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REGENTS BY PERFORMANCE INDICATOR: TOPIC

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

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

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

The interquartile range for these data is
1 7
2 5
3 7 to 12
4 6 to 13

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

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

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

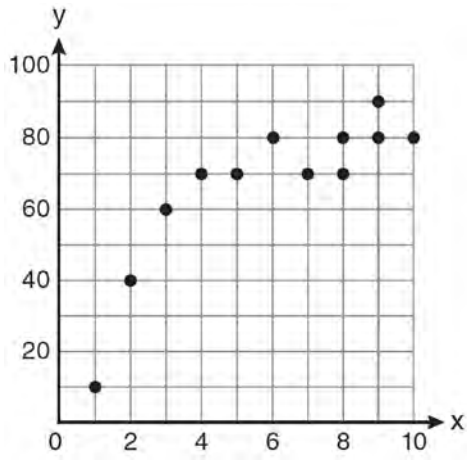
19 The table below displays the number of siblings of each of the 20 students in a class.

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

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

A2.S.6-7: REGRESSION

20 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

21 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.

22 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.*

23 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.

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

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

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

25 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.

26 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

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

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

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

A2.S.8: CORRELATION COEFFICIENT

28 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

29 Which calculator output shows the strongest linear relationship between x and y?
1
Lin Reg
$y = a + bx$
$a = 59.026$
$b = 6.767$
$r = .8643$
2
Lin Reg
$y = a + bx$
$a = .7$
$b = 24.2$
$r = .8361$
3
Lin Reg
$y = a + bx$
$a = 2.45$
$b = .95$
$r = .6022$
4
Lin Reg
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

30 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

31 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

32 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

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

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

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

34 A study compared the number of years of education a person received and that person's average yearly salary. It was determined that the relationship between these two quantities was linear and the correlation coefficient was 0.91. Which conclusion can be made based on the findings of this study?
1 There was a weak relationship.
2 There was a strong relationship.
3 There was no relationship.
4 There was an unpredictable relationship.

A2.S.5: NORMAL DISTRIBUTIONS

35 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

36 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

37 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.

38 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.

39 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%

40 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

41 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

42 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*.

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

44 The scores on a standardized exam have a mean of 82 and a standard deviation of 3.6. Assuming a normal distribution, a student's score of 91 would rank
1 below the 75^{th} percentile
2 between the 75^{th} and 85^{th} percentiles
3 between the 85^{th} and 95^{th} percentiles
4 above the 95^{th} percentile

PROBABILITY

A2.S.10: PERMUTATIONS

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

46 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.

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

48 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

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

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

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

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

53 How many different 11-letter arrangements are possible using the letters in the word "ARRANGEMENT"?
1 2,494,800
2 4,989,600
3 19,958,400
4 39,916,800

54 What is the total number of different nine-letter arrangements that can be formed using the letters in the word "TENNESSEE"?
1 3,780
2 15,120
3 45,360
4 362,880

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

A2.S.11: COMBINATIONS

56 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

57 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

58 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.

59 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

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

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

A2.S.9: DIFFERENTIATING BETWEEN PERMUTATIONS AND COMBINATIONS

62 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 ${}_{20}P_3$

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

64 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 ${}_8C_5$

65 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?

66 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 ${}_{30}C_3 + {}_{20}C_2$

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

1 ${}_6P_4 \cdot {}_4P_2$

2 ${}_6P_4 + {}_4P_2$

3 ${}_6C_4 \cdot {}_4C_2$

4 ${}_6C_4 + {}_4C_2$

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

1 $6!$

2 $6! \cdot 2!$

3 $\frac{6!}{2!}$

4 $\frac{6!}{4! \cdot 2!}$

A2.S.12: SAMPLE SPACE

69 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.

70 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

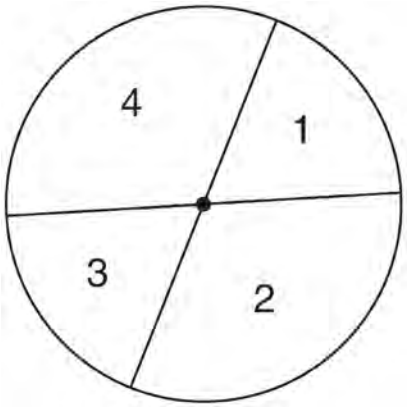
2 15

3 30

4 60

A2.S.13: GEOMETRIC PROBABILITY

71 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

72 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?

73 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.

74 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.

75 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.

76 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 $\frac{225}{512}$

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

78 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.

79 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.

80 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.

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

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

83 The probability of winning a game is $\frac{2}{3}$. Determine the probability, expressed as a fraction, of winning *exactly* four games if seven games are played.

ABSOLUTE VALUE

A2.A.1: ABSOLUTE VALUE EQUATIONS AND INEQUALITIES

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

1 $\varnothing$

2 $\{0\}$

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

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

85 What is the solution set of $|x - 2| = 3x + 10$?

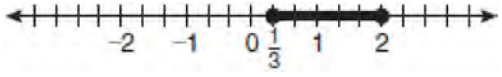
1 { }

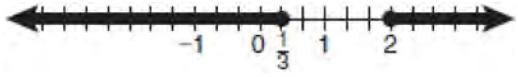
2 $\{-2\}$

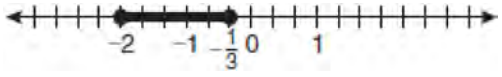
3 $\{-6\}$

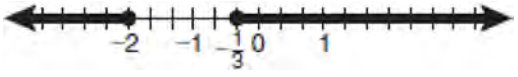
4 $\{-2, -6\}$

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

1 

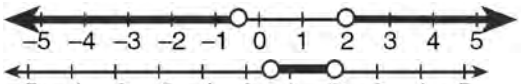
2 

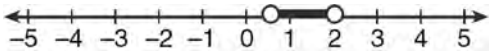
3 

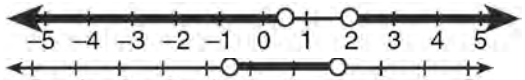
4 

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

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

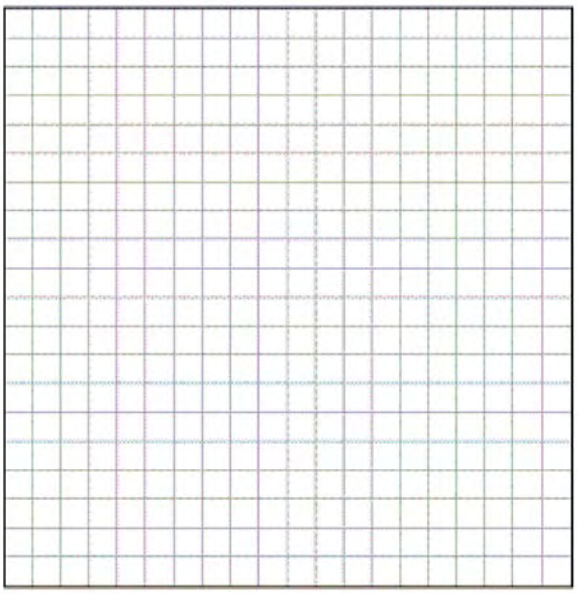
1 

2 

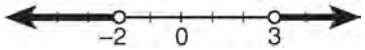
3 

4 

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



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

1 

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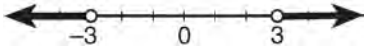
3 

4 

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

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

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

QUADRATICS

A2.A.20-21: ROOTS OF QUADRATICS

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

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

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

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

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

1 5

2 $\frac{5}{2}$

3 –5

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

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

1 $\frac{3}{4}$

2 $\frac{5}{4}$

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

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

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

101 Which statement about the equation $3x^2 + 9x - 12 = 0$ is true?
1 The product of the roots is –12.
2 The product of the roots is –4.
3 The sum of the roots is 3.
4 The sum of the roots is –9.

102 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 $4x^2 + 3x - 2 = 0$

103 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 $2x^2 - 6x + 4 = 0$

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

105 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 $4x^2 - 9x - 3 = 0$

106 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

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

108 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 $2x^2(2x + 3)(3x - 2)$

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

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

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

A2.A.7: FACTORING BY GROUPING

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

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

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

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

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

A2.A.25: QUADRATIC FORMULA

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

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

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

119 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

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

A2.A.2: USING THE DISCRIMINANT

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

122 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

123 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

124 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

125 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

126 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

127 Which equation has real, rational, and unequal roots?
1 $x^2 + 10x + 25 = 0$
2 $x^2 - 5x + 4 = 0$
3 $x^2 - 3x + 1 = 0$
4 $x^2 - 2x + 5 = 0$

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

A2.A.24: COMPLETING THE SQUARE

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

130 If $x^2 + 2 = 6x$ is solved by completing the square, an intermediate step would be
1 $(x + 3)^2 = 7$
2 $(x - 3)^2 = 7$
3 $(x - 3)^2 = 11$
4 $(x - 6)^2 = 34$

131 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

132 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 $-3 \pm 2i$

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

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

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

1 $\frac{1}{64}$

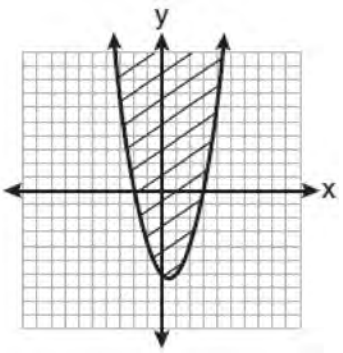
2 $\frac{1}{16}$

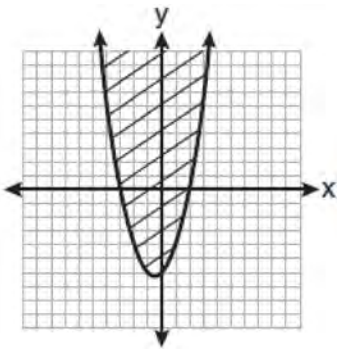
3 $\frac{1}{8}$

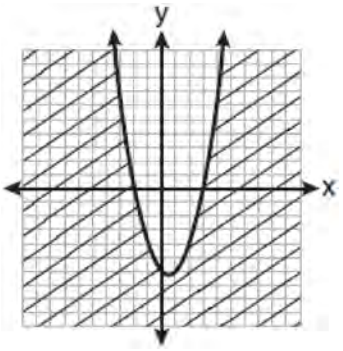
4 $\frac{1}{4}$

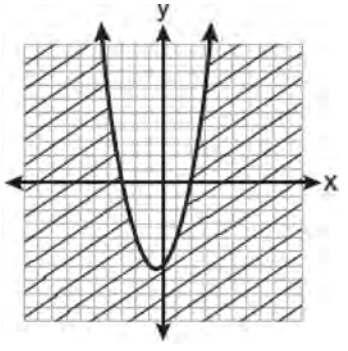
A2.A.4: QUADRATIC INEQUALITIES

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

1 

2 

3 

4 

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

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

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

SYSTEMS

A2.A.3: QUADRATIC-LINEAR SYSTEMS

140 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 $-6, 2$

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

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

142 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 $(-4,9)$

143 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 $(-6,-2)$

144 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

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

146 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 $x^2 - x - 3$

147 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.

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

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

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

151 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 $4-12\sqrt{x}+6x$

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

1 0

2 $-3x$

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

4 $3x-2$

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

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

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

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

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

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

154 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 $\frac{8}{9}$

155 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 $4n^{-1} > (6n)^{-1}$

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

1 $7\frac{1}{2}$

2 $9\frac{1}{2}$

3 $16\frac{1}{2}$

4 $17\frac{1}{2}$

157 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}

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

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

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

2 $-3x^2$

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

4 $-9x^2$

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

1 $-8a^4$

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

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

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

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

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

1 -1

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

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

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

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

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

1 1

2 $\frac{1}{x}$

3 x

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

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

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

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

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

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

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

167 Which expression is equivalent to $(5^{-2}a^{3}b^{-4})^{-1}$?

1 $\frac{10b^{4}}{a^{3}}$

2 $\frac{25b^{4}}{a^{3}}$

3 $\frac{a^{3}}{25b^{4}}$

4 $\frac{a^{2}}{125b^{5}}$

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

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

2 $\frac{x^{3}}{y^{6}}$

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

4 $\frac{y^{6}}{x^{3}}$

A2.A.12: EVALUATING EXPONENTIAL EXPRESSIONS

169 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.

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

171 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%.

172 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

173 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 $A = 18{,}000e^{0.0125 \cdot 24}$

174 A population, p(x), of wild turkeys in a certain area is represented by the function $p(x) = 17(1.15)^{2x}$, where x is the number of years since 2010. How many more turkeys will be in the population for the year 2015 than 2010?
1 46
2 49
3 51
4 68

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

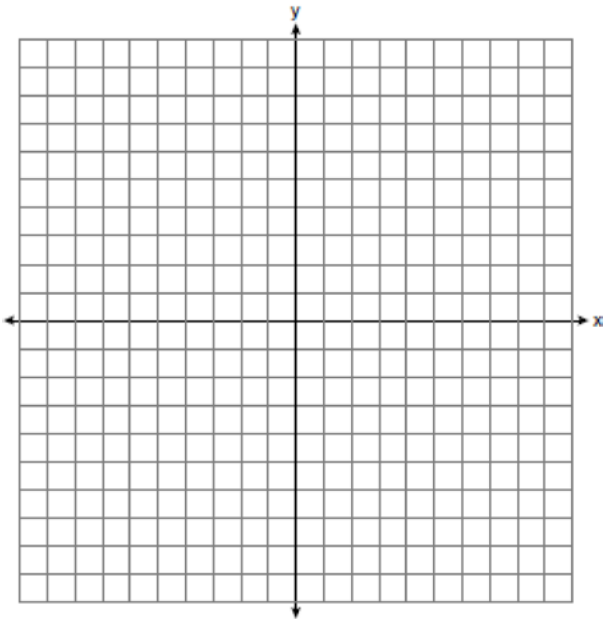
A2.A.18: EVALUATING LOGARITHMIC EXPRESSIONS

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

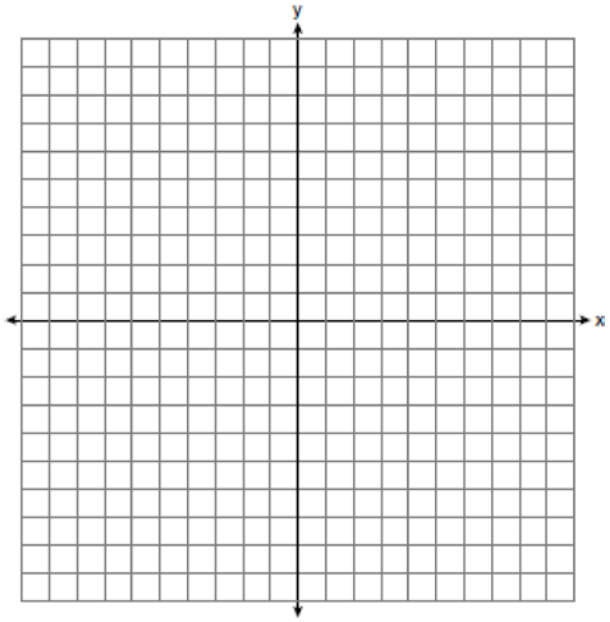
177 The expression $\log_5\left(\frac{1}{25}\right)$ is equivalent to
1 $\frac{1}{2}$
2 2
3 $-\frac{1}{2}$
4 –2

A2.A.53: GRAPHING EXPONENTIAL FUNCTIONS

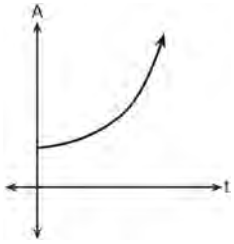
178 The graph of the equation $y = \left(\frac{1}{2}\right)^x$ has an asymptote. On the grid below, sketch the graph of $y = \left(\frac{1}{2}\right)^x$ and write the equation of this asymptote.

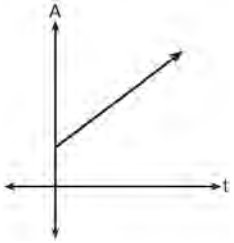


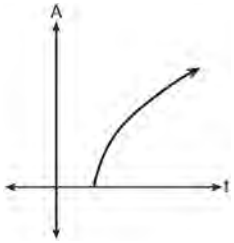
179 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.

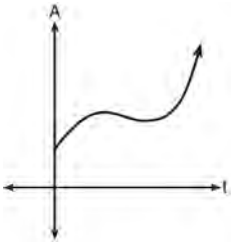


180 An investment is earning 5% interest compounded quarterly. The equation represents the total amount of money, *A*, where *P* is the original investment, *r* is the interest rate, *t* is the number of years, and *n* represents the number of times per year the money earns interest. Which graph could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

1 

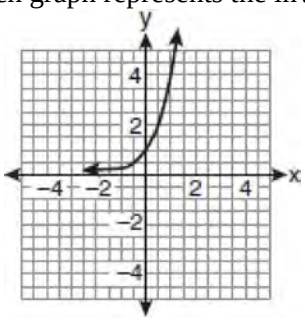
2 

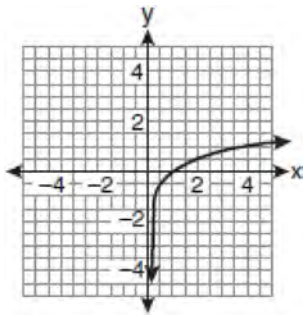
3 

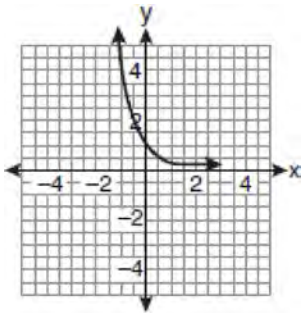
4 

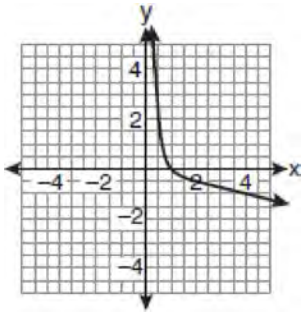
A2.A.54: GRAPHING LOGARITHMIC FUNCTIONS

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

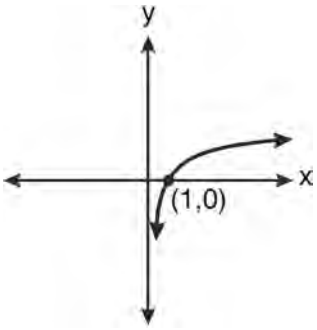
1 

2 

3 

4 

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

1


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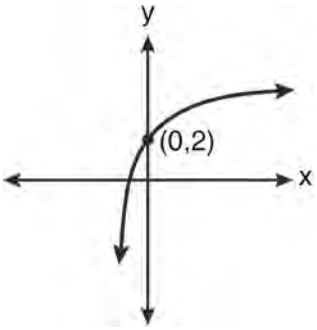

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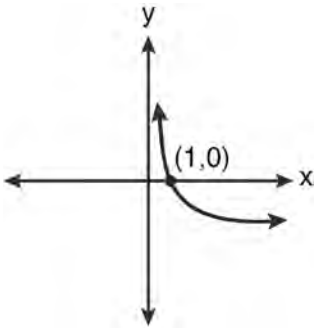

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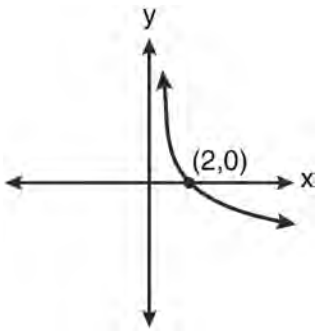
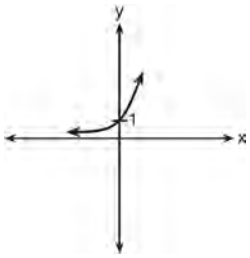


183 Which sketch shows the inverse of $y = a^x$, where $a > 1$?

1


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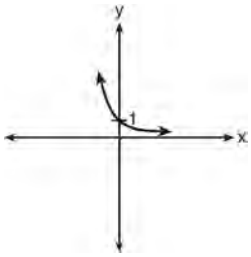

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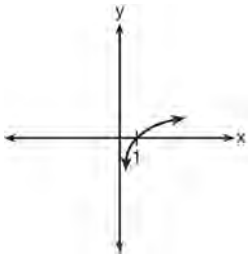
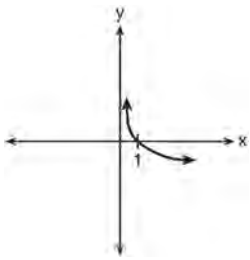


4


A2.A.19: PROPERTIES OF LOGARITHMS

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

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

186 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 $\log 6 + 2\log a$

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

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

189 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 $\log 16 + 2\log m$

190 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 $\log 2 + 3\log x$

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

1 $a^2 b$

2 $2ab$

3 $a^2 + b$

4 $2a + b$

A2.A.28: LOGARITHMIC EQUATIONS

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

1 6.4

2 2.56

3 $\frac{9}{5}$

4 $\frac{8}{5}$

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

194 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.]

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

1 1.16
2 20
3 625
4 1,024

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

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

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

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

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

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

1 $x^y = a$
2 $y^a = x$
3 $a^y = x$
4 $a^x = y$

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

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

A2.A.6, 27: EXPONENTIAL EQUATIONS

204 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

205 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

206 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.

207 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

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

209 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 $\frac{4}{3}$

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

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

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

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

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

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

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

A2.A.36: BINOMIAL EXPANSIONS

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

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

219 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

220 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 $2x^4y^2$

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

222 What is the fourth term in the binomial expansion $(x-2)^8$?
1 $448x^5$
2 $448x^4$
3 $-448x^5$
4 $-448x^4$

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

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

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

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

A2.A.26, 50: SOLVING POLYNOMIAL EQUATIONS

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

226 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 $0,-1,-2$

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

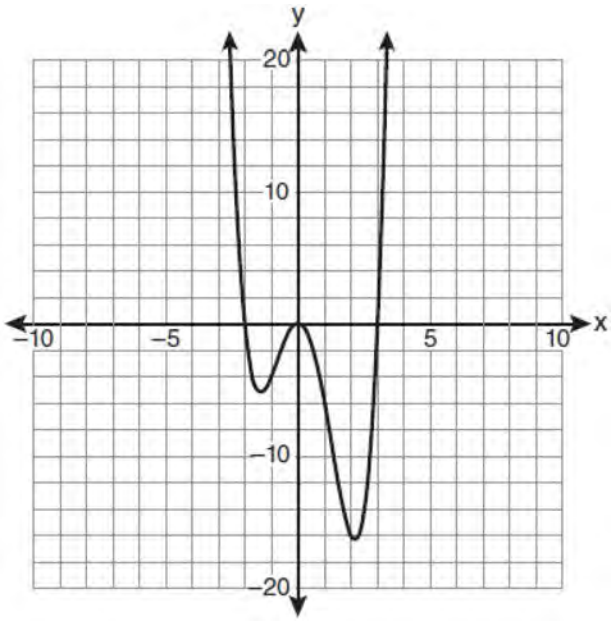
1 $\{0,\pm 2\}$
2 $\{0,\pm 2,3\}$
3 $\{0,\pm 2,\pm 2i\}$
4 $\{\pm 2,\pm 2i\}$

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

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

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

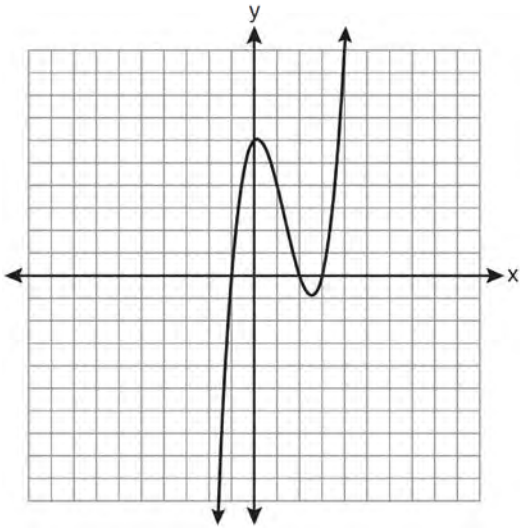
231 The graph of $y=f(x)$ is shown below.



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

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

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



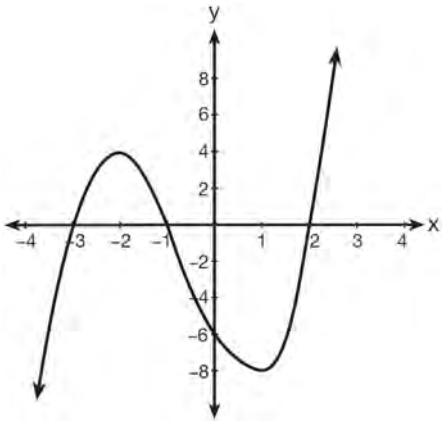
What is the product of the roots of the equation $x^3 - 4x^2 + x + 6 = 0$?

1 −36
2 −6
3 6
4 4

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

1 1
2 2
3 3
4 0

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



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

RADICALS

A2.N.4: OPERATIONS WITH IRRATIONAL EXPRESSIONS

235 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

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

237 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

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

239 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 $10a^2b\sqrt[3]{8}$

240 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 $6x^2\sqrt[3]{2}$

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

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

242 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 $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

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

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

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

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

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

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

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

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

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

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

1 $4+\sqrt{11}$

2 $\frac{20+5\sqrt{11}}{27}$

3 $4-\sqrt{11}$

4 $\frac{20-5\sqrt{11}}{27}$

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

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

2 $-\sqrt{3}+\frac{2}{3}\sqrt{6}$

3 $\frac{3-\sqrt{24}}{3}$

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

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

252 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 $2\sqrt{x+2}$

253 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

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

1 {1}

2 {0}

3 {1,6}

4 {2,3}

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

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

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

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

259 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

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

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

262 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 $4x^8y^{28}$

263 The expression $\sqrt[4]{81x^2y^5}$ is equivalent to
1 $3x^{\frac{1}{2}}y^{\frac{5}{4}}$
2 $3x^{\frac{1}{2}}y^{\frac{4}{5}}$
3 $9xy^{\frac{5}{2}}$
4 $9xy^{\frac{2}{5}}$

A2.N.6: SQUARE ROOTS OF NEGATIVE NUMBERS

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

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

266 The expression $\sqrt{-180x^{16}}$ is equivalent to
1 $-6x^4\sqrt{5}$
2 $-6x^8\sqrt{5}$
3 $6x^4i\sqrt{5}$
4 $6x^8i\sqrt{5}$

A2.N.7: IMAGINARY NUMBERS

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

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

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

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

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

A2.N.8: CONJUGATES OF COMPLEX NUMBERS

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

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

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

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

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

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

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

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

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

280 When $-3-2i$ is multiplied by its conjugate, the result is
1 -13
2 -5
3 5
4 13

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

RATIONALS

A2.A.16: MULTIPLICATION AND DIVISION OF RATIONALS

282 Perform the indicated operations and simplify completely:

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

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

284 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 $\dfrac{1}{11-x}$

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

A2.A.16: ADDITION AND SUBTRACTION OF RATIONALS

286 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 INEQALITIES

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

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

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

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

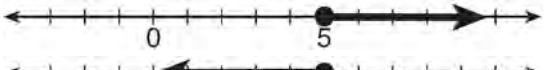
290 What is the solution set of the equation $\dfrac{30}{x^2-9}+1=\dfrac{5}{x-3}$?
1 $\{2,3\}$
2 $\{2\}$
3 $\{3\}$
4 $\{\ \}$

291 Which equation could be used to solve $\dfrac{5}{x-3}-\dfrac{2}{x}=1$?
1 $x^2-6x-3=0$
2 $x^2-6x+3=0$
3 $x^2-6x-6=0$
4 $x^2-6x+6=0$

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

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

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

1 

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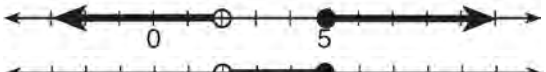
3 

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A2.A.17: COMPLEX FRACTIONS

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

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

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

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

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

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

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

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

A2.A.5: INVERSE VARIATION

300 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.

301 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

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

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

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

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

304 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

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

306 Given y varies inversely as x, when y is multiplied by $\frac{1}{2}$, then x is multiplied by

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

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

1 \$1067
2 \$400
3 \$240
4 \$150

FUNCTIONS

A2.A.40-41: FUNCTIONAL NOTATION

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

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

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

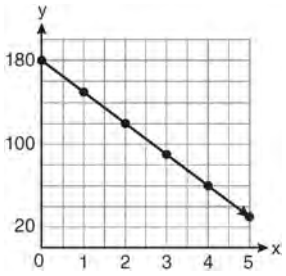
310 If $g(x) = \left(ax\sqrt{1-x}\right)^2$, express $g(10)$ in simplest form.

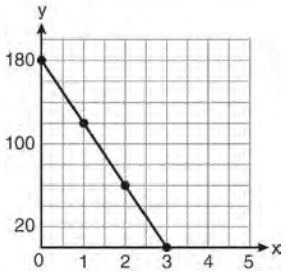
311 If $f(x) = 4x^2 - x + 1$, then $f(a+1)$ equals

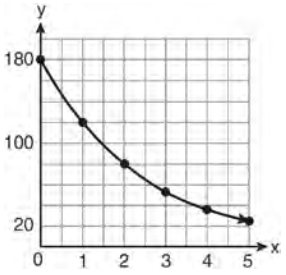
1 $4a^2 - a + 6$
2 $4a^2 - a + 4$
3 $4a^2 + 7a + 6$
4 $4a^2 + 7a + 4$

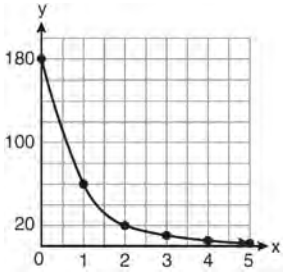
A2.A.52: FAMILIES OF FUNCTIONS

312 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

313 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 $(e, 1)$.

314 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

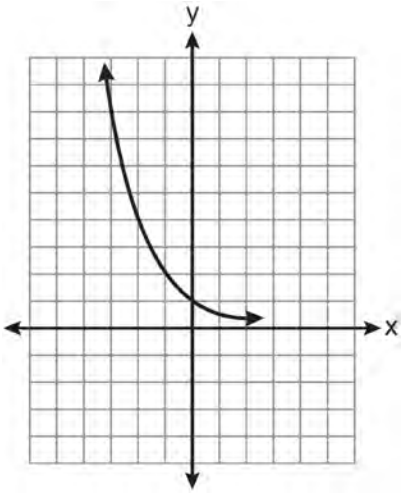
315 Four points on the graph of the function f(x) are shown below.

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

Which equation represents f(x)?

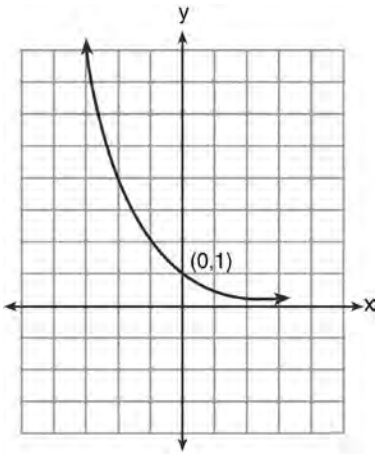
1 $f(x) = 2^x$
2 $f(x) = 2x$
3 $f(x) = x + 1$
4 $f(x) = \log_2 x$

316 Which equation is represented by the graph below?



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

317 What is the equation of the graph shown below?



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

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

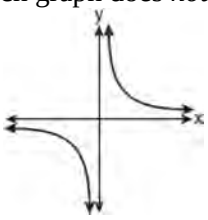
x	y
−2	5
−1	4
0	3
1	4
2	5

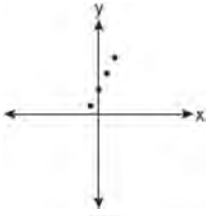
1 $f(x) = |x + 3|$
2 $f(x) = |x| + 3$
3 $f(y) = |y + 3|$
4 $f(y) = |y| + 3$

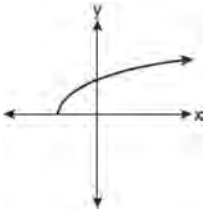
A2.A.37, 38, 43: DEFINING FUNCTIONS

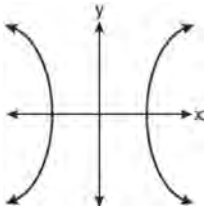
319 Given the relation $\{(8,2),(3,6),(7,5),(k,4)\}$, which value of *k* will result in the relation *not* being a function?
1 1
2 2
3 3
4 4

320 Which graph does *not* represent a function?

1 

2 

3 

4 

321 Which relation is *not* a function?

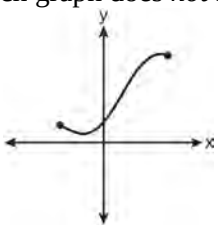
1 $(x-2)^2+y^2=4$

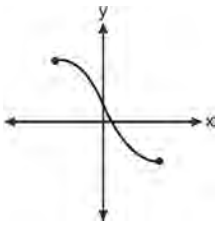
2 $x^2+4x+y=4$

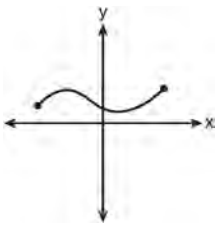
3 $x+y=4$

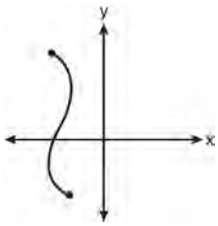
4 $xy=4$

322 Which graph does *not* represent a function?

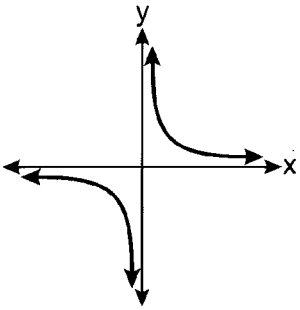
1 

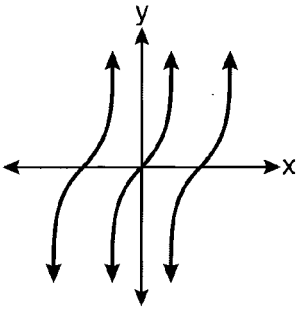
2 

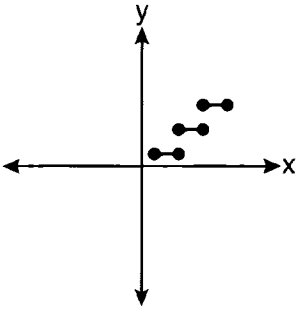
3 

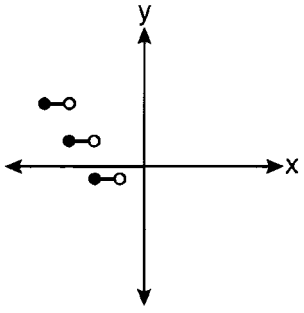
4 

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

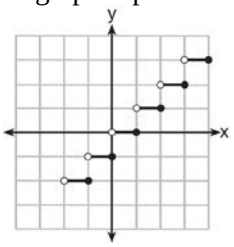
1 

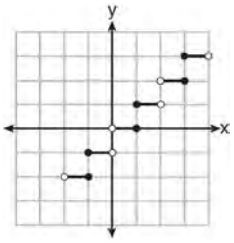
2 

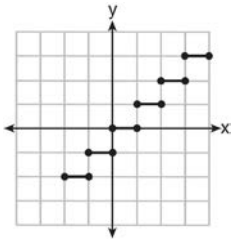
3 

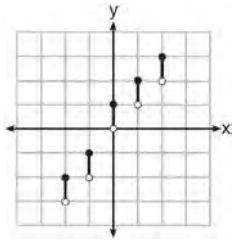
4 

324 Which graph represents a function?

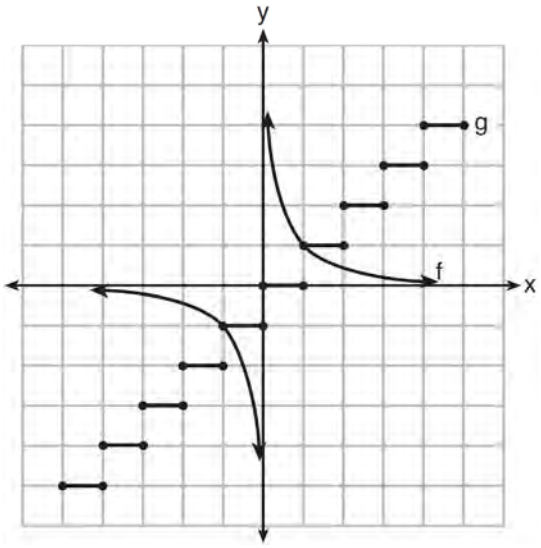
1 

2 

3 

4 

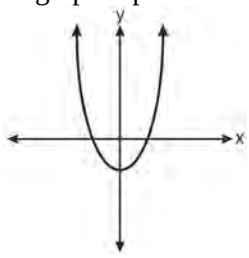
325 Which statement is true about the graphs of f and g shown below?



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

326 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 $\{(0,1),(1,0),(2,0),(3,2)\}$

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

1


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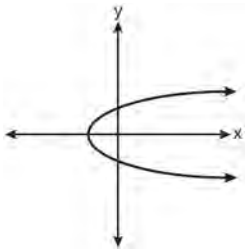

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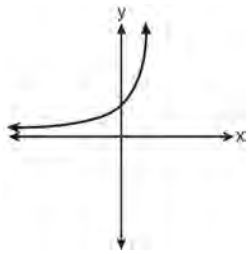

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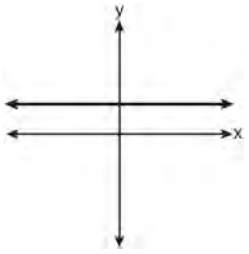
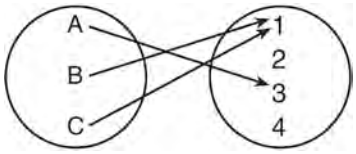
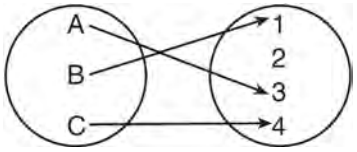


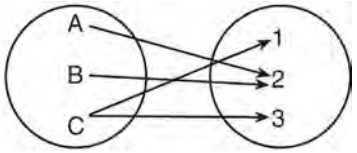
328 Which function is one-to-one?
1 $f(x) = |x|$
2 $f(x) = 2^x$
3 $f(x) = x^2$
4 $f(x) = \sin x$

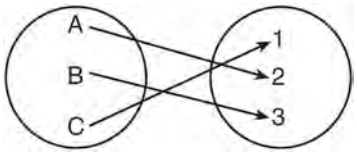
329 Which function is one-to-one?
1 $k(x) = x^2 + 2$
2 $g(x) = x^3 + 2$
3 $f(x) = |x| + 2$
4 $j(x) = x^4 + 2$

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

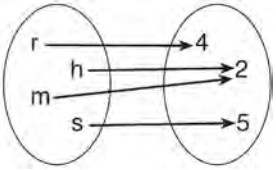
1 

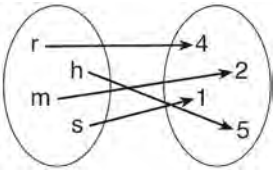
2 

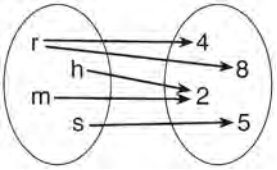
3 

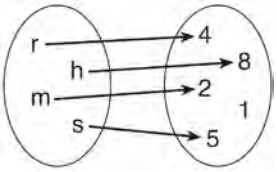
4 

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

1 

2 

3 

4 

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

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

A2.A.39, 51: DOMAIN AND RANGE

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

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

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

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

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

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

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

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

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

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

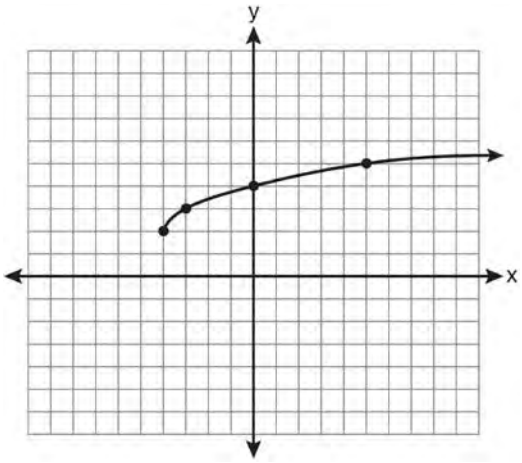
338 The domain of $f(x) = -\frac{3}{\sqrt{2-x}}$ is the set of all real numbers

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

339 What is the domain of the function $g(x) = 3^x - 1$?

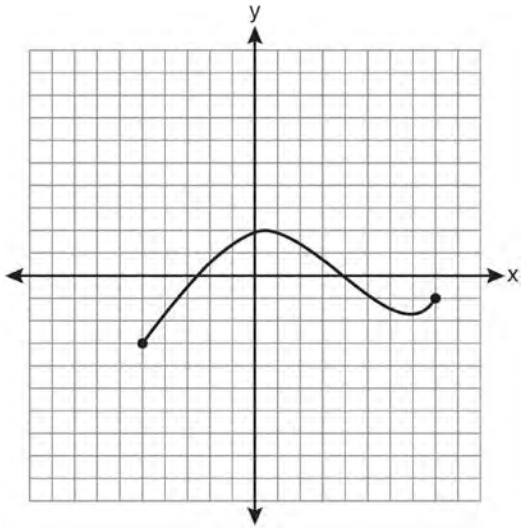
1 $(-\infty, 3]$
2 $(-\infty, 3)$
3 $(-\infty, \infty)$
4 $(-1, \infty)$

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



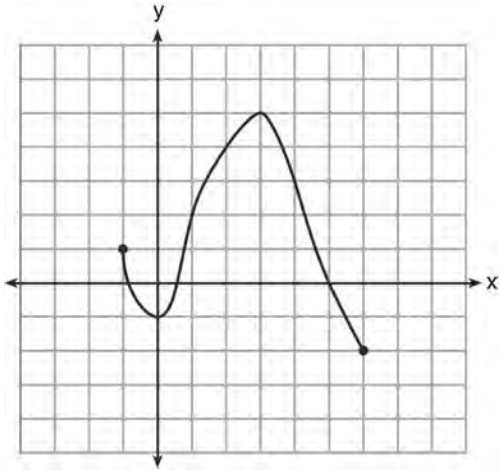
1 $\{x \mid x > -4\}$; $\{y \mid y > 2\}$
2 $\{x \mid x \geq -4\}$; $\{y \mid y \geq 2\}$
3 $\{x \mid x > 2\}$; $\{y \mid y > -4\}$
4 $\{x \mid x \geq 2\}$; $\{y \mid y \geq -4\}$

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



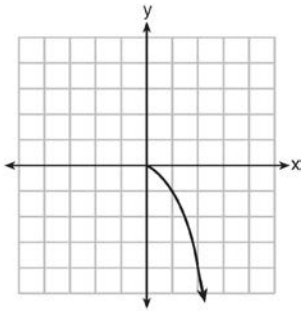
State the domain and range of this function.

342 What is the domain of the function shown below?



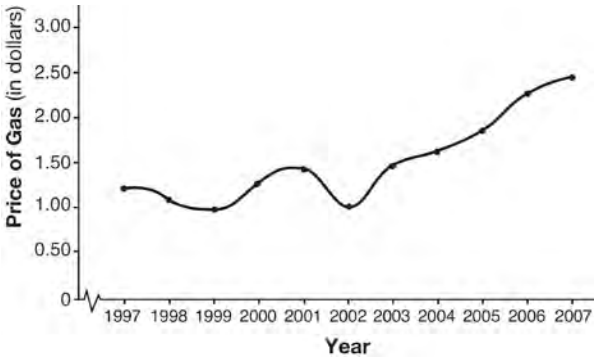
1 $-1 \leq x \leq 6$
2 $-1 \leq y \leq 6$
3 $-2 \leq x \leq 5$
4 $-2 \leq y \leq 5$

343 What is the range of the function shown below?



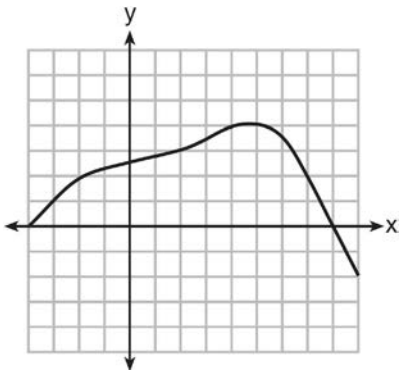
1 $x \le 0$
2 $x \ge 0$
3 $y \le 0$
4 $y \ge 0$

344 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 $1.27 \le y \le 2.38$

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



1 0
2 2
3 3
4 7

A2.A.42: COMPOSITIONS OF FUNCTIONS

346 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

347 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 $x^2 + 6x - 5$

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

349 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

350 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 $3\sin^2 x$

351 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

352 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 $2x^2 - 3x + 36$

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

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

A2.A.44: INVERSE OF FUNCTIONS

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

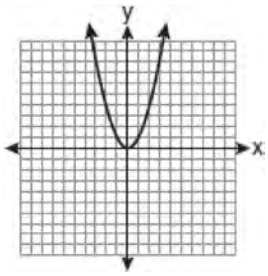
356 If $f(x) = x^2 - 6$, find $f^{-1}(x)$.

357 What is the inverse of the function $f(x) = \log_4 x$?
1 $f^{-1}(x) = x^4$
2 $f^{-1}(x) = 4^x$
3 $f^{-1}(x) = \log_x 4$
4 $f^{-1}(x) = -\log_x 4$

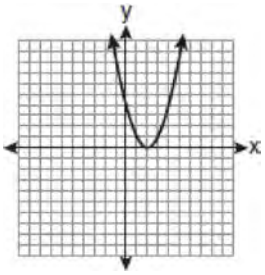
358 If $m = \{(-1,1),(1,1),(-2,4),(2,4),(-3,9),(3,9)\}$, which statement is true?
1 m and its inverse are both functions.
2 m is a function and its inverse is not a function.
3 m is not a function and its inverse is a function.
4 Neither m nor its inverse is a function.

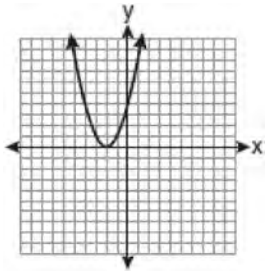
A2.A.46: TRANSFORMATIONS WITH FUNCTIONS AND RELATIONS

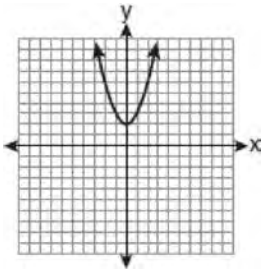
359 The graph below shows the function f(x).

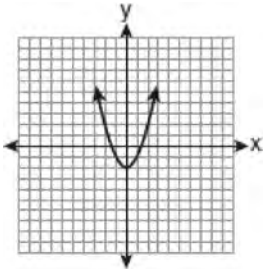


Which graph represents the function f($x + 2$)?

1


2


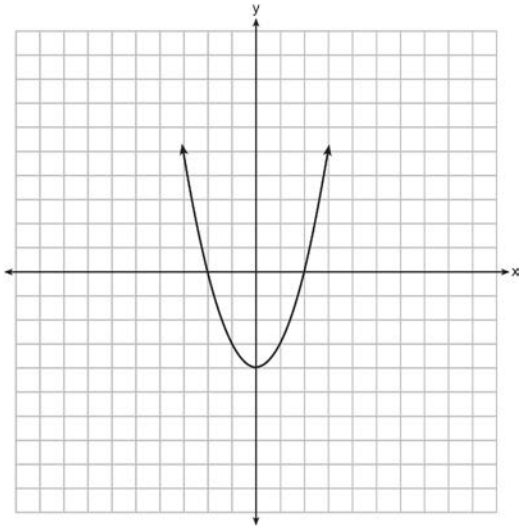
3


4


360 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 $(-6,-3)$

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



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

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

SEQUENCES AND SERIES

A2.A.29-33: SEQUENCES

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

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

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

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

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

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

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

1 $b_n = 8 + 2n$

2 $b_n = 10 + 2n$

3 $b_n = 10(2)^n$

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

365 A sequence has the following terms: $a_1 = 4$, $a_2 = 10$, $a_3 = 25$, $a_4 = 62.5$. Which formula represents the *n*th term in the sequence?

1 $a_n = 4 + 2.5n$

2 $a_n = 4 + 2.5(n-1)$

3 $a_n = 4(2.5)^n$

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

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

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

1 $35 + (n + 4)$

2 $35 + (4n)$

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

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

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

1 $\frac{8}{5}$

2 -3

3 3

4 9

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

370 What is the common difference in the sequence $2a + 1$, $4a + 4$, $6a + 7$, $8a + 10$, ...?

1 $2a + 3$

2 $-2a - 3$

3 $2a + 5$

4 $-2a + 5$

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

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

1 -3

2 $-3x$

3 3

4 $3x$

372 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 $\frac{37}{3}$

373 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

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

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

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

376 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

377 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 $16384\sqrt{10}$

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

1 105
2 110
3 124
4 130

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

$$a_1 = -3$$

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

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

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

$$a_1 = 2$$

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

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

$a_n = \left(\frac{2x}{y}\right)a_{n-1}$?

1 $12x^3y^3$
2 $24x^2y^4$
3 $24x^4y^2$
4 $48x^5y$

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

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

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

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

1 12
2 22
3 24
4 26

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

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

1 –38
2 –12
3 26
4 62

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

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

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

389 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 $4a^2-20a+30$

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

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

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

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

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

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

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

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

1 $\sum_{n=4}^{7} 2^n - 10$

2 $\sum_{n=3}^{6} \frac{2n^2}{3}$

3 $\sum_{n=2}^{5} 5n - 4$

4 $\sum_{n=2}^{5} n^2 + n$

A2.A.35: SERIES

397 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

398 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

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

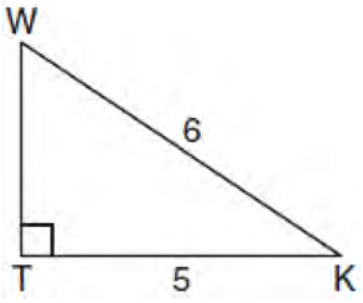
400 The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \ldots$ is

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

TRIGONOMETRY

A2.A.55: TRIGONOMETRIC RATIOS

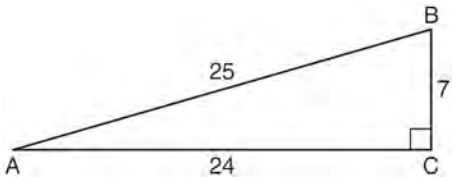
401 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.



What is the measure of $\angle K$, to the *nearest minute*?

1 33°33'
2 33°34'
3 33°55'
4 33°56'

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



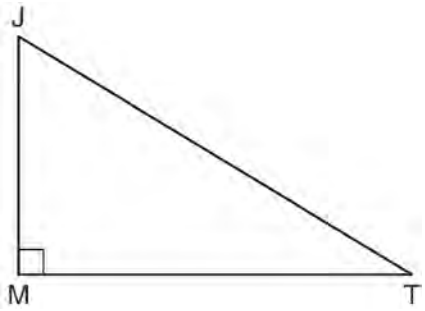
1 $\frac{25}{24}$

2 $\frac{25}{7}$

3 $\frac{24}{7}$

4 $\frac{7}{24}$

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



What is the value of $\cot J$?

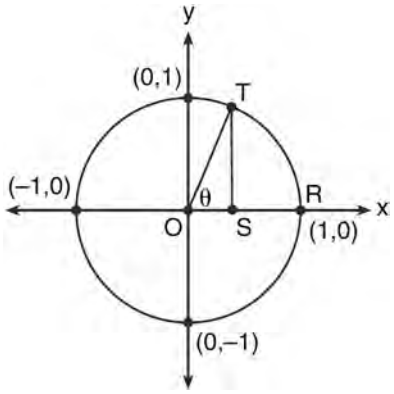
1 $\frac{\sqrt{3}}{3}$

2 2

3 $\sqrt{3}$

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

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



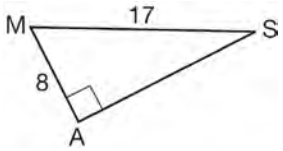
1 $\overline{TO}$

2 $\overline{TS}$

3 $\overline{OR}$

4 $\overline{OS}$

405 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'

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

1 $\sin 4.76° = \frac{h}{15}$

2 $\sin 4.76° = \frac{15}{h}$

3 $\tan 4.76° = \frac{h}{15}$

4 $\tan 4.76° = \frac{15}{h}$

A2.M.1-2: RADIAN MEASURE

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

408 The terminal side of an angle measuring $\frac{4\pi}{5}$ radians lies in Quadrant

1 I

2 II

3 III

4 IV

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

410 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

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

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

413 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

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

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

416 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

417 Approximately how many degrees does five radians equal?

1 286

2 900

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

4 5π

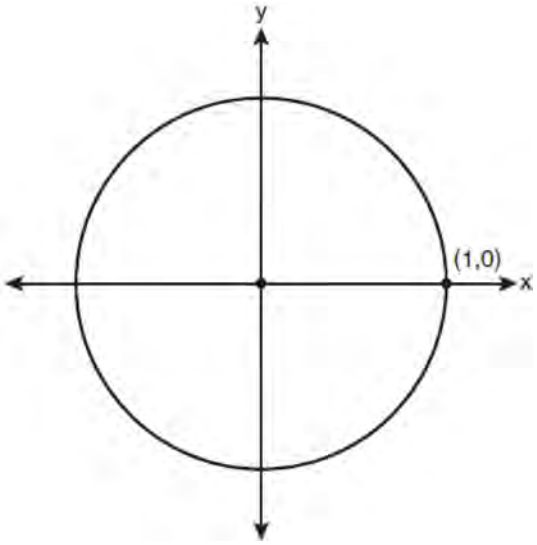
418 Convert 2.5 radians to degrees, and express the answer to the *nearest minute*.

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

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

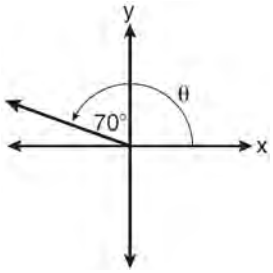
A2.A.60: UNIT CIRCLE

421 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 $\sin 240°$.



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

1



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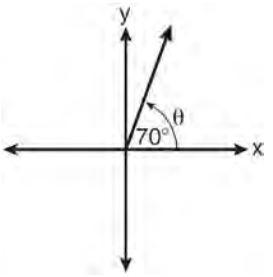

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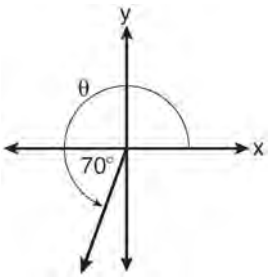

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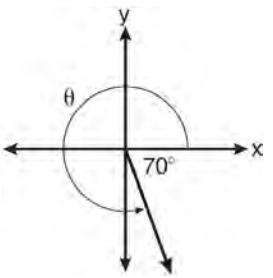
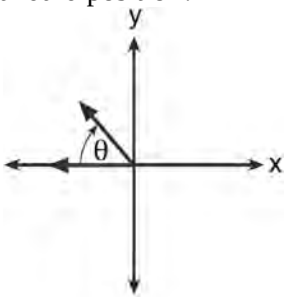
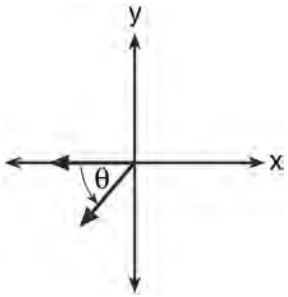
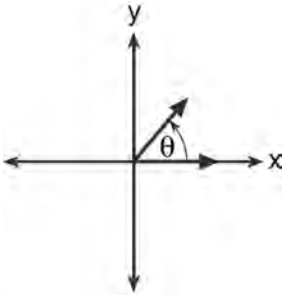
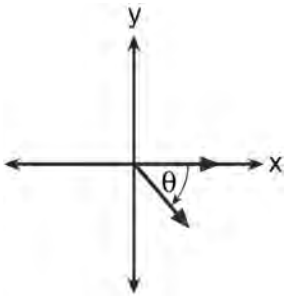


423 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?

1 

2 

3 

4 

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

424 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 $\sec P > 0$

425 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

426 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

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

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

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

430 Circle *O* has a radius of 2 units. An angle with a measure of $\frac{\pi}{6}$ radians is in standard position. If the terminal side of the angle intersects the circle at point *B*, what are the coordinates of *B*?
1 $\left(\frac{\sqrt{3}}{2},\frac{1}{2}\right)$
2 $\left(\sqrt{3},1\right)$
3 $\left(\frac{1}{2},\frac{\sqrt{3}}{2}\right)$
4 $\left(1,\sqrt{3}\right)$

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

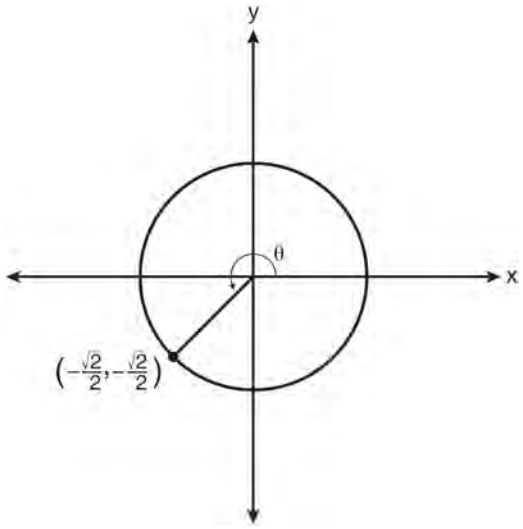
432 Which expression, when rounded to three decimal places, is equal to −1.155?
1 $\sec\left(\frac{5\pi}{6}\right)$
2 $\tan(49°20')$
3 $\sin\left(-\frac{3\pi}{5}\right)$
4 $\csc(-118°)$

433 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

434 What is the principal value of $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?
1 −30°
2 60°
3 150°
4 240°

435 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

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

437 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 $3\sqrt{2}$

438 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 $-\frac{24}{25}$

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

1 $\frac{8}{15}$

2 $\frac{8}{17}$

3 $\frac{15}{8}$

4 $\frac{17}{8}$

A2.A.57: REFERENCE ANGLES

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

1 $-\cos 55°$

2 $\cos 55°$

3 $-\sin 55°$

4 $\sin 55°$

441 Expressed as a function of a positive acute angle, $\sin 230°$ is equal to

1 $-\sin 40°$

2 $-\sin 50°$

3 $\sin 40°$

4 $\sin 50°$

A2.A.61: ARC LENGTH

442 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

443 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?

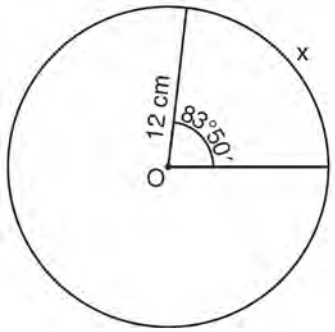
1 $\frac{3\pi}{4}$

2 π

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

4 3π

444 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'.



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

1 45

2 23

3 13

4 11

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

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

447 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 $\cot(90° - A) = \frac{1}{3}$

448 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 $\csc^2\theta$

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

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

451 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.

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

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

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

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

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

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

456 The exact value of $\csc 120°$ is

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

A2.A.67: SIMPLIFYING TRIGONOMETRIC EXPRESSIONS & PROVING TRIGONOMETRIC IDENTITIES

457 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 $\cos x + \sin x$

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

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

A2.A.76: ANGLE SUM AND DIFFERENCE IDENTITIES

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

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

461 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 $\tan(A + B)$.

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

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

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

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

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

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

466 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

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

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

469 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

470 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 $\frac{7}{9}$

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

1 $-\frac{9}{64}$

2 $\frac{1}{4}$

3 $\frac{23}{32}$

4 $\frac{55}{64}$

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

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

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

1 $\frac{1}{8}$

2 $\frac{9}{16}$

3 $-\frac{1}{8}$

4 $\frac{3}{2}$

A2.A.68: TRIGONOMETRIC EQUATIONS

474 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

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

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

477 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 $\{60°, 300°\}$

478 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 $\{225°, 315°\}$

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

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

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

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

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

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

A2.A.69: PROPERTIES OF TRIGONOMETRIC FUNCTIONS

484 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

485 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

486 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 $y = 3\sin 4x$

487 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

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

1 1

2 2

3 3

4 4

489 What is the period of the graph of the equation $y = \frac{1}{3}\sin 2x$?

1 $\frac{1}{3}$

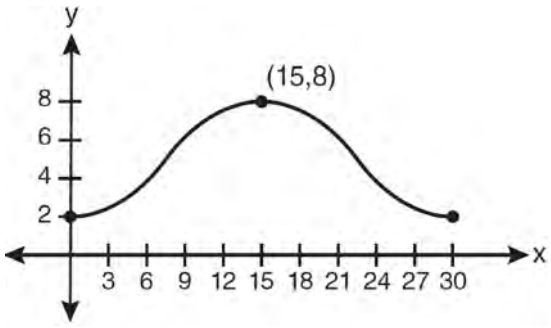
2 *2*

3 π

4 6π

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

490 Which equation is graphed in the diagram below?



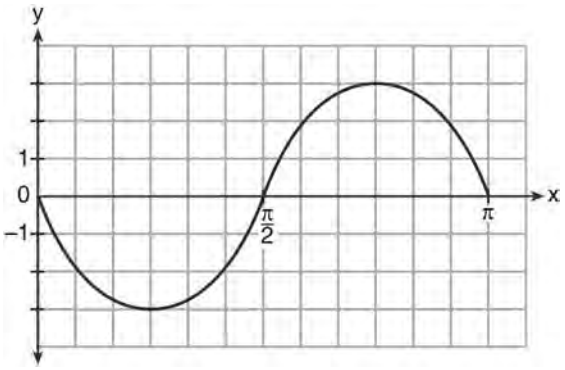
1 $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$

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

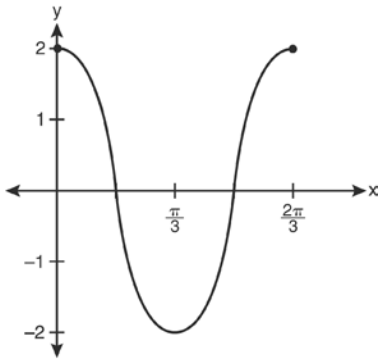
3 $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$

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

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

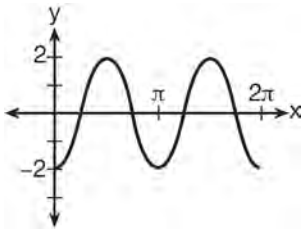


492 Which equation is represented by the graph below?



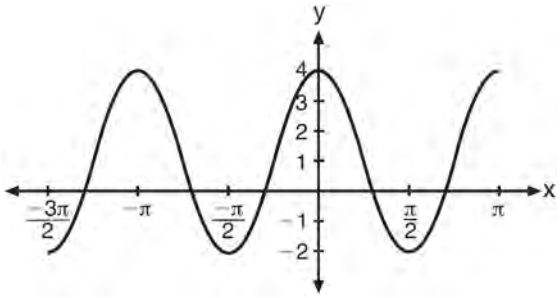
1 $y = 2\cos 3x$
2 $y = 2\sin 3x$
3 $y = 2\cos\frac{2\pi}{3}x$
4 $y = 2\sin\frac{2\pi}{3}x$

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

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

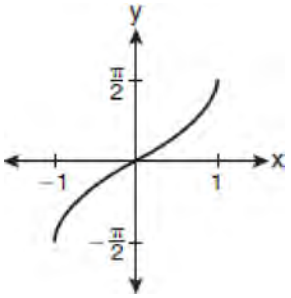


State the values of a, b, and c, and write an equation for the graph.

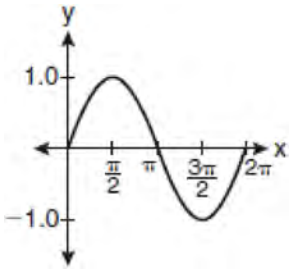
A2.A.65, 70-71: GRAPHING TRIGONOMETRIC FUNCTIONS

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

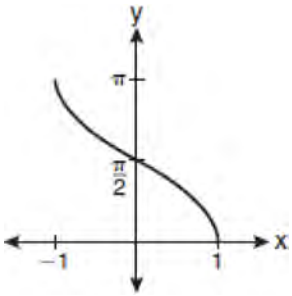
1



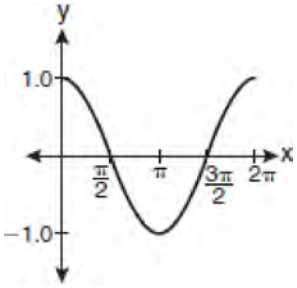
2



3

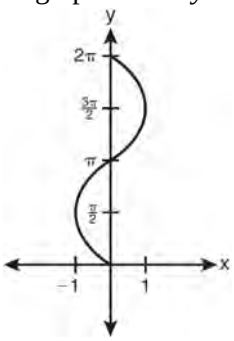


4

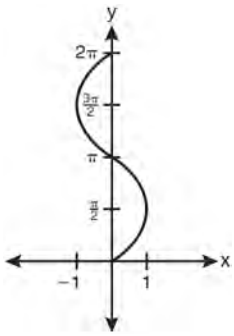


496 Which graph shows $y = \cos^{-1} x$?

1



2



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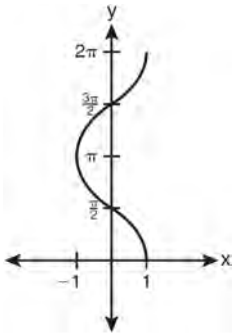

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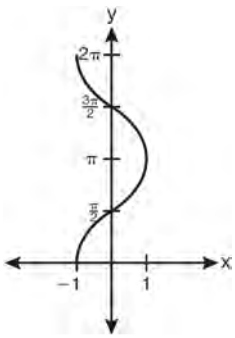
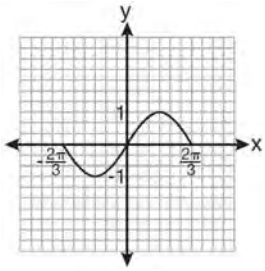
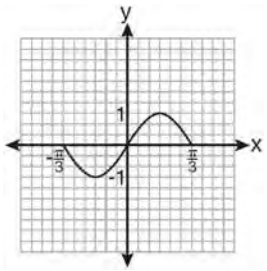


Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic

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

1


2


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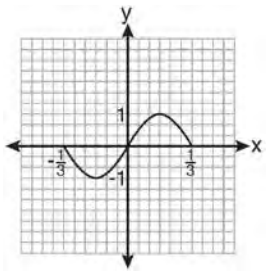

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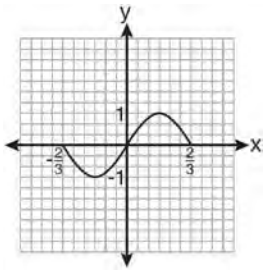
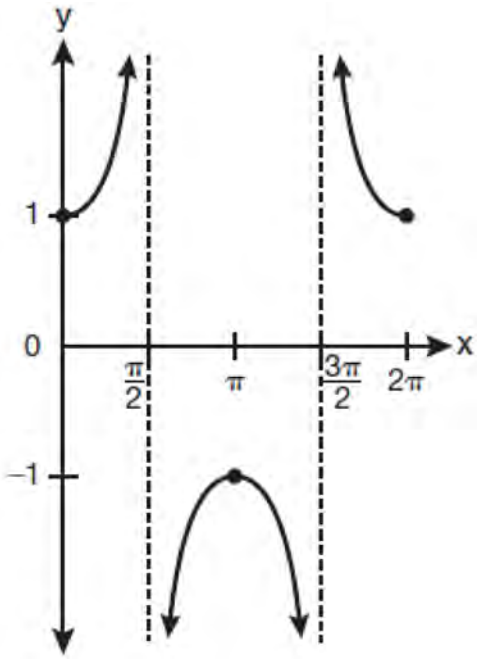
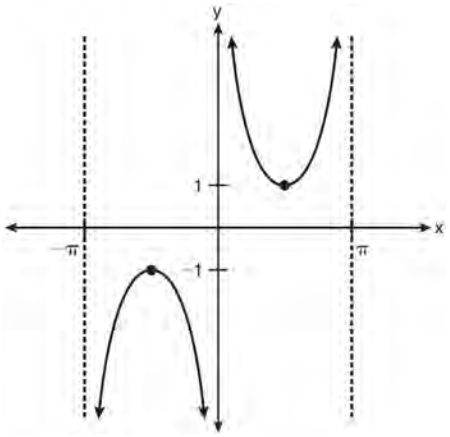


498 Which equation is represented by the graph below?



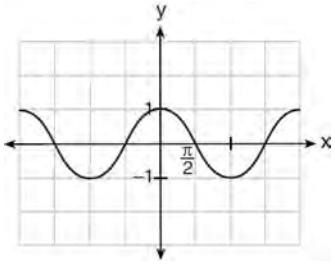
1 $y = \cot x$
2 $y = \csc x$
3 $y = \sec x$
4 $y = \tan x$

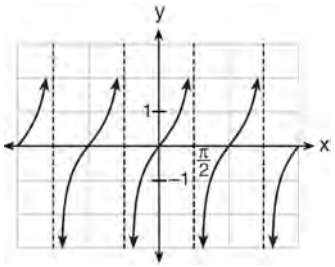
499 Which equation is sketched in the diagram below?

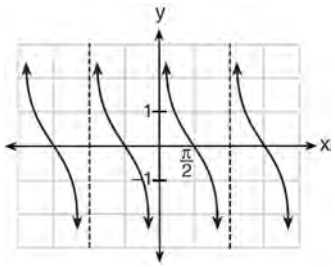


1 $y = \csc x$
2 $y = \sec x$
3 $y = \cot x$
4 $y = \tan x$

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

1


2


3


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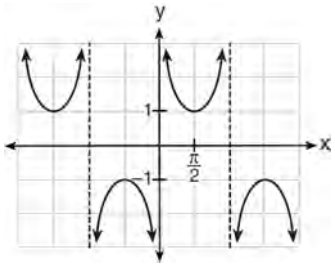


A2.A.63: DOMAIN AND RANGE

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

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

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

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

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

3 $0 \le x \le \pi$

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

503 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

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

1 52
2 78
3 90
4 156

505 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*.

506 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

507 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 $\triangle BLF$?

1 11.4
2 14.1
3 22.7
4 28.1

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

509 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

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

511 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°.

512 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

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

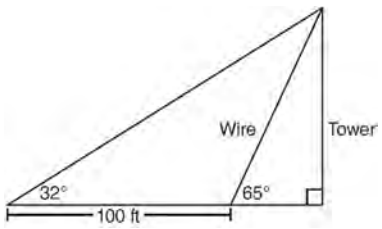
514 What is the area of a parallelogram that has sides measuring 8 cm and 12 cm and includes an angle of 120°?

1 $24\sqrt{3}$
2 $48\sqrt{3}$
3 $83\sqrt{3}$
4 $96\sqrt{3}$

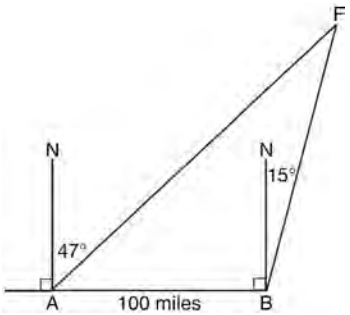
A2.A.73: LAW OF SINES

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

516 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*.



517 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.]



518 In $\triangle PQR$, p equals

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

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

519 In $\triangle ABC$, $m\angle A = 74$, $a = 59.2$, and $c = 60.3$. What are the two possible values for $m\angle C$, to the *nearest tenth*?

1 73.7 and 106.3
2 73.7 and 163.7
3 78.3 and 101.7
4 78.3 and 168.3

520 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

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

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

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

1 35
2 40
3 45
4 50

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

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

525 How many distinct triangles can be constructed if $m\angle A = 30$, side $a = \sqrt{34}$, and side $b = 12$?
1 one acute triangle
2 one obtuse triangle
3 two triangles
4 none

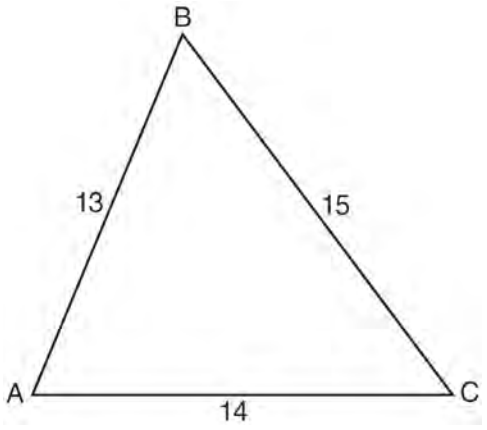
526 In triangle *ABC*, determine the number of distinct triangles that can be formed if $m\angle A = 85$, side $a = 8$, and side $c = 2$. Justify your answer.

A2.A.73: LAW OF COSINES

527 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.

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

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



1 53
2 59
3 67
4 127

530 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*.

531 In $\triangle FGH$, $f = 6$, $g = 9$, and $m\angle H = 57$. Which statement can be used to determine the numerical value of *h?*
1 $h^2 = 6^2 + 9^2 - 2(9)(h)\cos 57°$
2 $h^2 = 6^2 + 9^2 - 2(6)(9)\cos 57°$
3 $6^2 = 9^2 + h^2 - 2(9)(h)\cos 57°$
4 $9^2 = 6^2 + h^2 - 2(6)(h)\cos 57°$

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

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

A2.A.73: VECTORS

534 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.

535 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.

536 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

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

538 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 $(8,3)$

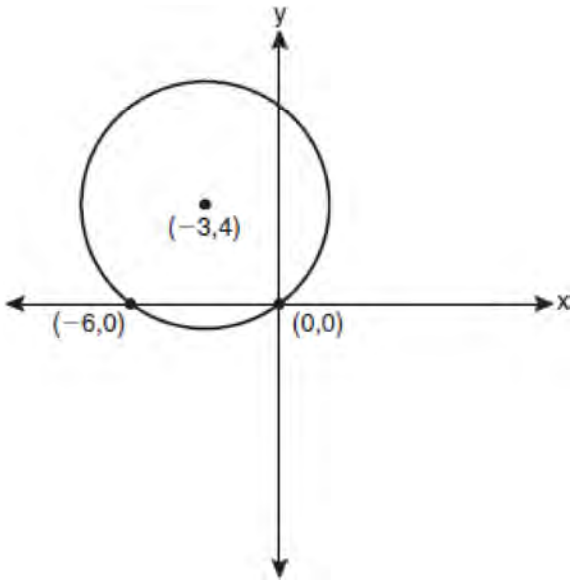
539 What is the equation of the circle passing through the point $(6,5)$ and centered at $(3,-4)$?

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 $(x-3)^2 + (y+4)^2 = 90$

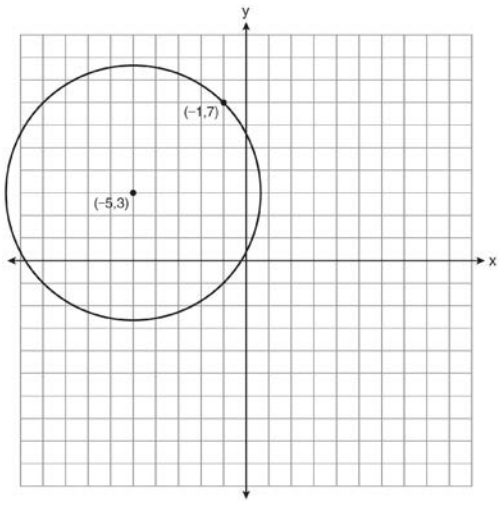
540 Which equation represents a circle with its center at $(2,-3)$ and that passes through the point $(6,2)$?

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

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

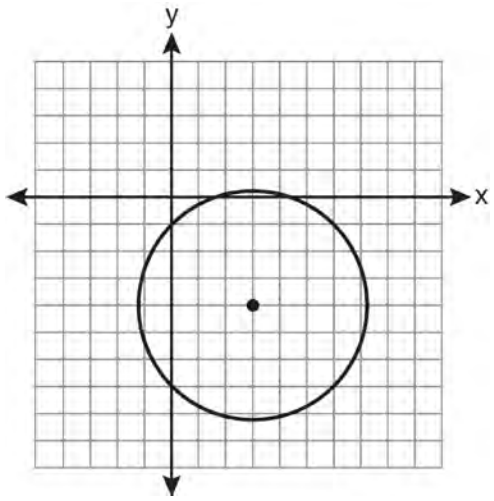


542 A circle shown in the diagram below has a center of $(-5,3)$ and passes through point $(-1,7)$.



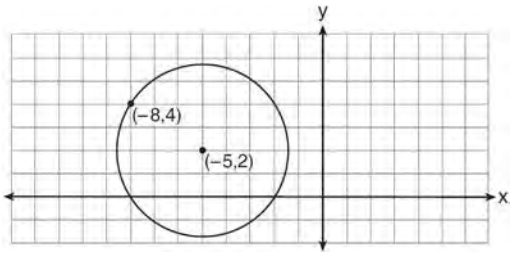
Write an equation that represents the circle.

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

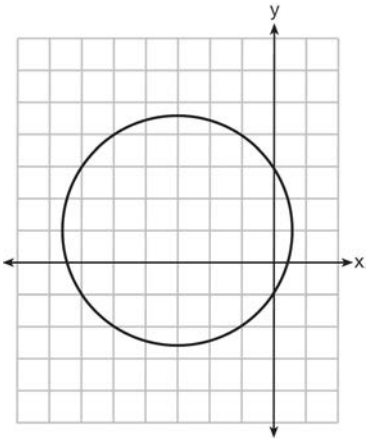


1 $(x-3)^2+(y+4)^2=16$
2 $(x-3)^2+(y+4)^2=18$
3 $(x+3)^2+(y-4)^2=16$
4 $(x+3)^2+(y-4)^2=18$

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

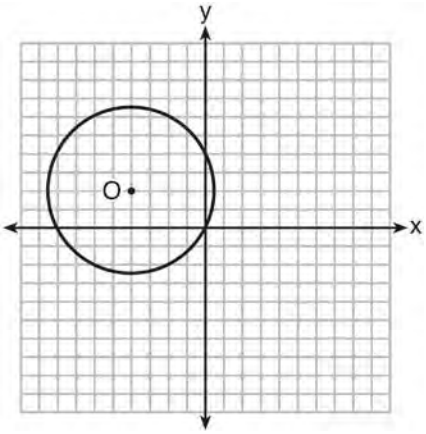


545 Which equation is represented by the graph below?



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

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



What is the equation of circle O?

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

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

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

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

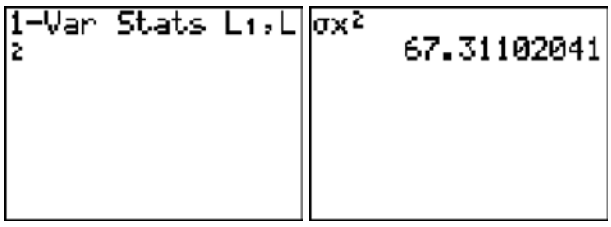
$$4k+36=2k+44$$

$$2k=8$$

$$k=4$$

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: 2
$12 - 7 = 5$

PTS: 2 REF: 011525a2 STA: A2.S.4 TOP: Dispersion
KEY: range, quartiles, interquartile range, variance

18 ANS:
5.17 84.46 ± 5.17

$79.29 - 89.63$

$5 + 7 + 5 = 17$

PTS: 4 REF: 061538a2 STA: A2.S.4 TOP: Dispersion
KEY: advanced, group frequency distributions
19 ANS: 2 PTS: 2 REF: 081509a2 STA: A2.S.4
TOP: Dispersion KEY: basic, group frequency distributions
20 ANS: 3 PTS: 2 REF: 061127a2 STA: A2.S.6
TOP: Regression
21 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
22 ANS:
$y = 10.596(1.586)^x$

PTS: 2 REF: 081031a2 STA: A2.S.7 TOP: Exponential Regression
23 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
24 ANS:
$y = 180.377(0.954)^x$

PTS: 2 REF: 061231a2 STA: A2.S.7 TOP: Exponential Regression
25 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
26 ANS:
$y = 0.488(1.116)^x$

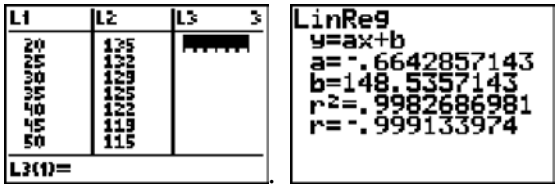
PTS: 2 REF: 061429a2 STA: A2.S.7 TOP: Exponential Regression
27 ANS:
$y = 733.646(0.786)^x$ $733.646(0.786)^{12} \approx 41$

PTS: 4 REF: 011536a2 STA: A2.S.7 TOP: Exponential Regression
28 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8
TOP: Correlation Coefficient

29 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

30 ANS: 1



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

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

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

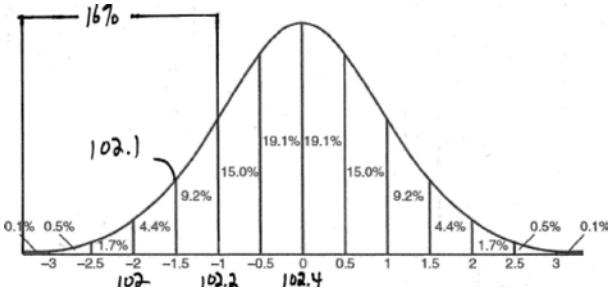
32 ANS: 1 PTS: 2 REF: 061316a2 STA: A2.S.8
TOP: Correlation Coefficient

33 ANS:
$r_A \approx 0.976$ $r_B \approx 0.994$ Set B has the stronger linear relationship since r is higher.

PTS: 2 REF: 061535a2 STA: A2.S.8 TOP: Correlation Coefficient

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

35 ANS: 1



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

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

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

37 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

38 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

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

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

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

153 ± 22

$131 - 175$

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

41 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

42 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

43 ANS:

$$\text{sd} = \frac{81 - 57}{3} = 8$$

$57 + 8 = 65$

$81 - 2(8) = 65$

PTS: 2 REF: 011534a2 STA: A2.S.5 TOP: Normal Distributions
KEY: mean and standard deviation

44 ANS: 4

$$\frac{91 - 82}{3.6} = 2.5\,\text{sd}$$

PTS: 2 REF: 081521a2 STA: A2.S.5 TOP: Normal Distributions
KEY: interval

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

46 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

47 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

48 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

49 ANS: 1

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

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

50 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

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

52 ANS: 3

$2!\cdot 2!\cdot 2! = 8$

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

53 ANS: 1

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

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

54 ANS: 1

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

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

55 ANS: 1

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

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

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

PTS: 2 REF: 081012a2 STA: A2.S.11 TOP: Combinations
57 ANS: 1
$_{10}C_4 = 210$

PTS: 2 REF: 061113a2 STA: A2.S.11 TOP: Combinations
58 ANS:
$_{25}C_{20} = 53,130$

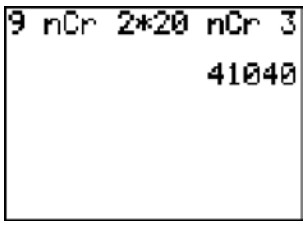
PTS: 2 REF: 011232a2 STA: A2.S.11 TOP: Combinations
59 ANS: 4
$_{15}C_5 = 3,003.\ _{25}C_5 = {}_{25}C_{20} = 53,130.\ _{25}C_{15} = 3,268,760.$

PTS: 2 REF: 061227a2 STA: A2.S.11 TOP: Combinations
60 ANS: 3
$_{20}C_4 = 4,845$

PTS: 2 REF: 011509a2 STA: A2.S.11 TOP: Combinations
61 ANS: 3
$_9C_3 = 84$

PTS: 2 REF: 081513a2 STA: A2.S.11 TOP: Combinations
62 ANS: 3 PTS: 2 REF: 061007a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
63 ANS: 1 PTS: 2 REF: 011117a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
64 ANS: 1 PTS: 2 REF: 011310a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
65 ANS: 1 PTS: 2 REF: 061317a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
66 ANS: 2 PTS: 2 REF: 011417a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
67 ANS: 3 PTS: 2 REF: 061523a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations
68 ANS: 4 PTS: 2 REF: 081526a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

69 ANS:



41,040.

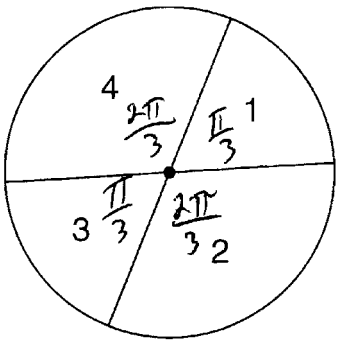
PTS: 2 REF: fall0935a2 STA: A2.S.12 TOP: Sample Space

70 ANS: 3

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

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

71 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

72 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

73 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

74 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

75 ANS:

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

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

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

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

76 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

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

78 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

79 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

80 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

81 ANS:

${}_6C_5\left(\frac{2}{5}\right)^5\left(\frac{3}{5}\right) = 6\left(\frac{32}{3125}\right)\left(\frac{3}{5}\right) = \frac{576}{15,625}$

PTS: 2 REF: 011532a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

82 ANS:

$${}_3C_1\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^2 = 3\cdot\frac{1}{4}\cdot\frac{9}{16} = \frac{27}{64}$$

PTS: 2 REF: 061530a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

83 ANS:

$${}_7C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^3 = 35\left(\frac{16}{81}\right)\left(\frac{1}{27}\right) = \frac{560}{2187}$$

PTS: 2 REF: 081531a2 STA: A2.S.15 TOP: Binomial Probability
KEY: exactly

84 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

85 ANS: 2

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

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

$-6 = x$ $x = -2$

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

86 ANS: 1

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

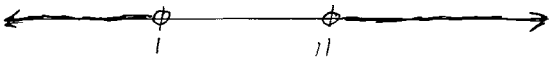
$6x \le 12$ $6x \ge 2$

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

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

87 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

88 ANS: 3

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

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

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

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

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

89 ANS:

$3 - 2x \geq 7$ or $3 - 2x \leq -7$

$-2x \geq 4$ $\quad$ $-2x \leq -10$

$x \leq -2$ $\quad$ $x \geq 5$

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

90 ANS: 1

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

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

$x > 3$ $\quad$ $x < -2$

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

91 ANS:

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

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

$x > -2$ $\quad$ $x < 4.5$

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

92 ANS:

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

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

$x > 4$ $\quad$ $x < -1$

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

93 ANS:

$|3x-5| < x+17$ $3x-5 < x+17$ and $3x-5 > -x-17$ $-3 < x < 11$

$2x < 22$ $\quad$ $4x > -12$

$x < 11$ $\quad$ $x > -3$

PTS: 4 REF: 081538a2 STA: A2.A.1 TOP: Absolute Value Inequalities

94 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

95 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

96 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

97 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

98 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

99 ANS: 3

$\frac{c}{a} = \frac{-3}{4}$

PTS: 2 REF: 011517a2 STA: A2.A.20 TOP: Roots of Quadratics

100 ANS:

Sum $\frac{-b}{a} = \frac{-2}{3}$. Product $\frac{c}{a} = \frac{k}{3}$

PTS: 2 REF: 061534a2 STA: A2.A.20 TOP: Roots of Quadratics

101 ANS: 2

$P = \frac{c}{a} = \frac{-12}{3} = -4$

PTS: 2 REF: 081506a2 STA: A2.A.20 TOP: Roots of Quadratics

102 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

103 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

104 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

105 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

106 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

107 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

108 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

109 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

110 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

111 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

112 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

113 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

114 ANS: 2

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

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

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

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

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

115 ANS:

$x^2(x-6)-25(x-6)$

$(x^2-25)(x-6)$

$(x+5)(x-5)(x-6)$

PTS: 2 REF: 061532a2 STA: A2.A.7 TOP: Factoring by Grouping

116 ANS: 4

$$\frac{3\pm\sqrt{(-3)^2-4(1)(-9)}}{2(1)}=\frac{3\pm\sqrt{45}}{2}=\frac{3\pm3\sqrt{5}}{2}$$

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

117 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

118 ANS:

$$\frac{2\pm\sqrt{(-2)^2-4(6)(-3)}}{2(6)}=\frac{2\pm\sqrt{76}}{12}=\frac{2\pm\sqrt{4}\sqrt{19}}{12}=\frac{2\pm2\sqrt{19}}{12}=\frac{1\pm\sqrt{19}}{6}$$

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

119 ANS: 2

$60=-16t^2+5t+105$ $t=\dfrac{-5\pm\sqrt{5^2-4(-16)(45)}}{2(-16)}\approx\dfrac{-5\pm53.89}{-32}\approx1.84$

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

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

120 ANS:

$(x+14)(x+22)=800$ $x=\dfrac{-36\pm\sqrt{(-36)^2-4(1)(-492)}}{2(1)}=\dfrac{-36+\sqrt{3264}}{2}\approx10.6$ 10 feet increase.

$x^2+36x+308=800$

$x^2+36x-492=0$

PTS: 6 REF: 011539a2 STA: A2.A.25 TOP: Quadratics with Irrational Solutions

121 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

122 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

123 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

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

125 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

126 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

127 ANS: 2

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

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

128 ANS: 3

$3x^2 + x - 14 = 0 \;\; 1^2 - 4(3)(-14) = 1 + 168 = 169 = 13^2$

PTS: 2 REF: 061524a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

129 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

130 ANS: 2
$$x^2 + 2 = 6x$$
$$x^2 - 6x = -2$$
$$x^2 - 6x + 9 = -2 + 9$$
$$(x-3)^2 = 7$$

PTS: 2 REF: 011116a2 STA: A2.A.24 TOP: Completing the Square

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

132 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

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

134 ANS: 3
$$x^2 = 12x - 7$$
$$x^2 - 12x = -7$$
$$x^2 - 12x + 36 = -7 + 36$$
$$(x-6)^2 = 29$$

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

135 ANS: 1

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

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

136 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

137 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

138 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

139 ANS: 2

$9 - x^2 < 0$ or $x + 3 < 0$ and $x - 3 < 0$

$x^2 - 9 > 0$ $x < -3$ and $x < 3$

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

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

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

$x > 3$

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

140 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

141 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

142 ANS: 3

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

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

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

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

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

$x^2 + x - 20 = 0$

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

$x = -5, 4$

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

143 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

144 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

145 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

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

147 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

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

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

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

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

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

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

152 ANS: 4

$\left(\frac{3}{2}x-1\right)\left[\left(\frac{3}{2}x+1\right)-\left(\frac{3}{2}x-1\right)\right]=\left(\frac{3}{2}x-1\right)(2)=3x-2$

PTS: 2 REF: 011524a2 STA: A2.N.3 TOP: Operations with Polynomials

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

154 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

155 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

156 ANS: 4

$f(16)=4(16)^{\frac{1}{2}}+16^{0}+16^{-\frac{1}{4}}$

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

$=17\frac{1}{2}$

PTS: 2 REF: 081503a2 STA: A2.N.1 TOP: Negative and Fractional Exponents

157 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

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

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

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

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

162 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

163 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

164 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

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

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

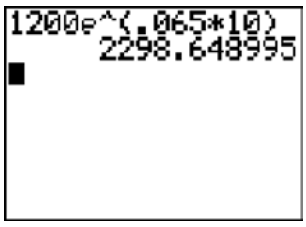
167 ANS: 2

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

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

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

169 ANS:



2,298.65.

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

170 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

171 ANS:

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

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

172 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

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

174 ANS: 3

$p(5) - p(0) = 17(1.15)^{2(5)} - 17(1.15)^{2(0)} \approx 68.8 - 17 \approx 51$

PTS: 2 REF: 061527a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

175 ANS: 2

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

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

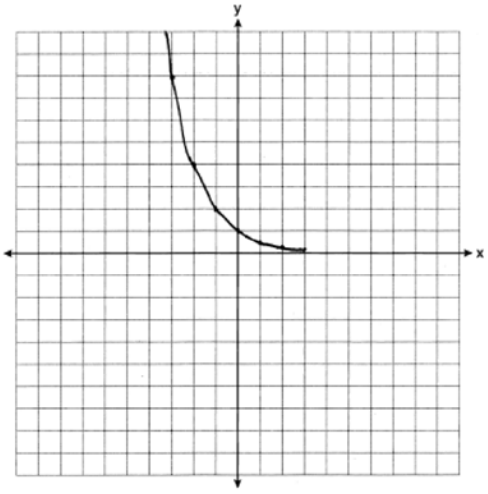
176 ANS: 2

$8^2 = 64$

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

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

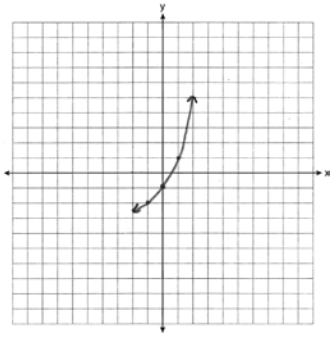
178 ANS:



$y = 0$

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

179 ANS:



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

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

181 ANS: 2

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

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

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

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

184 ANS: 1

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

PTS: 2 REF: 061010a2 STA: A2.A.19 TOP: Properties of Logarithms

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

186 ANS: 2

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

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

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

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

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

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

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

188 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

189 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

190 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

191 ANS: 1

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

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

$x = a^2 b$

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

192 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

193 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

194 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

195 ANS: 3

$x = 5^4 = 625$

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

196 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

197 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

198 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

199 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

200 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

201 ANS: 3 PTS: 2 REF: 011503a2 STA: A2.A.28
TOP: Logarithmic Equations KEY: basic

202 ANS:

$(x+1)^3 = 64$

$x+1 = 4$

$x = 3$

PTS: 2 REF: 061531a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

203 ANS:

$\log_2\left(\frac{x^2-7x+12}{2x-10}\right) = 3$ $\qquad x = \frac{23 \pm \sqrt{(-23)^2 - 4(1)(92)}}{2(1)} \approx 17.84, 5.16$

$\frac{x^2-7x+12}{2x-10} = 8$

$x^2 - 7x + 12 = 16x - 80$

$x^2 - 23x + 92 = 0$

PTS: 6 REF: 081539a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: applying properties of logarithms

204 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

205 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

206 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

207 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

208 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

209 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

210 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

211 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

212 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

213 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

214 ANS:

$\ln e^{4x} = \ln 12$

$4x = \ln 12$

$x = \frac{\ln 12}{4}$

≈ 0.62

PTS: 2 REF: 011530a2 STA: A2.A.27 TOP: Exponential Equations
KEY: without common base

215 ANS:

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

$4x = 3x - 3$

$x = -3$

PTS: 2 REF: 061528a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base shown

216 ANS:

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

$-4 = 3x - 1$

$-3 = 3x$

$-1 = x$

PTS: 2 REF: 081529a2 STA: A2.A.27 TOP: Exponential Equations
KEY: common base shown

217 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

218 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

219 ANS: 1

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

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

220 ANS: 3

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

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

221 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

222 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

223 ANS: 1

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

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

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

225 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 $2x + 1 = 0$

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

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

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

226 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

227 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

228 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

229 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

230 ANS:

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

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

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

$$x = \pm 2, \frac{1}{2}$$

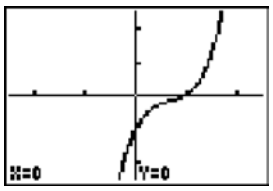
PTS: 4 REF: 081537a2 STA: A2.A.26 TOP: Solving Polynomial Equations

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

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

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

233 ANS: 4



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

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

235 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

236 ANS:

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

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

237 ANS: 3

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

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

238 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

239 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

240 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

241 ANS: 1

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

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

242 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

243 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

244 ANS: 1

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

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

245 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

246 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

247 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

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

248 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

249 ANS: 1

$$\frac{5}{4-\sqrt{11}} \cdot \frac{4+\sqrt{11}}{4+\sqrt{11}} = \frac{5(4+\sqrt{11})}{16-11} = \frac{5(4+\sqrt{11})}{5} = 4+\sqrt{11}$$

PTS: 2 REF: 061509a2 STA: A2.N.5 TOP: Rationalizing Denominators

250 ANS: 4

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

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

251 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

252 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

253 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

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

255 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

256 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

257 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

258 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

259 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

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

261 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

262 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

263 ANS: 1

$\sqrt[4]{81x^2y^5} = 81^{\frac{1}{4}}x^{\frac{2}{4}}y^{\frac{5}{4}} = 3x^{\frac{1}{2}}y^{\frac{5}{4}}$

PTS: 2 REF: 081504a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

264 ANS: 3
$\sqrt{-300} = \sqrt{100}\sqrt{-1}\sqrt{3}$

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

265 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

266 ANS: 4
$\sqrt{-180x^{16}} = 6x^8 i\sqrt{5}$

PTS: 2 REF: 081524a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers

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

268 ANS: 1
$2i^2 + 3i^3 = 2(-1) + 3(-i) = -2 - 3i$

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

269 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

270 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

271 ANS:
$xi^8 - yi^6 = x(1) - y(-1) = x + y$

PTS: 2 REF: 061533a2 STA: A2.N.7 TOP: Imaginary Numbers

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

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

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

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

276 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

277 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

278 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

279 ANS:

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

PTS: 2 REF: 061432a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

280 ANS: 4

$(-3-2i)(-3+2i) = 9-4i^2 = 9+4 = 13$

PTS: 2 REF: 011512a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

281 ANS:

$2xi(i-4i^2) = 2xi^2-8xi^3 = 2xi^2-8xi^3 = -2x+8xi$

PTS: 2 REF: 011533a2 STA: A2.N.9
TOP: Multiplication and Division of Complex Numbers

282 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

283 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

284 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

285 ANS:

$$\frac{(6-x)(6+x)}{(x+6)(x+6)} \cdot \frac{(x+6)(x-3)}{x-3} = 6-x$$

PTS: 2 REF: 011529a2 STA: A2.A.16 TOP: Multiplication and Division of Rationals
KEY: division

286 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

287 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

288 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

289 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

290 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

291 ANS: 3

$$\frac{5x}{x(x-3)} - \frac{2(x-3)}{x(x-3)} = \frac{x(x-3)}{x(x-3)}$$
$$5x - 2x + 6 = x^2 - 3x$$
$$0 = x^2 - 6x - 6$$

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

292 ANS:

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

PTS: 4 REF: 061537a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

293 ANS:

$$\frac{10x}{4} = \frac{1}{x} + \frac{x}{4}$$

$$\frac{9x}{4} = \frac{1}{x}$$

$$9x^2 = 4$$

$$x^2 = \frac{4}{9}$$

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

PTS: 2 REF: 081534a2 STA: A2.A.23 TOP: Solving Rationals
KEY: rational solutions

294 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

295 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

296 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

297 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

298 ANS: 3

$$\frac{a+\frac{b}{c}}{d-\frac{b}{c}} = \frac{\frac{ac+b}{c}}{\frac{cd-b}{c}} = \frac{ac+b}{c} \cdot \frac{c}{cd-b} = \frac{ac+b}{cd-b}$$

PTS: 2 REF: 011405a2 STA: A2.A.17 TOP: Complex Fractions

299 ANS:

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

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

300 ANS:

$12 \cdot 6 = 9w$

$8 = w$

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

301 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

302 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

303 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

304 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

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

305 ANS:

$25 \cdot 6 = 30q$

$5 = q$

PTS: 2 REF: 011528a2 STA: A2.A.5 TOP: Inverse Variation

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

307 ANS: 4

$3 \cdot 400 = 8x$

$150 = x$

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

308 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

309 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

310 ANS:

$$g(10) = \left(a(10)\sqrt{1-10}\right)^2 = 100a^2(-9) = -900a^2$$

PTS: 2 REF: 061333a2 STA: A2.A.41 TOP: Functional Notation

311 ANS: 4

$$f(a+1) = 4(a+1)^2 - (a+1) + 1$$
$$= 4(a^2 + 2a + 1) - a$$
$$= 4a^2 + 8a + 4 - a$$
$$= 4a^2 + 7a + 4$$

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

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

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

314 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

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

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

317 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.52
TOP: Identifying the Equation of a Graph

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

319 ANS: 3 PTS: 2 REF: 011305a2 STA: A2.A.37
TOP: Defining Functions

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

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

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

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

324 ANS: 1 PTS: 2 REF: 061409a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs
325 ANS: 2 PTS: 2 REF: 011507a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs
326 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
327 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
328 ANS: 2 PTS: 2 REF: 011225a2 STA: A2.A.43
TOP: Defining Functions
329 ANS: 2 PTS: 2 REF: 061218a2 STA: A2.A.43
TOP: Defining Functions
330 ANS: 4 PTS: 2 REF: 061303a2 STA: A2.A.43
TOP: Defining Functions
331 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43
TOP: Defining Functions
332 ANS: 3 PTS: 2 REF: 061501a2 STA: A2.A.43
TOP: Defining Functions
333 ANS: 3 PTS: 2 REF: fall0923a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
334 ANS: 4 PTS: 2 REF: 061112a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
335 ANS: 2 PTS: 2 REF: 011222a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
336 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
337 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
338 ANS: 2 PTS: 2 REF: 011521a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
339 ANS: 3 PTS: 2 REF: 081517a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain
340 ANS: 2 PTS: 2 REF: 081003a2 STA: A2.A.51
TOP: Domain and Range
341 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
342 ANS: 1 PTS: 2 REF: 061202a2 STA: A2.A.51
TOP: Domain and Range

343 ANS: 3 PTS: 2 REF: 061308ge STA: A2.A.51
TOP: Domain and Range
344 ANS: 3 PTS: 2 REF: 061418a2 STA: A2.A.51
TOP: Domain and Range
345 ANS: 4 PTS: 2 REF: 061518a2 STA: A2.A.51
TOP: Domain and Range
346 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
347 ANS: 2
$6(x^2 - 5) = 6x^2 - 30$

PTS: 2 REF: 011109a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables
348 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
349 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
350 ANS: 2 PTS: 2 REF: 061216a2 STA: A2.A.42
TOP: Compositions of Functions KEY: variables
351 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
352 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

353 ANS: 4

$g(-2) = 3(-2) - 2 = -8$ $f(-8) = 2(-8)^2 + 1 = 128 + 1 = 129$

PTS: 2 REF: 061503a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: numbers

354 ANS:

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

PTS: 2 REF: 081530a2 STA: A2.A.42 TOP: Compositions of Functions
KEY: variables

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

356 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

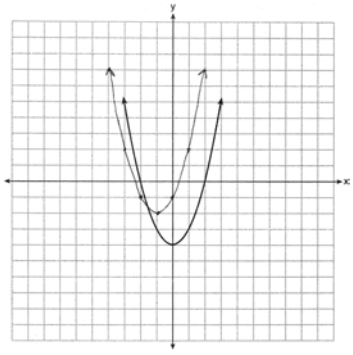
357 ANS: 2 PTS: 2 REF: 061521a2 STA: A2.A.44
TOP: Inverse of Functions KEY: equations

358 ANS: 2 PTS: 2 REF: 081523a2 STA: A2.A.44
TOP: Inverse of Functions KEY: ordered pairs

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

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

361 ANS:



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

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

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

364 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

365 ANS: 4

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

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

366 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

367 ANS: 4 PTS: 2 REF: 061520a2 STA: A2.A.29
TOP: Sequences

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

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

370 ANS: 1

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

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

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

372 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

373 ANS: 3

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

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

374 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

375 ANS: 1

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

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

376 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

377 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

378 ANS: 3

$\frac{40-10}{6-1} = \frac{30}{5} = 6$ $a_n = 6n + 4$

$a_{20} = 6(20) + 4 = 124$

PTS: 2 REF: 081510a2 STA: A2.A.32 TOP: Sequences

379 ANS:

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

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

380 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

381 ANS:

$a_2 = 3(2)^{-2} = \frac{3}{4}$ $a_3 = 3\left(\frac{3}{4}\right)^{-2} = \frac{16}{3}$ $a_4 = 3\left(\frac{16}{3}\right)^{-2} = \frac{27}{256}$

PTS: 4 REF: 011537a2 STA: A2.A.33 TOP: Recursive Sequences

382 ANS: 3

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

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

383 ANS: 1 PTS: 2 REF: 081520a2 STA: A2.A.33
TOP: Sequences

384 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

385 ANS:

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

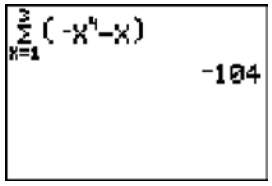
PTS: 2 REF: 011131a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

386 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

387 ANS:



–104.

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

388 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

389 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

390 ANS: 4

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

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

391 ANS:

$x-1+x-4+x-9+x-16=4x-30$

PTS: 2 REF: 081535a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

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

393 ANS:

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

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

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

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

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

397 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

398 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

399 ANS:

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

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

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

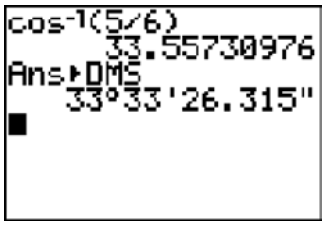
PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Summations
KEY: arithmetic

400 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

401 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

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

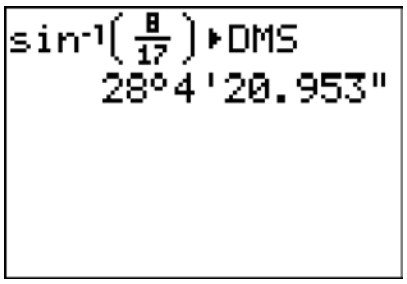
403 ANS: 1

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

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

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

405 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

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

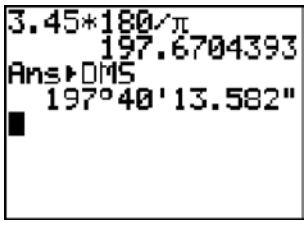
407 ANS: 3

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

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

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

409 ANS:



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

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

410 ANS: 2

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

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

411 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

412 ANS:

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

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

413 ANS: 1

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

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

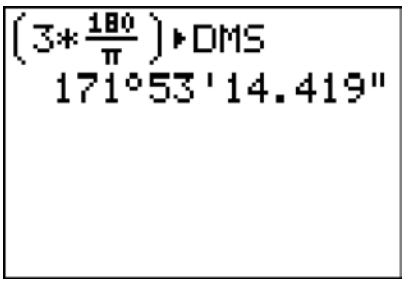
414 ANS:

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

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

415 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

416 ANS: 2

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

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

417 ANS: 1

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

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

418 ANS:

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

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

419 ANS:

$\frac{5}{11}\pi\left(\frac{180}{\pi}\right) = 81°49'$

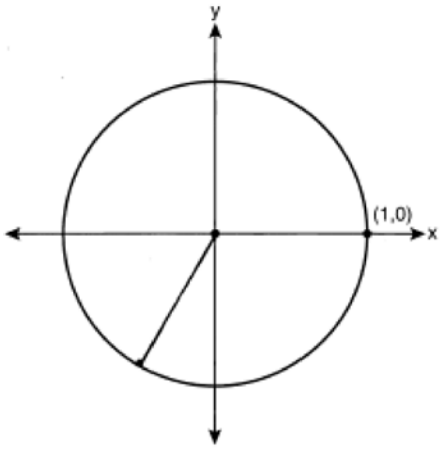
PTS: 2 REF: 011531a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

420 ANS:

$2.5\left(\frac{180}{\pi}\right) = 143°14'$

PTS: 2 REF: 081528a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

421 ANS:



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

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

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

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

424 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

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

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

427 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

428 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

429 ANS: 2

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

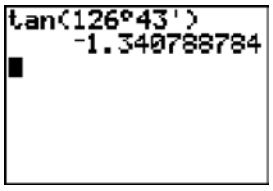
PTS: 2 REF: 011520a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

430 ANS: 2

$$x = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3} \quad y = 2 \cdot \frac{1}{2} = 1$$

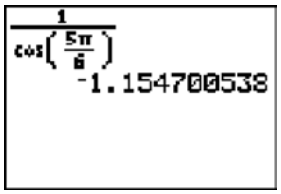
PTS: 2 REF: 061525a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

431 ANS: 2



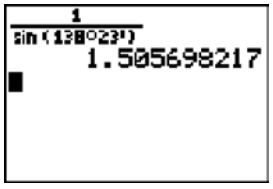
PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

432 ANS: 1



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

433 ANS: 4



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

434 ANS: 3 PTS: 2 REF: 081007a2 STA: A2.A.64
TOP: Using Inverse Trigonometric Functions KEY: basic
435 ANS: 3 PTS: 2 REF: 011104a2 STA: A2.A.64
TOP: Using Inverse Trigonometric Functions KEY: unit circle
436 ANS: 1 PTS: 2 REF: 011112a2 STA: A2.A.64
TOP: Using Inverse Trigonometric Functions KEY: advanced
437 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
438 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
439 ANS: 1

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

PTS: 2 REF: 081508a2 STA: A2.A.64 TOP: Using Inverse Trigonometric Functions
KEY: advanced
440 ANS: 2
$\cos(-305° + 360°) = \cos(55°)$

PTS: 2 REF: 061104a2 STA: A2.A.57 TOP: Reference Angles
441 ANS: 2 PTS: 2 REF: 081515a2 STA: A2.A.57
TOP: Reference Angles
442 ANS: 4
$s = \theta r = 2 \cdot 4 = 8$

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

443 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

444 ANS:

$83°50' \cdot \frac{\pi}{180} \approx 1.463 \text{ radians} \quad s = \theta r = 1.463 \cdot 12 \approx 17.6$

PTS: 2 REF: 011435a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

445 ANS: 2

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

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

446 ANS:

$r = \frac{6.6}{\frac{2}{3}} = 9.9$

PTS: 2 REF: 081532a2 STA: A2.A.61 TOP: Arc Length
KEY: radius

447 ANS: 3

Cofunctions tangent and cotangent are complementary

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

448 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

449 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

450 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

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

451 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

452 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

453 ANS: 3

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

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

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

454 ANS:

$$\frac{\frac{1}{\cos^2 x} - 1}{\frac{1}{\cos^2 x}} \cdot \frac{\cos^2 x}{\cos^2 x} = \frac{1 - \cos^2 x}{1} = \sin^2 x$$

PTS: 2 REF: 081533a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

455 ANS:

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

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

456 ANS: 1

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

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

457 ANS: 2 PTS: 2 REF: 011208a2 STA: A2.A.67
TOP: Simplifying Trigonometric Expressions

458 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

459 ANS:

$$\sec\theta \sin\theta \cot\theta = \frac{1}{\cos\theta} \cdot \sin\theta \cdot \frac{\cos\theta}{\sin\theta} = 1$$

PTS: 2 REF: 011428a2 STA: A2.A.67 TOP: Proving Trigonometric Identities

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

461 ANS:

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

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

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

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

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

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

462 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

463 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

464 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

465 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

466 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

467 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

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

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

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

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

469 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

470 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

471 ANS: 3

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

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

472 ANS: 1

$\frac{1+\cos 2A}{\sin 2A} = \frac{1+2\cos^2 A - 1}{2\sin A\cos A} = \frac{\cos A}{\sin A} = \cot A$

PTS: 2 REF: 061522a2 STA: A2.A.77 TOP: Double Angle Identities
KEY: simplifying

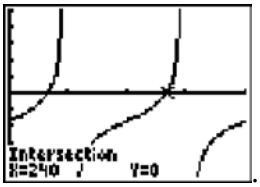
473 ANS: 1

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

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

474 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

475 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

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

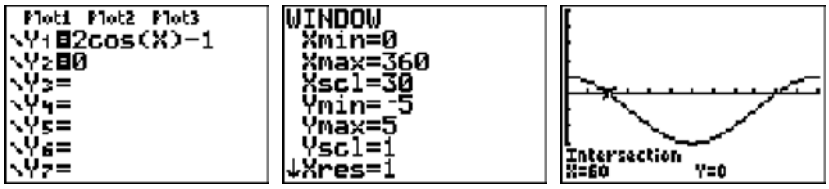
$$1 = \tan C$$

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

$$C = 45, 225$$

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

477 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

478 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

479 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

480 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

481 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

482 ANS:

$5\cos\theta - 2\sec\theta + 3 = 0$

$5\cos\theta - \frac{2}{\cos\theta} + 3 = 0$

$5\cos^2\theta + 3\cos\theta - 2 = 0$

$(5\cos\theta - 2)(\cos\theta + 1) = 0$

$\cos\theta = \frac{2}{5}, -1$

$\theta \approx 66.4, 293.6, 180$

PTS: 6 REF: 061539a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: reciprocal functions

483 ANS: 2

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

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

$x = 30, 150, 270$

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

484 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

485 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

486 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

487 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

488 ANS: 1

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

$\frac{\pi}{\pi} = 1$

PTS: 2 REF: 061519a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

489 ANS: 3

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

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

490 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

491 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

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

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

494 ANS:

$a = 3, b = 2, c = 1$ $y = 3\cos 2x + 1$.

PTS: 2 REF: 011538a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

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

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

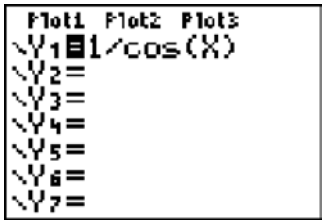
Algebra 2/Trigonometry Regents Exam Questions by Performance Indicator: Topic
Answer Section

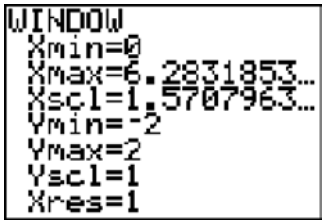
497 ANS: 3

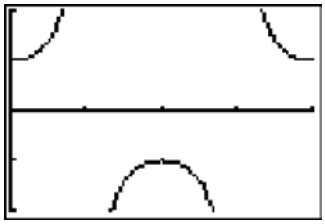
$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$

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

498 ANS: 3

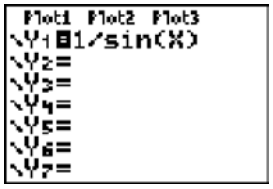


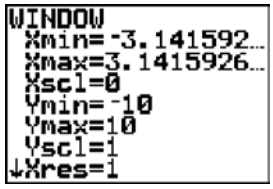


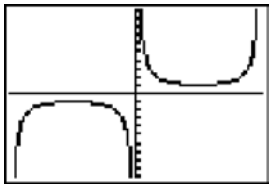


PTS: 2 REF: 061020a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

499 ANS: 1

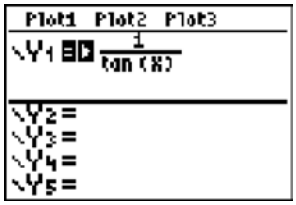


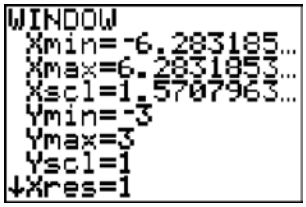


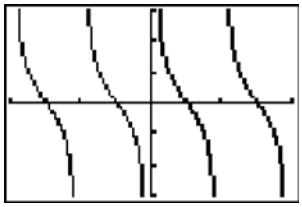


PTS: 2 REF: 011123a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

500 ANS: 3







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

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

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

503 ANS: 4 PTS: 2 REF: 061427a2 STA: A2.A.63
TOP: Domain and Range

504 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

505 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

506 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

507 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

508 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

509 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

510 ANS:
$\frac{15}{\sin 103} = \frac{a}{\sin 42}$. $\frac{1}{2}(15)(10.3)\sin 35 \approx 44$

$a \approx 10.3$

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

511 ANS:
$K = ab\sin C = 6 \cdot 6 \sin 50 \approx 27.6$

PTS: 2 REF: 011429a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

512 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

513 ANS:

$594 = 32 \cdot 46 \sin C$

$\frac{594}{1472} = \sin C$

$23.8 \approx C$

PTS: 2 REF: 011535a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: Parallelograms

514 ANS: 2

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

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

515 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

516 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

517 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

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

519 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

520 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

521 ANS: 1

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

$A \approx 58$

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

522 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

523 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

524 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

525 ANS: 4

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

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

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

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

526 ANS:

$$\frac{8}{\sin 85} = \frac{2}{\sin C}$$

$85 + 14.4 < 180$ 1 triangle

$85 + 165.6 \geq 180$

$$C = \sin^{-1}\left(\frac{2\sin 85}{8}\right)$$

$$C \approx 14.4$$

PTS: 2 REF: 061529a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

527 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

528 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

529 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

530 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

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

532 ANS:

$28^2 = 47^2 + 34^2 - 2(47)(34)\cos A$

$784 = 3365 - 3196\cos A$

$-2581 = -3196\cos A$

$\frac{2581}{3196} = \cos A$

$36 \approx A$

PTS: 4 REF: 061536a2 STA: A2.A.73 TOP: Law of Cosines
KEY: find angle

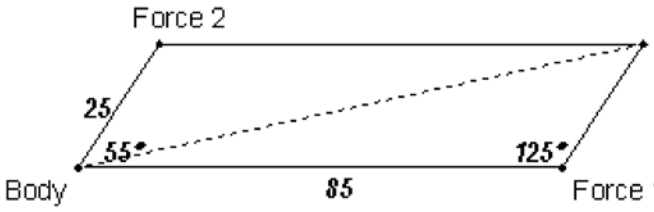
533 ANS:

$a = \sqrt{8^2 + 11^2 - 2(8)(11)\cos 82} \approx 12.67$. The angle opposite the shortest side: $\frac{8}{\sin x} = \frac{12.67}{\sin 82}$

$x \approx 38.7$

PTS: 4 REF: 081536a2 STA: A2.A.73 TOP: Law of Cosines
KEY: advanced

534 ANS:



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

$r^2 \approx 10287.7$

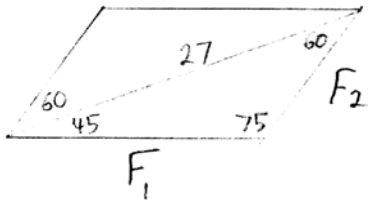
$r \approx 101.43$

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

$x \approx 12$

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

535 ANS:

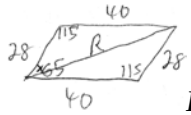


$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}$. $\frac{27}{\sin 75} = \frac{F_2}{\sin 45}$.

$F_1 \approx 24$ $F_2 \approx 20$

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

536 ANS:



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

$x \approx 39$

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

537 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

538 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

539 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

540 ANS: 3

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

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

541 ANS:

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

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

542 ANS:

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

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

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

544 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

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

546 ANS: 4 PTS: 2 REF: 011513a2 STA: A2.A.49
TOP: Equations of Circles