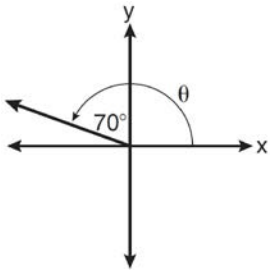
A2.A.60: UNIT CIRCLE

330 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 $\sin 240°$.



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

1



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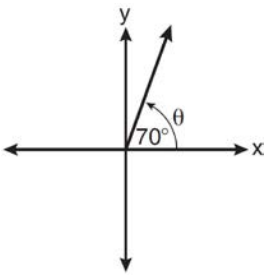

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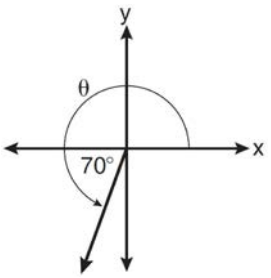

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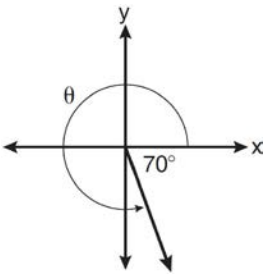
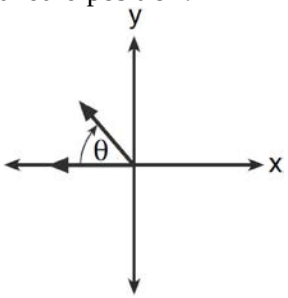
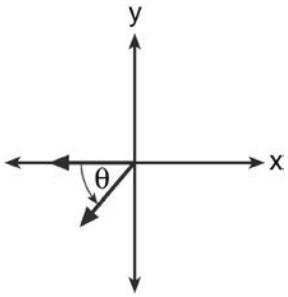


332 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?

1


2


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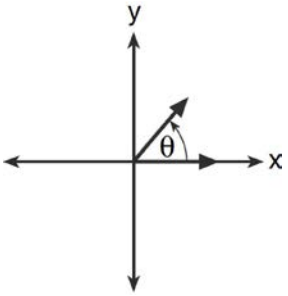

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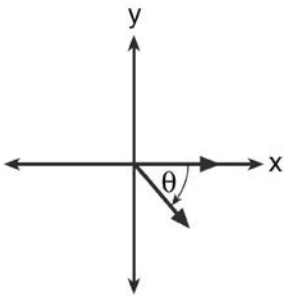


A2.A.60: FINDING THE TERMINAL SIDE OF AN ANGLE

333 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 $\sec P > 0$

334 If $\sin\theta < 0$ and $\cot\theta > 0$, in which quadrant does the terminal side of angle θ lie?
1 I
2 II
3 III
4 IV

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

335 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

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

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

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

339 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 $\csc(-118°)$

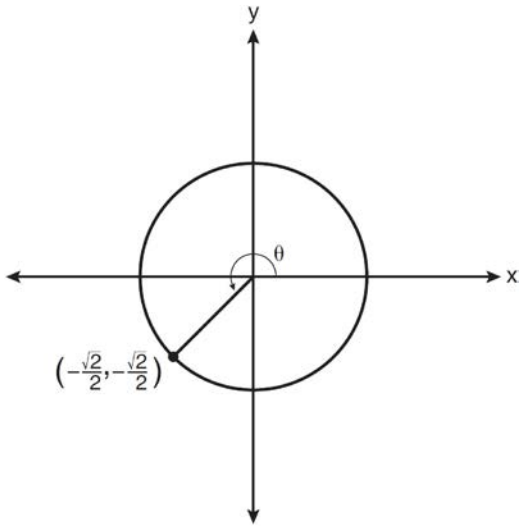
340 The value of $\csc 138°23'$ rounded to four decimal places is
1 −1.3376
2 −1.3408
3 1.5012
4 1.5057

A2.A.64: USING INVERSE TRIGONOMETRIC FUNCTIONS

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

1 $-30°$
2 $60°$
3 $150°$
4 $240°$

342 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

343 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 $\cos A = \frac{8}{5}$

344 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 $3\sqrt{2}$

345 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

346 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

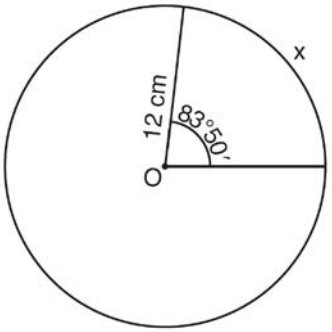
347 A circle has a radius of 4 inches. In inches, what is the length of the arc intercepted by a central angle of 2 radians?

1 2π
2 2
3 8π
4 8

348 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

349 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

350 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 $\cot(90° - A) = \frac{1}{3}$

351 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 $\csc^2\theta$

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

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

354 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.

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

356 The expression $\frac{\cot x}{\csc x}$ is equivalent to

1 $\sin x$
2 $\cos x$
3 $\tan x$
4 $\sec x$

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

A2.A.67: PROVING TRIGONOMETRIC IDENTITIES

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

359 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

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

361 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 $\tan(A + B)$.

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

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

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

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

366 If $\sin x = \sin y = a$ and $\cos x = \cos y = b$, then $\cos(x - y)$ is
1 $b^2 - a^2$
2 $b^2 + a^2$
3 $2b - 2a$
4 $2b + 2a$

A2.A.77: DOUBLE AND HALF ANGLE IDENTITIES

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

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

369 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

370 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

371 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

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

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

374 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 $\{60°, 300°\}$

375 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 $\{225°, 315°\}$

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

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

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

A2.A.69: PROPERTIES OF TRIGONOMETRIC FUNCTIONS

379 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

380 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

381 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 $y = 3\sin 4x$

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

1 $\frac{\pi}{6}$

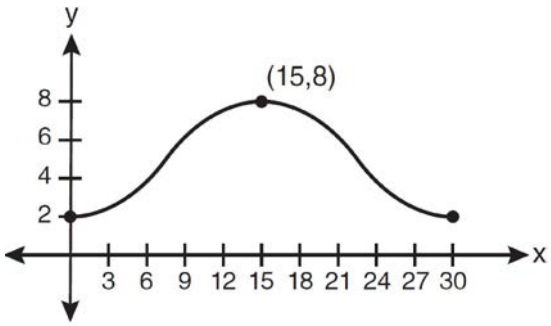
2 $\frac{\pi}{3}$

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

4 6π

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

383 Which equation is graphed in the diagram below?



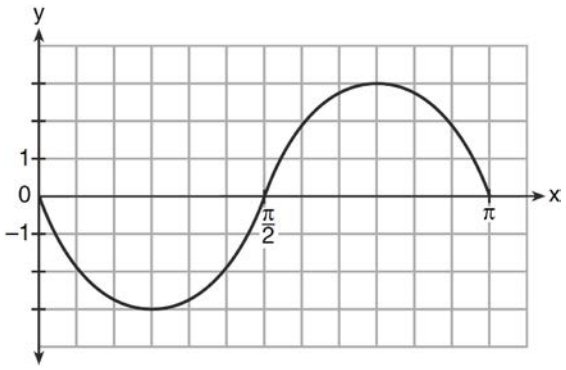
1 $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$

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

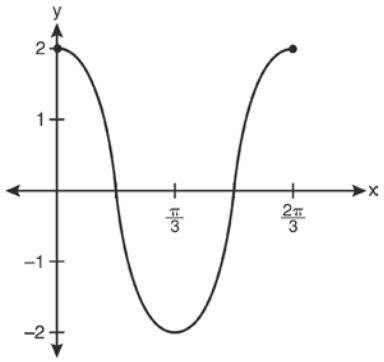
3 $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$

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

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



385 Which equation is represented by the graph below?



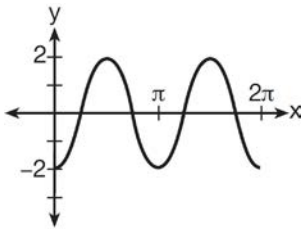
1 $y = 2\cos 3x$

2 $y = 2\sin 3x$

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

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

386 Which equation represents the graph below?



1 $y = -2\sin 2x$

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

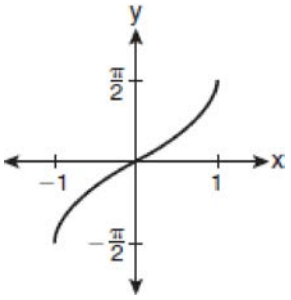
3 $y = -2\cos 2x$

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

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

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

1



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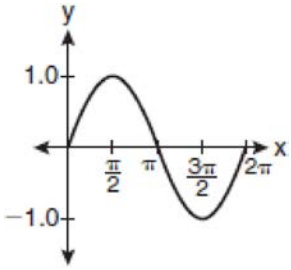
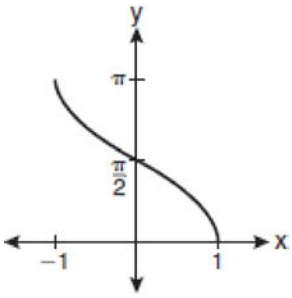
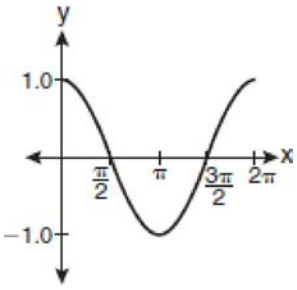


3

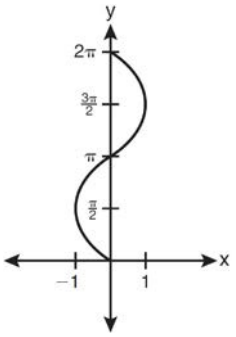


4



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

1



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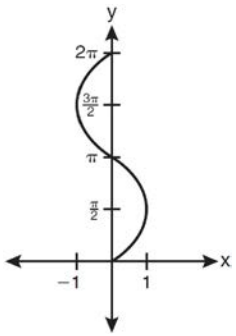

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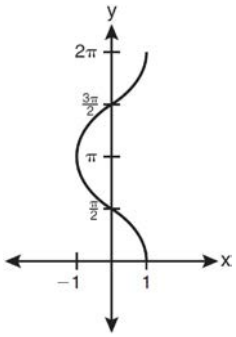
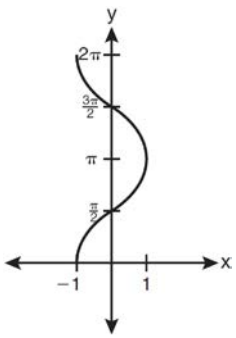
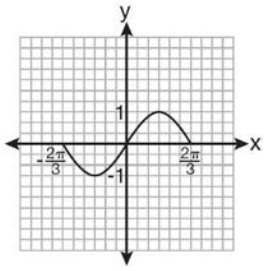


4

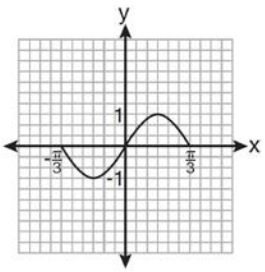


389 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?

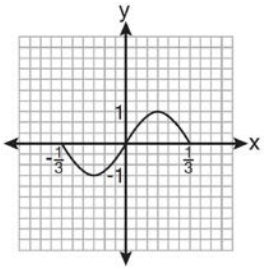
1



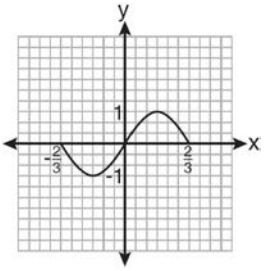
2



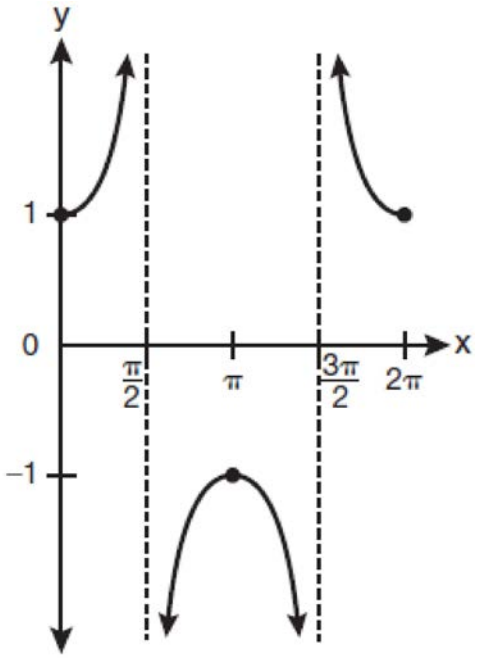
3



4

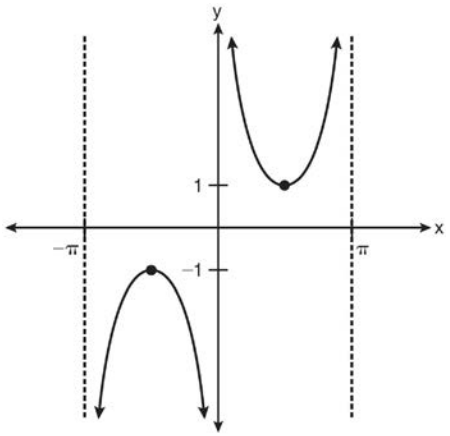


390 Which equation is represented by the graph below?



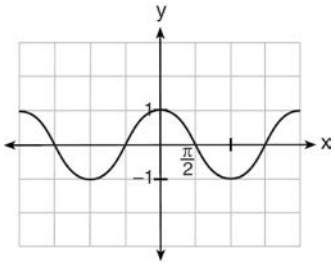
1 $y = \cot x$
2 $y = \csc x$
3 $y = \sec x$
4 $y = \tan x$

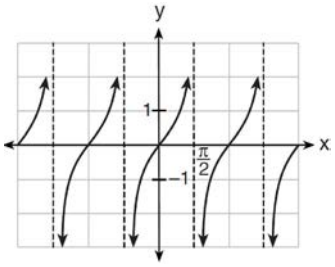
391 Which equation is sketched in the diagram below?



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

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

1


2


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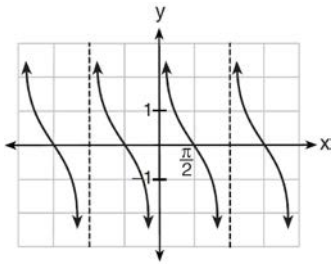
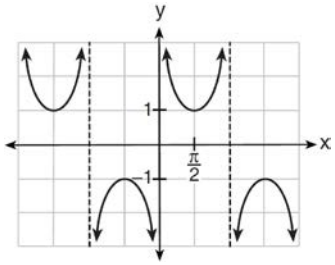


4


A2.A.63: DOMAIN AND RANGE

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

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

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

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

3 $0 \leq x \leq \pi$

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

395 Which statement regarding the inverse function is true?

1 A domain of $y = \sin^{-1}x$ is $[0, 2\pi]$.

2 The range of $y = \sin^{-1}x$ is $[-1, 1]$.

3 A domain of $y = \cos^{-1}x$ is $(-\infty, \infty)$.

4 The range of $y = \cos^{-1}x$ is $[0, \pi]$.

A2.A.74: USING TRIGONOMETRY TO FIND AREA

396 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

397 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*.

398 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

399 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

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

401 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

402 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*.

403 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°.

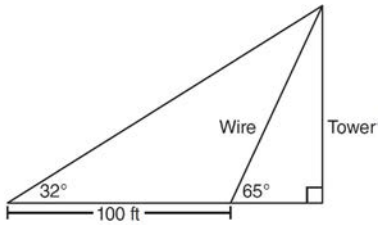
404 Two sides of a triangular-shaped sandbox measure 22 feet and 13 feet. If the angle between these two sides measures 55°, what is the area of the sandbox, to the *nearest square foot*?

1 82
2 117
3 143
4 234

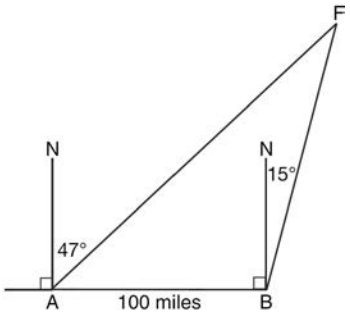
A2.A.73: LAW OF SINES

405 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*.

406 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*.



407 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.]



408 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

409 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

410 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

411 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

412 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

413 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

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

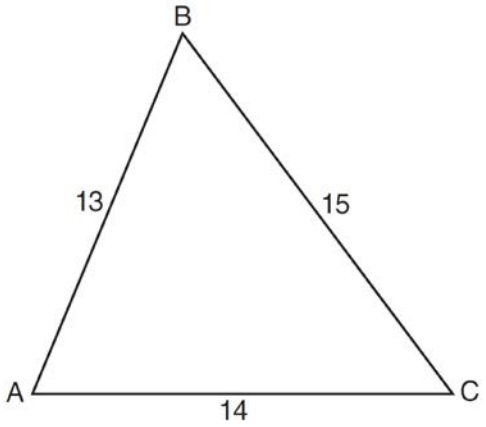
1 1
2 2
3 3
4 0

A2.A.73: LAW OF COSINES

415 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.

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

417 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

418 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

419 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.

420 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.

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

CONICS

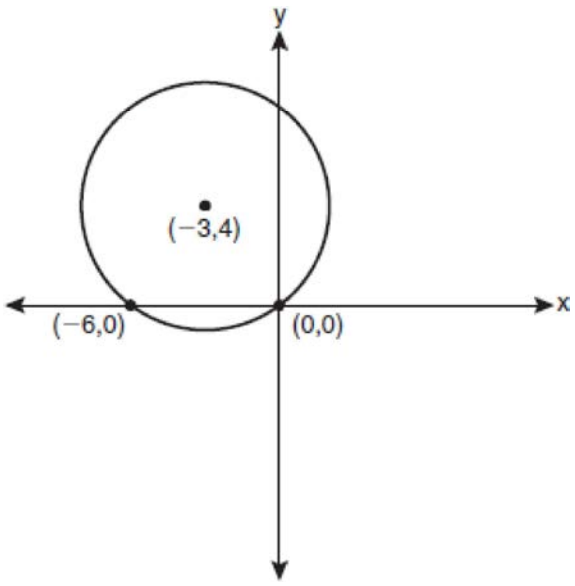
A2.A.47-49: EQUATIONS OF CIRCLES

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

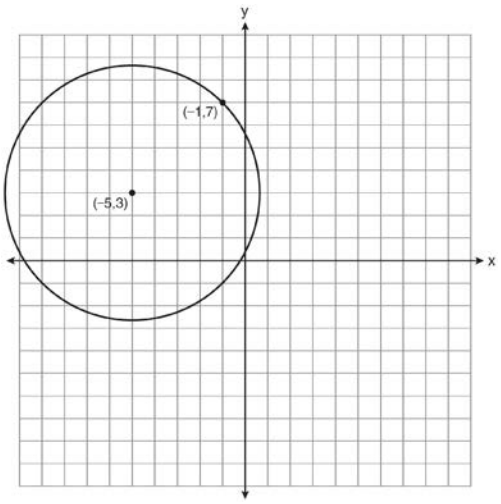
423 What are the coordinates of the center of a circle whose equation is $x^2 + y^2 - 16x + 6y + 53 = 0$?
1 $(-8,-3)$
2 $(-8,3)$
3 $(8,-3)$
4 $(8,3)$

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

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

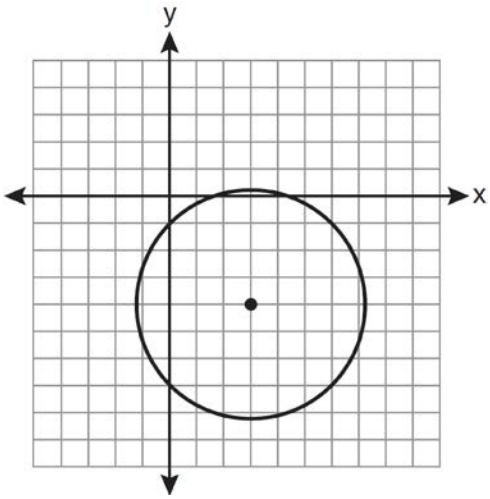


426 A circle shown in the diagram below has a center of $(-5, 3)$ and passes through point $(-1, 7)$.



Write an equation that represents the circle.

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



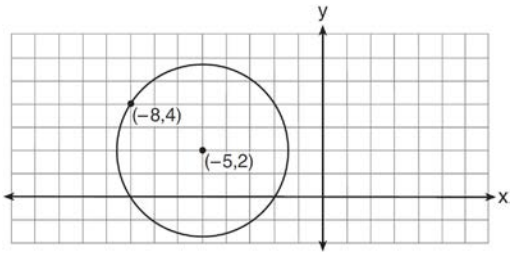
1 $(x-3)^2 + (y+4)^2 = 16$

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

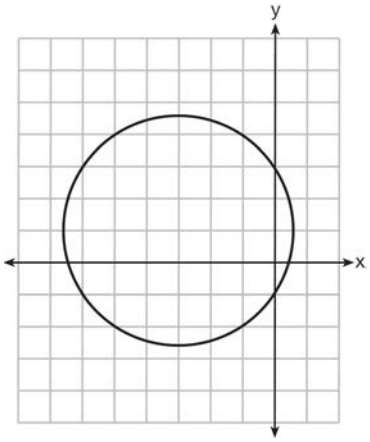
3 $(x+3)^2 + (y-4)^2 = 16$

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

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



429 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: 1 PTS: 2 REF: 061401a2 STA: A2.S.2
TOP: Analysis of Data

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

10 ANS: 4

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

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

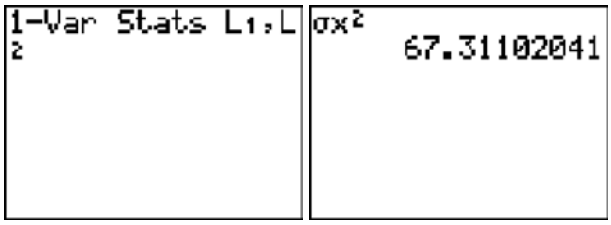
$$4k+36=2k+44$$

$$2k=8$$

$$k=4$$

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

11 ANS: 3



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

12 ANS:
7.4

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

13 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

14 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

15 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

16 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

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

18 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

19 ANS:
$y = 10.596(1.586)^x$

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

20 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

21 ANS:
$y = 180.377(0.954)^x$

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

22 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

23 ANS:

$y = 0.488(1.116)^x$

PTS: 2 REF: 061429a2 STA: A2.S.7 TOP: Exponential Regression

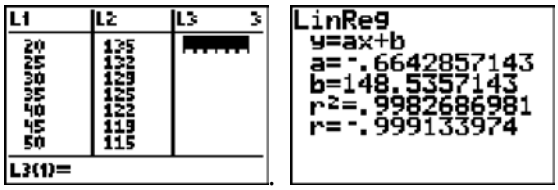
24 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8
TOP: Correlation Coefficient

25 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

26 ANS: 1



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

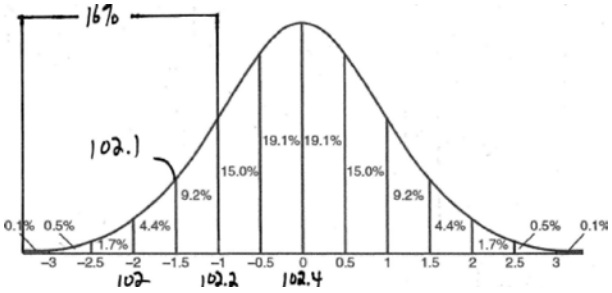
27 ANS: 2

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

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

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

29 ANS: 1



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

30 ANS: 3

$68\% \times 50 = 34$

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

31 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

32 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

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

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

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

153 ± 22

131 – 175

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

35 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

36 ANS:
Less than 60 inches is below 1.5 standard deviations from the mean. $0.067 \cdot 450 \approx 30$

PTS: 2 REF: 061428a2 STA: A2.S.5 TOP: Normal Distributions
KEY: predict

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

38 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

39 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

40 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

41 ANS: 1
$\frac{{}_6P_6}{3!2!} = \frac{720}{12} = 60$

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

42 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

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

44 ANS: 3
$2! \cdot 2! \cdot 2! = 8$

PTS: 2 REF: 061425a2 STA: A2.S.10 TOP: Permutations

45 ANS: 2
${}_{15}C_8 = 6,435$

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

46 ANS: 1
${}_{10}C_4 = 210$

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

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

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

48 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

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

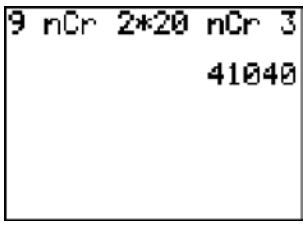
50 ANS: 1 PTS: 2 REF: 011117a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

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

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

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

54 ANS:



41,040.

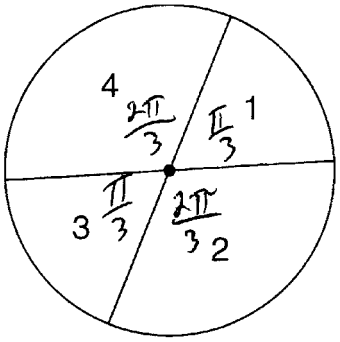
PTS: 2 REF: fall0935a2 STA: A2.S.12 TOP: Sample Space

55 ANS: 3

${}_3C_1 \cdot {}_5C_2 = 3 \cdot 10 = 30$

PTS: 2 REF: 061422a2 STA: A2.S.12 TOP: Combinations

56 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

57 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

58 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

59 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

60 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

61 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

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

63 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

64 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

65 ANS:

$${}_5C_0 \cdot 0.57^0 \cdot 0.43^5 + {}_5C_1 \cdot 0.57^1 \cdot 0.43^4 + {}_5C_2 \cdot 0.57^2 \cdot 0.43^3 \approx 0.37$$

PTS: 4 REF: 061438a2 STA: A2.S.15 TOP: Binomial Probability
KEY: at least or at most

66 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

67 ANS: 1

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

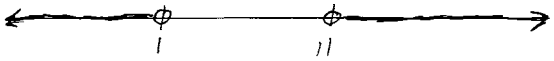
$6x \le 12 \qquad 6x \ge 2$

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

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

68 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

69 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

70 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

71 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

72 ANS:

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

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

$x > -2 \qquad x < 4.5$

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

73 ANS:

$2x - 3 > 5$ or $2x - 3 < -5$

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

$x > 4 \qquad x < -1$

PTS: 2 REF: 061430a2 STA: A2.A.1 TOP: Absolute Value Inequalities

74 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

75 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

76 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

77 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

78 ANS: 4

$2x^2 - 7x - 5 = 0$

$\frac{c}{a} = \frac{-5}{2}$

PTS: 2 REF: 061414a2 STA: A2.A.20 TOP: Roots of Quadratics

79 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

80 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

81 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

82 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

83 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

84 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

85 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

86 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

87 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

88 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

89 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

90 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

91 ANS: 4

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

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

92 ANS: 3

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

PTS: 2 REF: 081009a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

93 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

94 ANS: 2

$60 = -16t^2 + 5t + 105 \quad t = \dfrac{-5 \pm \sqrt{5^2 - 4(-16)(45)}}{2(-16)} \approx \dfrac{-5 \pm 53.89}{-32} \approx 1.84$

$0 = -16t^2 + 5t + 45$

PTS: 2 REF: 061424a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

95 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

96 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

97 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

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

99 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

100 ANS: 3

$(-5)^2 - 4(2)(0) = 25$

PTS: 2 REF: 061423a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine equation given nature of roots

101 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

102 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

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

104 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

105 ANS: 1 PTS: 2 REF: 061408a2 STA: A2.A.24
TOP: Completing the Square

106 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

107 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

108 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

109 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

110 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

111 ANS: 3

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

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

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

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

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

$x^2 + x - 20 = 0$

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

$x = -5, 4$

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

112 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

113 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

114 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

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

116 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

117 ANS: 2

The binomials are conjugates, so use FL.

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

118 ANS: 1

The binomials are conjugates, so use FL.

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

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

120 ANS: 3 PTS: 2 REF: 061407a2 STA: A2.N.3
TOP: Operations with Polynomials

121 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

122 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

123 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

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

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

126 ANS: 4 PTS: 2 REF: 061402a2 STA: A2.A.8
TOP: Negative and Fractional Exponents

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

128 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

129 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

130 ANS: 2

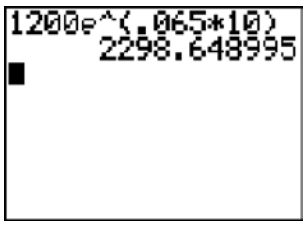
$$\frac{x^{-1}+1}{x+1}=\frac{\frac{1}{x}+1}{x+1}=\frac{\frac{1+x}{x}}{x+1}=\frac{1}{x}$$

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

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

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

133 ANS:



2,298.65.

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

134 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

135 ANS:

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

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

136 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

137 ANS: 3 PTS: 2 REF: 061416a2 STA: A2.A.12
TOP: Evaluating Exponential Expressions

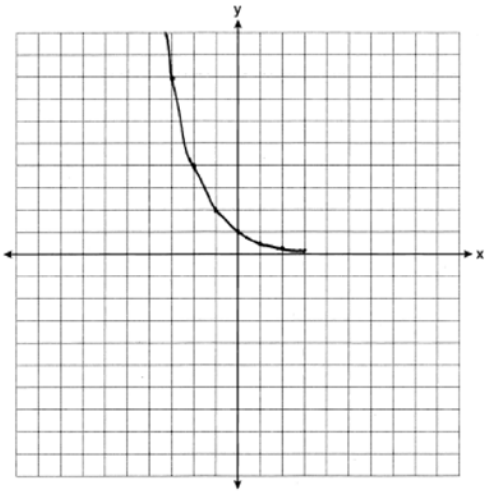
138 ANS: 2

$8^2 = 64$

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

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

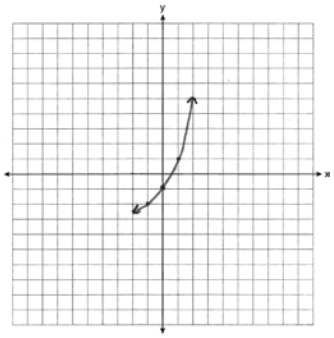
140 ANS:



$y = 0$

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

141 ANS:



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

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

143 ANS: 2

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

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

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

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

146 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

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

148 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

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

150 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

151 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

152 ANS: 4

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

PTS: 2 REF: 061426a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs

153 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

154 ANS:

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

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

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

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

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

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

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

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

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

155 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

156 ANS: 3

$x = 5^4 = 625$

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

157 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

158 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

159 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

160 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

161 ANS:

$(5x-1)^{\frac{1}{3}} = 4$

$5x - 1 = 64$

$5x = 65$

$x = 13$

PTS: 2 REF: 061433a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: advanced

162 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

163 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

164 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

165 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

166 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

167 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

168 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

169 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

170 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

171 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

172 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

173 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

174 ANS: 1

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

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

175 ANS: 3

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

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

176 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

177 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

178 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

179 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

180 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

181 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

182 ANS:

$x^3 + 5x^2 - 4x - 20 = 0$

$x^2(x+5) - 4(x+5) = 0$

$(x^2 - 4)(x+5) = 0$

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

$x = \pm 2, -5$

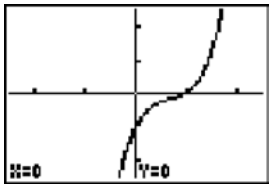
PTS: 4 REF: 061437a2 STA: A2.A.26 TOP: Solving Polynomial Equations

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

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

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

185 ANS: 4



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

186 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

187 ANS:

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

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

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

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

189 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

190 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

191 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

192 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

193 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

194 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

195 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

196 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

197 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

198 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

199 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

200 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

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

202 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

203 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

204 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

205 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

206 ANS: 2

$\sqrt{2x-4} = x - 2$

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

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

$0 = (x-4)(x-2)$

$x = 4, 2$

PTS: 2 REF: 061406a2 STA: A2.A.22 TOP: Solving Radicals
KEY: extraneous solutions

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

208 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

209 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

210 ANS: 3

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

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

211 ANS: 3

$$\sqrt{9}\sqrt{-1}\sqrt{2} - \sqrt{16}\sqrt{-1}\sqrt{2} = 3i\sqrt{2} - 4i\sqrt{2} = -i\sqrt{2}$$

PTS: 2 REF: 061404a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers

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

213 ANS: 1

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

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

214 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

215 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

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

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

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

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

220 ANS:

$(x + yi)(x - yi) = x^2 - y^2i^2 = x^2 + y^2$

PTS: 2 REF: 061432a2 STA: A2.N.8 TOP: Conjugates of Complex Numbers

221 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

222 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

223 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

224 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

225 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

226 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

227 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

228 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

229 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

230 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

231 ANS: 2

$\frac{30}{(x+3)(x-3)} + \frac{(x+3)(x-3)}{(x+3)(x-3)} = \frac{5(x+3)}{(x-3)(x+3)}$ 3 is an extraneous root.

$30 + x^2 - 9 = 5x + 15$

$x^2 - 5x + 6 = 0$

$(x-3)(x-2) = 0$

$x = 2$

PTS: 2 REF: 061417a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

232 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

233 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

234 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

235 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

236 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

237 ANS:

$$\frac{1+\frac{3}{x}}{1-\frac{5}{x}-\frac{24}{x^2}} \cdot \frac{x^2}{x^2} = \frac{x^2+3x}{x^2-5x-24} = \frac{x(x+3)}{(x-8)(x+3)} = \frac{x}{x-8}$$

PTS: 4 REF: 061436a2 STA: A2.A.17 TOP: Complex Fractions

238 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

239 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

240 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

241 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

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

242 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

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

243 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

244 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

245 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

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

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

248 ANS: 3

As originally written, alternatives (2) and (3) had no domain restriction, so that both were correct.

PTS: 2 REF: 061405a2 STA: A2.A.52
TOP: Properties of Graphs of Functions and Relations

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

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

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

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

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

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

255 ANS: 3 PTS: 2 REF: 011305a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs
256 ANS: 1 PTS: 2 REF: 061409a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs
257 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
258 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
259 ANS: 2 PTS: 2 REF: 011225a2 STA: A2.A.43
TOP: Defining Functions
260 ANS: 2 PTS: 2 REF: 061218a2 STA: A2.A.43
TOP: Defining Functions
261 ANS: 4 PTS: 2 REF: 061303a2 STA: A2.A.43
TOP: Defining Functions
262 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43
TOP: Defining Functions
263 ANS: 3 PTS: 2 REF: fall0923a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
264 ANS: 4 PTS: 2 REF: 061112a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
265 ANS: 2 PTS: 2 REF: 011222a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
266 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
267 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
268 ANS: 2 PTS: 2 REF: 081003a2 STA: A2.A.51
TOP: Domain and Range
269 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
270 ANS: 1 PTS: 2 REF: 061202a2 STA: A2.A.51
TOP: Domain and Range
271 ANS: 3 PTS: 2 REF: 061308ge STA: A2.A.51
TOP: Domain and Range
272 ANS: 3 PTS: 2 REF: 061418a2 STA: A2.A.51
TOP: Domain and Range

273 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

274 ANS: 2

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

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

275 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

276 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

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

278 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

279 ANS: 1

$f(g(x)) = 2(x + 5)^2 - 3(x + 5) + 1 = 2(x^2 + 10x + 25) - 3x - 15 + 1 = 2x^2 + 17x + 36$

PTS: 2 REF: 061419a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

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

281 ANS:

$y = x^2 - 6$. $f^{-1}(x)$ is not a function.

$x = y^2 - 6$

$x + 6 = y^2$

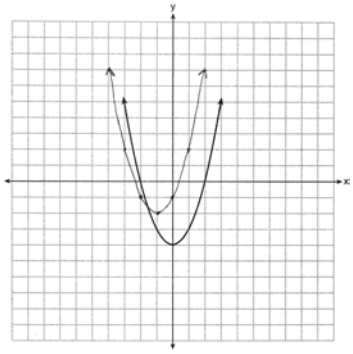
$\pm\sqrt{x+6} = y$

PTS: 2 REF: 061132a2 STA: A2.A.44 TOP: Inverse of Functions
KEY: equations

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

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

284 ANS:



PTS: 2 REF: 061435a2 STA: A2.A.46
TOP: Transformations with Functions and Relations

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

286 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

287 ANS: 4

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

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

288 ANS:

$\frac{31-19}{7-4} = \frac{12}{3} = 4 \quad x + (4-1)4 = 19 \quad a_n = 7 + (n-1)4$

$x + 12 = 19$

$x = 7$

PTS: 2 REF: 011434a2 STA: A2.A.29 TOP: Sequences

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

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

291 ANS: 1

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

PTS: 2 REF: 011401a2 STA: A2.A.30 TOP: Sequences

292 ANS: 4 PTS: 2 REF: 061411a2 STA: A2.A.30 TOP: Sequences

293 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

294 ANS: 3

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

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

295 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

296 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

297 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

298 ANS:

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

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

299 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

300 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

301 ANS:

230. $10 + (1^3 - 1) + (2^3 - 1) + (3^3 - 1) + (4^3 - 1) + (5^3 - 1) = 10 + 0 + 7 + 26 + 63 + 124 = 230$

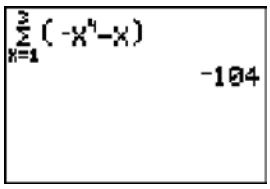
PTS: 2 REF: 011131a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

302 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

303 ANS:



-104.

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

304 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

305 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

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

307 ANS:

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

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

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

309 ANS: 1 PTS: 2 REF: 061420a2 STA: A2.A.34
TOP: Sigma Notation

310 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

311 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

312 ANS:

$a_n = 9n - 4$. $S_n = \frac{20(5 + 176)}{2} = 1810$

$a_1 = 9(1) - 4 = 5$

$a_{20} = 9(20) - 4 = 176$

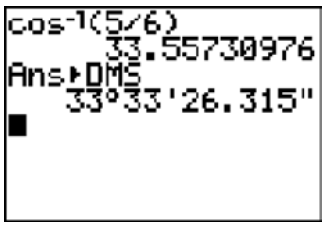
PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

313 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

314 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

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

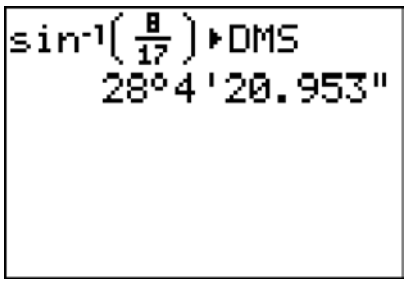
316 ANS: 1

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

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

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

318 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

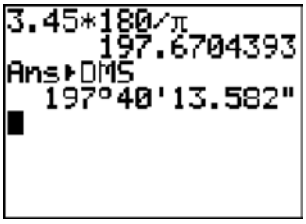
319 ANS: 3

$2\pi \cdot \frac{5}{12} = \frac{10\pi}{12} = \frac{5\pi}{6}$

PTS: 2 REF: 061125a2 STA: A2.M.1 TOP: Radian Measure

320 ANS:

197º40'. $3.45 \times \frac{180}{\pi} \approx 197°40'$.



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

321 ANS: 2

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

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

322 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

323 ANS:

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

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

324 ANS: 1

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

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

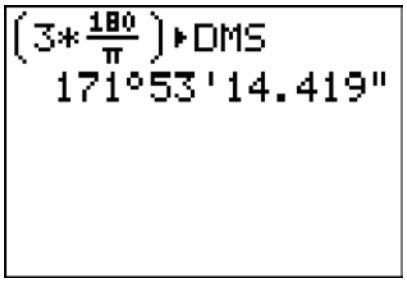
325 ANS:

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

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

326 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

327 ANS: 2

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

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

328 ANS: 1

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

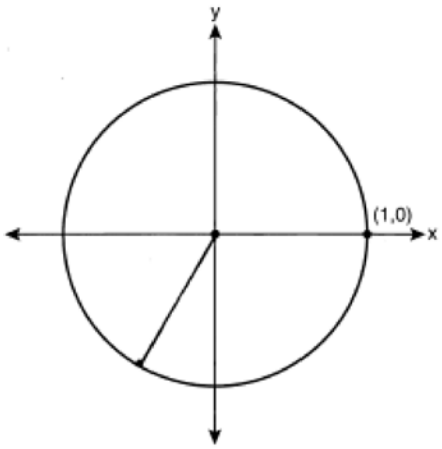
PTS: 2 REF: 011427a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

329 ANS:

$2.5 \cdot \frac{180}{\pi} \approx 143°14'$

PTS: 2 REF: 061431a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

330 ANS:



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

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

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

332 ANS: 4 PTS: 2 REF: 061206a2 STA: A2.A.60
TOP: Unit Circle

333 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

334 ANS: 3 PTS: 2 REF: 061412a2 STA: A2.A.60
TOP: Finding the Terminal Side of an Angle

335 ANS: 4 PTS: 1 REF: 011312a2 STA: A2.A.56
TOP: Determining Trigonometric Functions KEY: degrees, common angles

336 ANS:

$\frac{\sqrt{3}}{2} \times \frac{\sqrt{2}}{2} = \frac{\sqrt{6}}{4}$

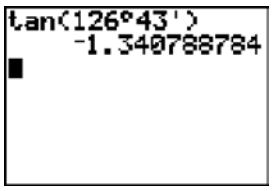
PTS: 2 REF: 061331a2 STA: A2.A.56 TOP: Determining Trigonometric Functions
KEY: degrees, common angles

337 ANS:

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

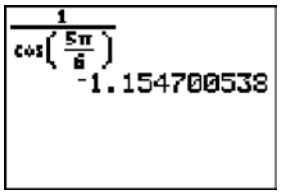
PTS: 2 REF: fall0933a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

338 ANS: 2



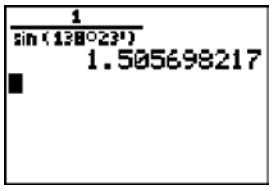
PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

339 ANS: 1



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

340 ANS: 4



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

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

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

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

344 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

345 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

346 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

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

347 ANS: 4

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

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

348 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

349 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

350 ANS: 3

Cofunctions tangent and cotangent are complementary

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

351 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

352 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

353 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

PTS: 2 REF: 011330a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships

354 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

355 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

356 ANS: 2

$$\frac{\cot x}{\csc x} = \frac{\frac{\cos x}{\sin x}}{\frac{1}{\sin x}} = \cos x$$

PTS: 2 REF: 061410a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

357 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

358 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

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

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

361 ANS:

$\frac{23}{2}$ $\qquad \cos^2 B + \sin^2 B = 1 \qquad \tan B = \frac{\sin B}{\cos B} = \frac{\frac{5}{\sqrt{41}}}{\frac{4}{\sqrt{41}}} = \frac{5}{4}$

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

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

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

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

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

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

362 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

363 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

364 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

365 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

366 ANS: 2

$\cos(x-y) = \cos x \cos y + \sin x \sin y$

$= b \cdot b + a \cdot a$

$= b^2 + a^2$

PTS: 2 REF: 061421a2 STA: A2.A.76 TOP: Angle Sum and Difference Identities
KEY: simplifying

367 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

368 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

369 ANS: 1

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

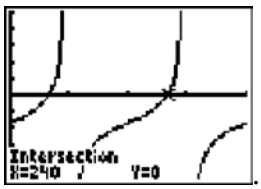
PTS: 2 REF: 061220a2 STA: A2.A.77 TOP: Half Angle Identities

370 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

371 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

372 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

373 ANS:
45, 225 $2\tan C - 3 = 3\tan C - 4$

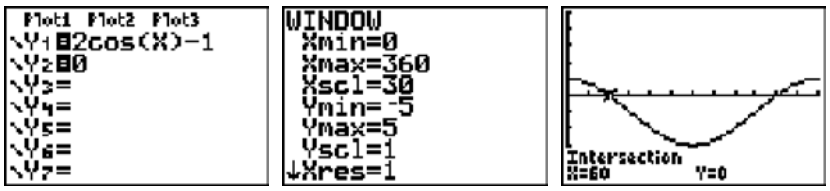
$1 = \tan C$

$\tan^{-1}1 = C$

$C = 45, 225$

PTS: 2 REF: 081032a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: basic

374 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

375 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

376 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

377 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

378 ANS:

$\sec x = \sqrt{2}$

$\cos x = \frac{1}{\sqrt{2}}$

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

$x = 45°, 315°$

PTS: 2 REF: 061434a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

379 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

380 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

381 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

382 ANS: 2

$\frac{2\pi}{6} = \frac{\pi}{3}$

PTS: 2 REF: 061413a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

383 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

384 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

385 ANS: 1 PTS: 2 REF: 011320a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

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

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

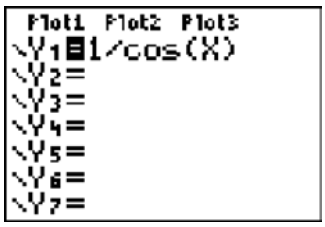
388 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

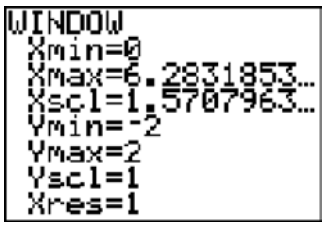
389 ANS: 3

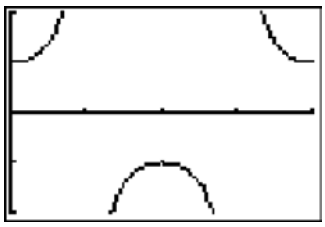
$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

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

390 ANS: 3

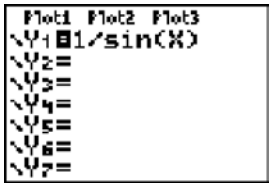


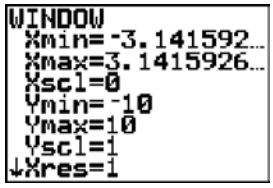


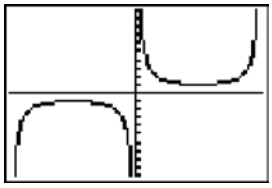


PTS: 2 REF: 061020a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

391 ANS: 1

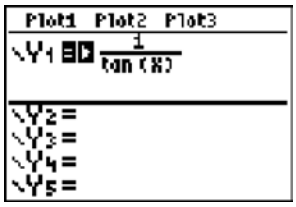


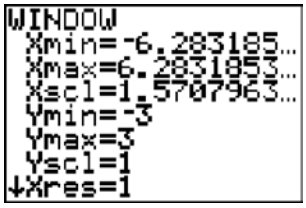


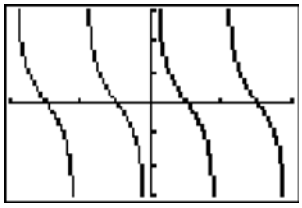


PTS: 2 REF: 011123a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

392 ANS: 3







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

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

394 ANS: 3 PTS: 2 REF: 061224a2 STA: A2.A.63
TOP: Domain and Range
395 ANS: 4 PTS: 2 REF: 061427a2 STA: A2.A.63
TOP: Domain and Range
396 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
397 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
398 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
399 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
400 ANS:
$K = ab\sin C = 18 \cdot 22\sin 60 = 396\frac{\sqrt{3}}{2} = 198\sqrt{3}$

PTS: 2 REF: 061234a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms
401 ANS: 3
$42 = \frac{1}{2}(a)(8)\sin 61$

$42 \approx 3.5a$

$12 \approx a$

PTS: 2 REF: 011316a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic
402 ANS:
$\frac{15}{\sin 103} = \frac{a}{\sin 42}$. $\frac{1}{2}(15)(10.3)\sin 35 \approx 44$

$a \approx 10.3$

PTS: 4 REF: 061337a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: advanced

403 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

404 ANS: 2
$\frac{1}{2}(22)(13)\sin 55 \approx 117$

PTS: 2 REF: 061403a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: basic

405 ANS:
$\frac{12}{\sin 32} = \frac{10}{\sin B}$. $C \approx 180 - (32 + 26.2) \approx 121.8$. $\frac{12}{\sin 32} = \frac{c}{\sin 121.8}$

$B = \sin^{-1}\frac{10\sin 32}{12} \approx 26.2$ $c = \frac{12\sin 121.8}{\sin 32} \approx 19.2$

PTS: 4 REF: 011137a2 STA: A2.A.73 TOP: Law of Sines
KEY: basic

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

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

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

407 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

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

409 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

410 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

411 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

412 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

413 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

414 ANS: 2

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

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

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

415 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

416 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

417 ANS: 1

$13^2 = 15^2 + 14^2 - 2(15)(14)\cos C$

$169 = 421 - 420\cos C$

$-252 = -420\cos C$

$\frac{252}{420} = \cos C$

$53 \approx C$

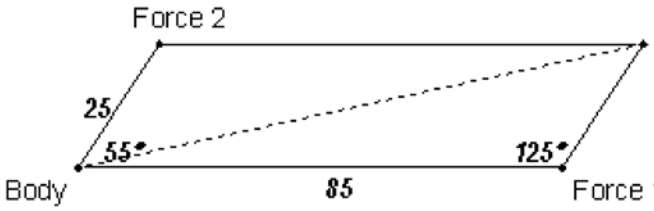
PTS: 2 REF: 061110a2 STA: A2.A.73 TOP: Law of Cosines
KEY: find angle

418 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

419 ANS:



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

$r^2 \approx 10287.7$

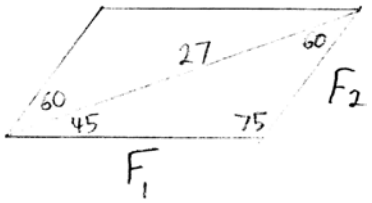
$r \approx 101.43$

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

$x \approx 12$

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

420 ANS:

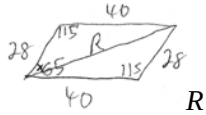


$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}$. $\frac{27}{\sin 75} = \frac{F_2}{\sin 45}$.

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

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

421 ANS:



$R = \sqrt{28^2 + 40^2 - 2(28)(40)\cos 115} \approx 58$ $\quad \frac{58}{\sin 115} = \frac{40}{\sin x}$

$x \approx 39$

PTS: 6 REF: 061439a2 STA: A2.A.73 TOP: Vectors

422 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

423 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

424 ANS: 4

$r = \sqrt{(6-3)^2 + (5-(-4))^2} = \sqrt{9+81} = \sqrt{90}$

PTS: 2 REF: 061415a2 STA: A2.A.48 TOP: Equations of Circles

425 ANS:

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

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

426 ANS:

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

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

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

428 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

429 ANS: 4 PTS: 2 REF: 061318a2 STA: A2.A.49
TOP: Equations of Circles