JMAP
REGENTS BY PERFORMANCE INDICATOR: TOPIC

NY Algebra 2/Trigonometry Regents Exam Questions
from Spring 2009 to January 2016 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

9 A survey is to be conducted in a small upstate village to determine whether or not local residents should fund construction of a skateboard park by raising taxes. Which segment of the population would provide the most unbiased responses?
1 a club of local skateboard enthusiasts
2 senior citizens living on fixed incomes
3 a group opposed to any increase in taxes
4 every tenth person 18 years of age or older walking down Main St.

A2.S.3: AVERAGE KNOWN WITH MISSING DATA

10 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 $17 = \frac{446 + 16x}{26 + x}$

11 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

12 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

13 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*.

14 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.

15 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.

16 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?

17 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.

18 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

19 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.

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

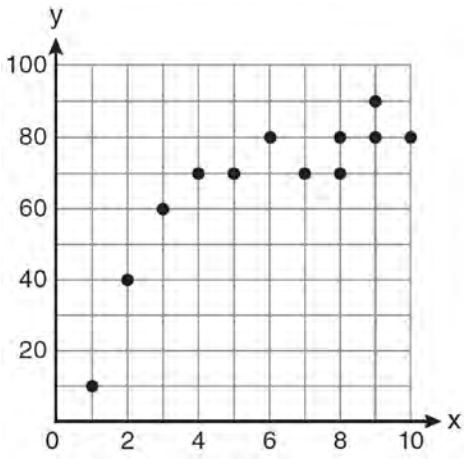
Number of Siblings	Frequency
0	2
1	5
2	7
3	4
4	2

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

21 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

22 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.

23 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.*

24 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.

25 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.*

26 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.

27 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

28 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*.

29 The table below gives the relationship between x and y.

x	1	2	3	4	5
y	4.2	33.5	113.1	268.1	523.6

Use exponential regression to find an equation for y as a function of x, rounding all values to the *nearest hundredth*. Using this equation, predict the value of x if y is 426.21, rounding to the *nearest tenth*. [Only an algebraic solution can receive full credit.]

A2.S.8: CORRELATION COEFFICIENT

30 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

31 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
$y = a + bx$
$a = -2.9$
$b = 24.1$
$r = -.8924$

32 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

33 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

34 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

35 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

36 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.

37 Which statement regarding correlation is *not* true?
1 The closer the absolute value of the correlation coefficient is to one, the closer the data conform to a line.
2 A correlation coefficient measures the strength of the linear relationship between two variables.
3 A negative correlation coefficient indicates that there is a weak relationship between two variables.
4 A relation for which most of the data fall close to a line is considered strong.

A2.S.5: NORMAL DISTRIBUTIONS

38 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

39 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

40 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.

41 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.

42 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%

43 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

44 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

45 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*.

46 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.

47 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

48 The scores of 1000 students on a standardized test were normally distributed with a mean of 50 and a standard deviation of 5. What is the expected number of students who had scores greater than 60?
1 1.7
2 23
3 46
4 304

PROBABILITY

A2.S.10: PERMUTATIONS

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

50 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.

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

52 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

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

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

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

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

57 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

58 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

59 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

60 Determine how many eleven-letter arrangements can be formed from the word "CATTARAUGUS."

A2.S.11: COMBINATIONS

61 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

62 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

63 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.

64 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

65 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

66 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

67 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 ${}_{20}P_3$

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

69 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 ${}_8C_5$

70 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?

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

72 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 ${}_6C_4 + {}_4C_2$

73 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

74 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.

75 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

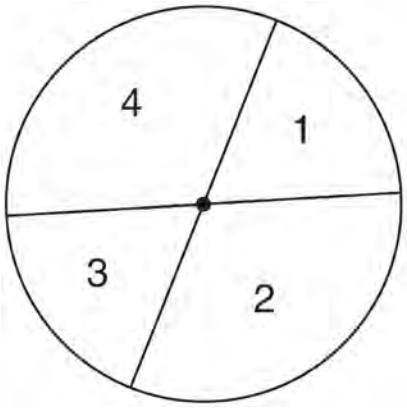
2 15

3 30

4 60

A2.S.13: GEOMETRIC PROBABILITY

76 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

77 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?

78 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.

79 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.

80 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.

81 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 $\frac{225}{512}$

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

83 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.

84 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.

85 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.

86 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.

87 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?

88 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.

89 In the diagram below, the spinner is divided into eight equal regions.

Which expression represents the probability of the spinner landing on *B exactly* three times in five spins?

1 ${}_8C_3\left(\frac{1}{5}\right)^3\left(\frac{4}{5}\right)^5$

2 ${}_8C_3\left(\frac{1}{5}\right)^5\left(\frac{4}{5}\right)^3$

3 ${}_5C_3\left(\frac{1}{8}\right)^2\left(\frac{7}{8}\right)^3$

4 ${}_5C_3\left(\frac{1}{8}\right)^3\left(\frac{7}{8}\right)^2$

ABSOLUTE VALUE

A2.A.1: ABSOLUTE VALUE EQUATIONS AND INEQUALITIES

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

1 $\varnothing$

2 $\{0\}$

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

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

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

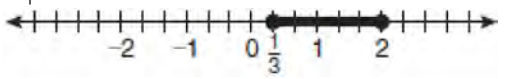
1 { }

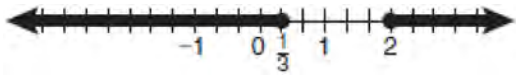
2 $\{-2\}$

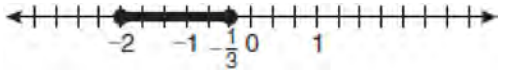
3 $\{-6\}$

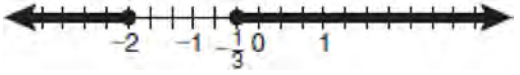
4 $\{-2, -6\}$

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

1 

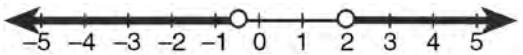
2 

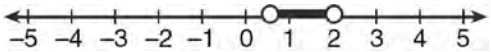
3 

4 

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

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

1 

2 

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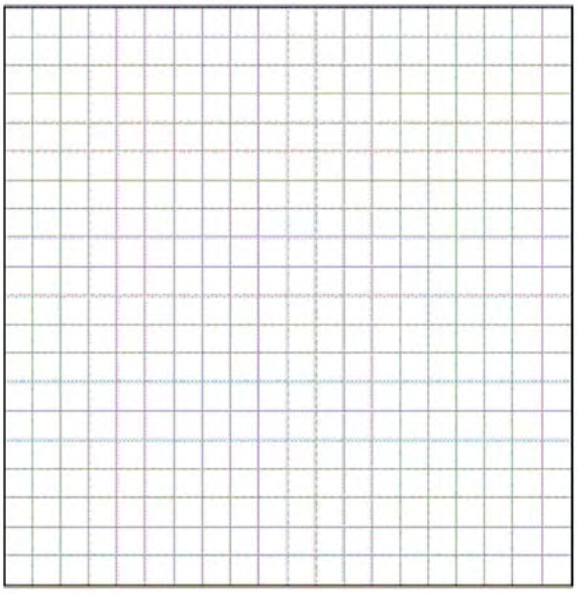
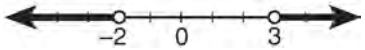
4 

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



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

1 

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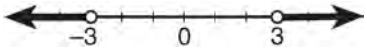
3 

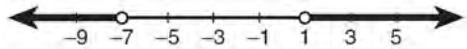
4 

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

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

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

100 Which graph is the solution to the inequality $4|2x + 6| - 5 < 27$?

1 

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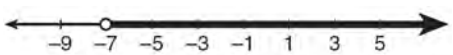
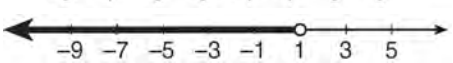
3 

4 

QUADRATICS

A2.A.20-21: ROOTS OF QUADRATICS

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

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

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

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

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

1 5

2 $\frac{5}{2}$

3 -5

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

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

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

108 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.

109 What is the sum of the roots of the equation $-3x^2 + 6x - 2 = 0$?
1 $\frac{2}{3}$
2 2
3 $-\frac{2}{3}$
4 –2

110 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 $4x^2 + 3x - 2 = 0$

111 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 $2x^2 - 6x + 4 = 0$

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

113 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 $4x^2 - 9x - 3 = 0$

114 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

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

116 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 $2x^2(2x + 3)(3x - 2)$

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

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

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

A2.A.7: FACTORING BY GROUPING

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

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

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

122 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 $(x - 3)^2(x - 2)$

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

124 Factor completely: $x^3 + 3x^2 + 2x + 6$

A2.A.25: QUADRATIC FORMULA

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

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

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

128 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

129 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

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

131 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

132 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

133 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

134 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

135 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

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

137 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

138 The roots of the equation $4(x^2 - 1) = -3x$ are
1 imaginary
2 real, rational, equal
3 real, rational, unequal
4 real, irrational, unequal

A2.A.24: COMPLETING THE SQUARE

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

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

141 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

142 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 $-3 \pm 2i$

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

144 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 $(x + 6)^2 = 29$

145 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 $\frac{1}{8}$

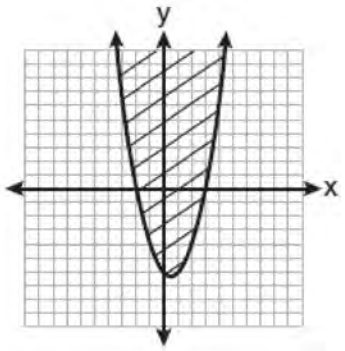
4 $\frac{1}{4}$

146 Find the exact roots of $x^2 + 10x - 8 = 0$ by completing the square.

A2.A.4: QUADRATIC INEQUALITIES

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

1



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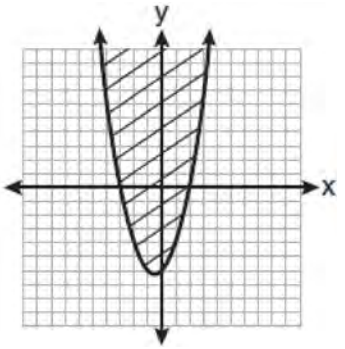

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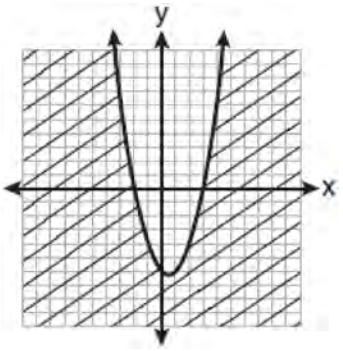

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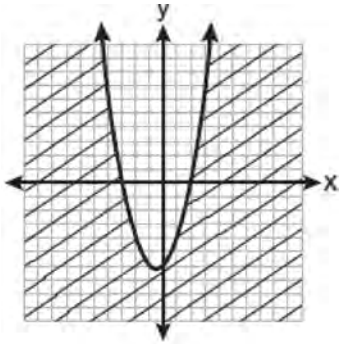


148 The solution set of the inequality $x^2 - 3x > 10$ is
1 $\{x \mid -2 < x < 5\}$
2 $\{x \mid 0 < x < 3\}$
3 $\{x \mid x < -2 \text{ or } x > 5\}$
4 $\{x \mid x < -5 \text{ or } x > 2\}$

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

150 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

151 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 $-6, 2$

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

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

153 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 $(-4,9)$

154 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 $(-6,-2)$

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

156 What is the total number of points of intersection of the graphs of the equations $2x^2 - y^2 = 8$ and $y = x + 2$?
1 1
2 2
3 3
4 0

POWERS

A2.N.3: OPERATIONS WITH POLYNOMIALS

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

158 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 $x^2 - x - 3$

159 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.

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

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

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

163 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 $3x-2$

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

165 Find the difference when $\frac{4}{3}x^3-\frac{5}{8}x^2+\frac{7}{9}x$ is subtracted from $2x^3+\frac{3}{4}x^2-\frac{2}{9}$.

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

166 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 $\frac{8}{9}$

167 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 $4n^{-1} > (6n)^{-1}$

168 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 $17\frac{1}{2}$

169 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}

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

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

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

2 $-3x^2$

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

4 $-9x^2$

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

1 $-8a^4$

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

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

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

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

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

1 -1

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

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

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

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

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

1 1

2 $\frac{1}{x}$

3 x

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

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

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

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

180 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

181 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.

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

183 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%.

184 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

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

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

187 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

188 The amount of money in an account can be determined by the formula $A = Pe^{rt}$, where P is the initial investment, r is the annual interest rate, and t is the number of years the money was invested. What is the value of a $5000 investment after 18 years, if it was invested at 4% interest compounded continuously?
1 $9367.30
2 $9869.39
3 $10,129.08
4 $10,272.17

A2.A.18: EVALUATING LOGARITHMIC EXPRESSIONS

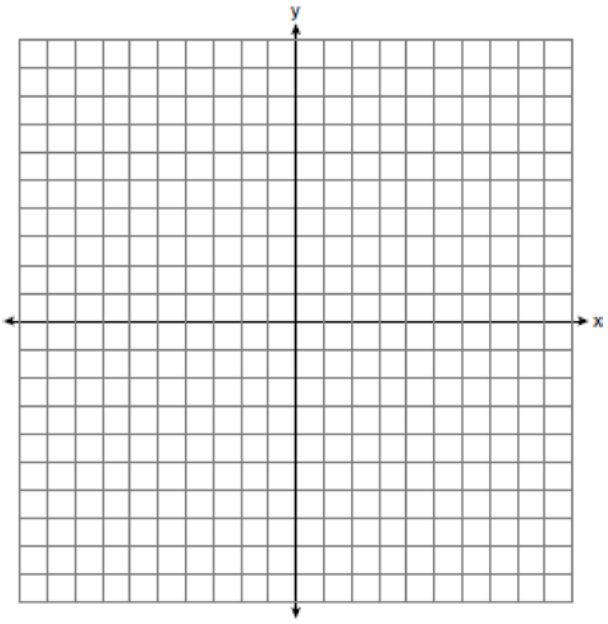
189 The expression $\log_8 64$ is equivalent to
1 8
2 2
3 $\frac{1}{2}$
4 $\frac{1}{8}$

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

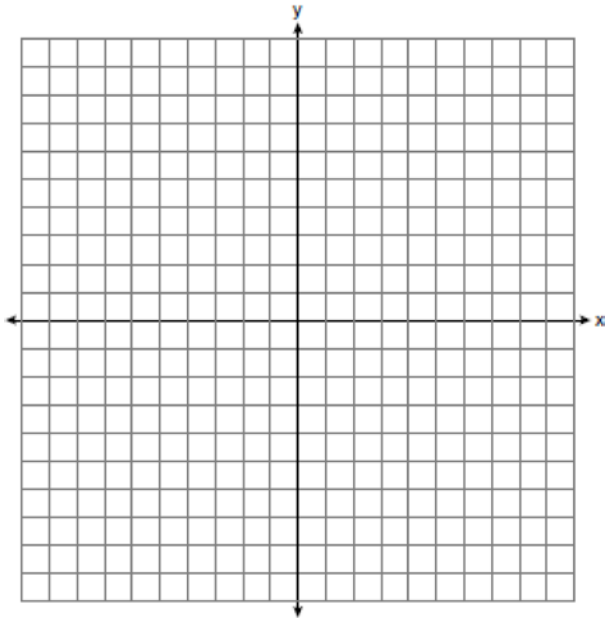
1 $\frac{1}{2}$
2 2
3 $-\frac{1}{2}$
4 -2

A2.A.53: GRAPHING EXPONENTIAL FUNCTIONS

191 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.



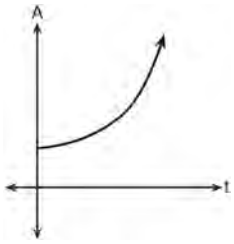
192 On the axes below, for $-2 \le x \le 2$, graph $y = 2^{x+1} - 3$.



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

193 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



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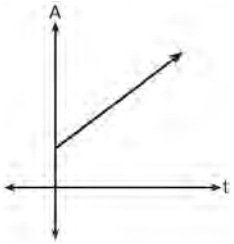

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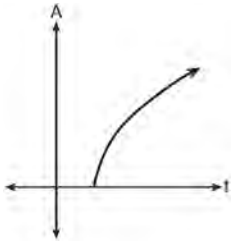

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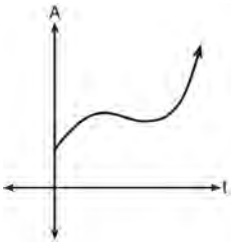
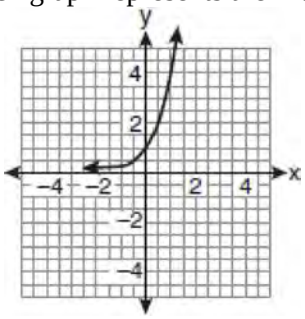


A2.A.53: GRAPHING EXPONENTIAL FUNCTIONS

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

1



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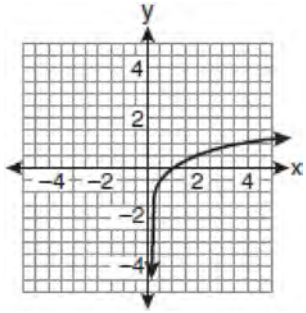

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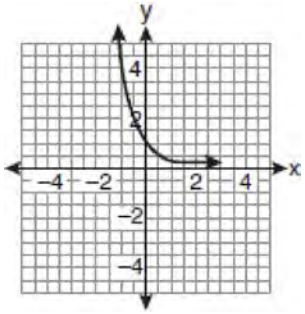

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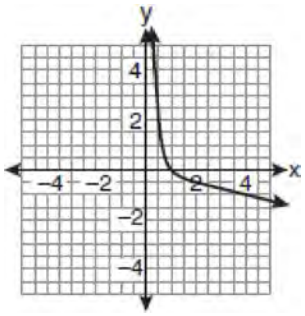
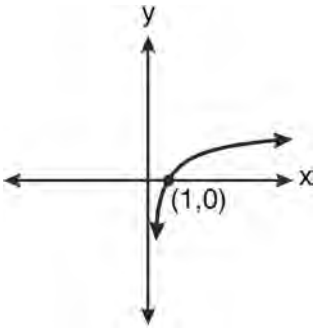
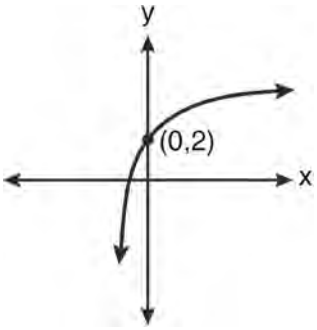
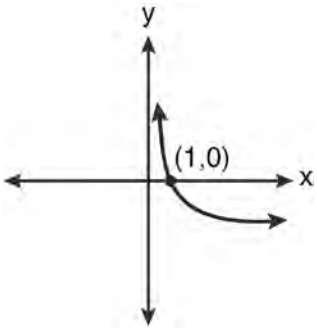
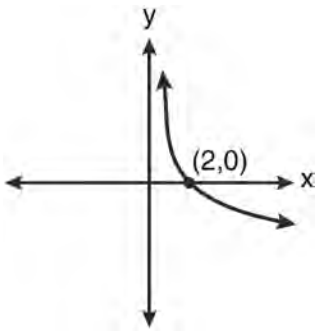


195 Which graph represents the function $\log_2 x = y$?

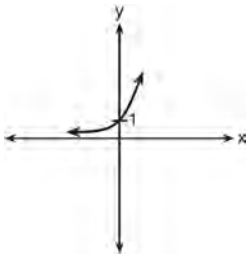
1 

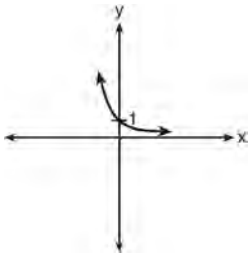
2 

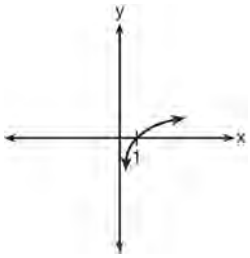
3 

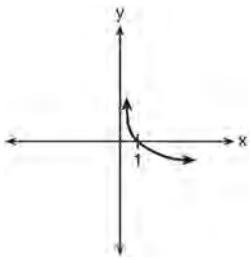
4 

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

1 

2 

3 

4 

A2.A.19: PROPERTIES OF LOGARITHMS

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

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

199 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 $\log 6 + 2\log a$

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

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

202 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 $\log 16 + 2\log m$

203 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 $\log 2 + 3\log x$

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

1 $a^2 b$

2 $2ab$

3 $a^2 + b$

4 $2a + b$

205 If $T = \frac{10x^2}{y}$, then $\log T$ is equivalent to

1 $(1 + 2\log x) - \log y$

2 $\log(1 + 2x) - \log y$

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

4 $2(1 - \log x) + \log y$

A2.A.28: LOGARITHMIC EQUATIONS

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

1 6.4

2 2.56

3 $\frac{9}{5}$

4 $\frac{8}{5}$

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

208 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.]

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

1 1.16
2 20
3 625
4 1,024

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

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

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

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

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

215 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 $a^x = y$

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

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

218 Solve algebraically for the *exact* value of *x*:
$\log_8 16 = x + 1$

A2.A.6, 27: EXPONENTIAL EQUATIONS

219 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

220 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

221 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.

222 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

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

224 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 $\frac{4}{3}$

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

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

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

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

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

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

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

A2.A.36: BINOMIAL EXPANSIONS

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

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

234 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

235 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 $2x^4y^2$

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

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

1 $448x^5$

2 $448x^4$

3 $-448x^5$

4 $-448x^4$

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

1 $720x^3$

2 $180x^3$

3 $-540x^2$

4 $-1080x^2$

239 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

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

241 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 $0,-1,-2$

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

1 $\{0,\pm2\}$

2 $\{0,\pm2,3\}$

3 $\{0,\pm2,\pm2i\}$

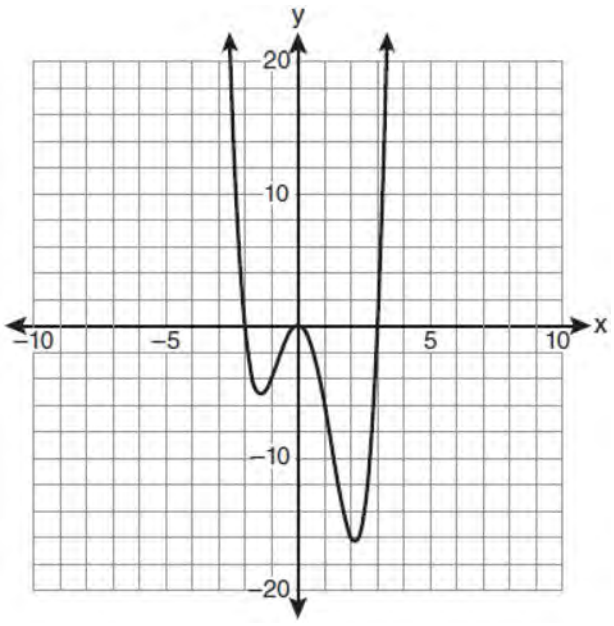
4 $\{\pm2,\pm2i\}$

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

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

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

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



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

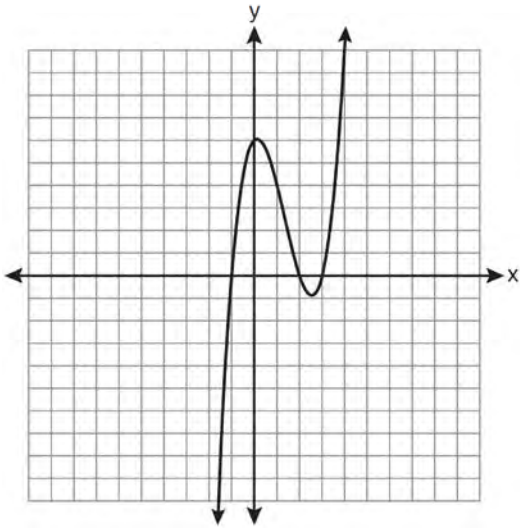
1 $\{-3,2\}$

2 $\{-2,3\}$

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

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

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



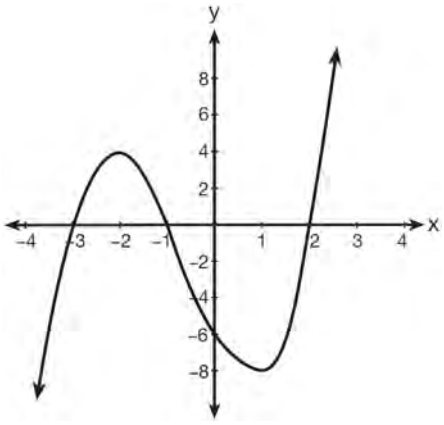
What is the product of the roots of the equation $x^3 - 4x^2 + x + 6 = 0$?

1 −36
2 −6
3 6
4 4

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

1 1
2 2
3 3
4 0

249 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

250 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

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

252 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

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

254 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 $10a^2b\sqrt[3]{8}$

255 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 $6x^2\sqrt[3]{2}$

256 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 $8a^2b^3\sqrt[3]{a}$

257 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 $-5ab\sqrt{2b} + 7ab\sqrt{6b}$

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

259 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 $4 - 12\sqrt{x} + 6x$

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

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

261 The legs of a right triangle are represented by $x + \sqrt{2}$ and $x - \sqrt{2}$. The length of the hypotenuse of the right triangle is represented by

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

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

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

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

1 $-\dfrac{14 + 5\sqrt{3}}{11}$
2 $-\dfrac{17 + 5\sqrt{3}}{11}$
3 $\dfrac{14 + 5\sqrt{3}}{14}$
4 $\dfrac{17 + 5\sqrt{3}}{14}$

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

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

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

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

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

269 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 $2\sqrt{x+2}$

270 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

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

1 $\{1\}$

2 $\{0\}$

3 $\{1,6\}$

4 $\{2,3\}$

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

1 $\{-3,4\}$

2 $\{-4,3\}$

3 $\{3\}$

4 $\{-4\}$

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

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

1 $\{4\}$

2 $\{-5\}$

3 $\{4,5\}$

4 $\{-5,4\}$

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

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

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

2 $\{2,4\}$

3 $\{4\}$

4 $\{\ \}$

277 Solve algebraically for x: $\sqrt{2x+1}+4=8$

A2.A.10-11: EXPONENTS AS RADICALS

278 The expression $(x^2-1)^{-\frac{2}{3}}$ is equivalent to

1 $\sqrt[3]{(x^2-1)^2}$

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

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

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

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

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

2 $-\sqrt[5]{x^2}$

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

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

280 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 $4x^8y^{28}$

281 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 $9xy^{\frac{2}{5}}$

282 The expression $\sqrt[3]{27a^{-6}b^3c^2}$ is equivalent to

1 $\frac{3bc^{\frac{2}{3}}}{a^2}$

2 $\frac{3b^9c^6}{a^{18}}$

3 $\frac{3b^6c^5}{a^3}$

4 $\frac{3b\sqrt[3]{3c^2}}{a^2}$

A2.N.6: SQUARE ROOTS OF NEGATIVE NUMBERS

283 In simplest form, $\sqrt{-300}$ is equivalent to

1 $3i\sqrt{10}$

2 $5i\sqrt{12}$

3 $10i\sqrt{3}$

4 $12i\sqrt{5}$

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

1 $-\sqrt{2}$

2 $-7\sqrt{2}$

3 $-i\sqrt{2}$

4 $7i\sqrt{2}$

285 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

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

1 1

2 –1

3 i

4 $-i$

287 The expression $2i^2+3i^3$ is equivalent to

1 $-2-3i$

2 $2-3i$

3 $-2+3i$

4 $2+3i$

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

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

290 Express xi^8-yi^6 in simplest form.

291 The expression $x(3i^2)^3+2xi^{12}$ is equivalent to

1 $2x+27xi$

2 $-7x$

3 $-25x$

4 $-29x$

A2.N.8: CONJUGATES OF COMPLEX NUMBERS

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

1 $-3+2i$

2 $-2-3i$

3 $2-3i$

4 $3+2i$

293 The conjugate of $7-5i$ is

1 $-7-5i$

2 $-7+5i$

3 $7-5i$

4 $7+5i$

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

295 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

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

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

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

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

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

301 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

302 Perform the indicated operations and simplify completely:

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

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

A2.A.16: ADDITION AND SUBTRACTION OF RATIONALS

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

305 What is $\frac{x}{x-1} - \frac{1}{2-2x}$ expressed as a single fraction?

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

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

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

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

A2.A.23: SOLVING RATIONALS AND RATIONAL INEQUALITIES

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

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

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

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

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

1 $\{2,3\}$

2 $\{2\}$

3 $\{3\}$

4 $\{\ \}$

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

1 $x^2 - 6x - 3 = 0$

2 $x^2 - 6x + 3 = 0$

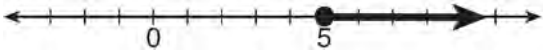
3 $x^2 - 6x - 6 = 0$

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

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

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

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

1 

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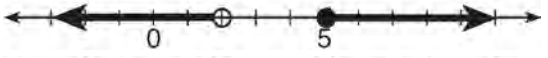
3 

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A2.A.17: COMPLEX FRACTIONS

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

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

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

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

1 $\dfrac{1}{2}$

2 $\dfrac{x}{x+2}$

3 $\dfrac{x}{3}$

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

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

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

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

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

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

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

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

321 The expression $\dfrac{\dfrac{1}{x}+\dfrac{3}{y}}{\dfrac{2}{xy}}$ is equivalent to

1 $\dfrac{3}{2}$

2 $\dfrac{3x+y}{2xy}$

3 $\dfrac{3xy}{2}$

4 $\dfrac{3x+y}{2}$

A2.A.5: INVERSE VARIATION

322 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.

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

1 25
2 15
3 9
4 4

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

1 –4 and 5

2 $\dfrac{20}{19}$

3 –5 and 4

4 $-\dfrac{1}{4}$

325 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

326 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

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

328 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

329 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

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

331 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 $\frac{5}{18}$

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

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

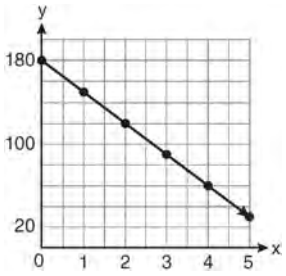
1 $4a^2 - a + 6$
2 $4a^2 - a + 4$
3 $4a^2 + 7a + 6$
4 $4a^2 + 7a + 4$

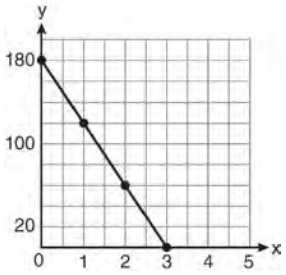
334 If $f(x) = 2x^2 - 3x + 4$, then $f(x+3)$ is equal to

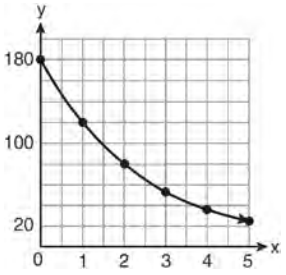
1 $2x^2 - 3x + 7$
2 $2x^2 - 3x + 13$
3 $2x^2 + 9x + 13$
4 $2x^2 + 9x + 25$

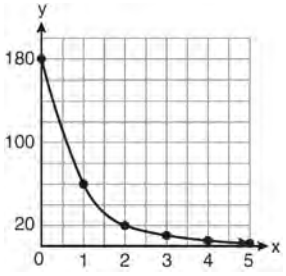
A2.A.52: FAMILIES OF FUNCTIONS

335 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

336 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 $(e, 1)$.

337 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

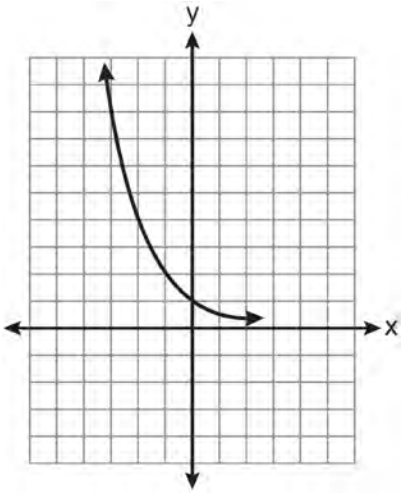
338 Four points on the graph of the function f(x) are shown below.

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

Which equation represents f(x)?

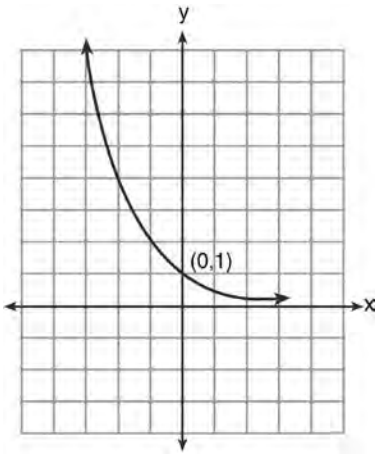
1 $f(x) = 2^x$
2 $f(x) = 2x$
3 $f(x) = x + 1$
4 $f(x) = \log_2 x$

339 Which equation is represented by the graph below?



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

340 What is the equation of the graph shown below?



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

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

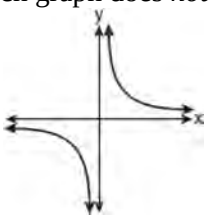
x	y
−2	5
−1	4
0	3
1	4
2	5

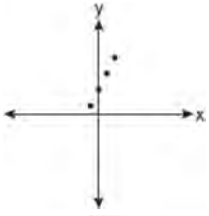
1 $f(x) = |x + 3|$
2 $f(x) = |x| + 3$
3 $f(y) = |y + 3|$
4 $f(y) = |y| + 3$

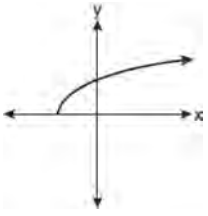
A2.A.37, 38, 43: DEFINING FUNCTIONS

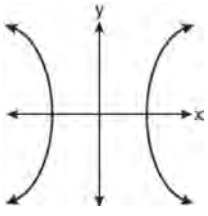
342 Given the relation $\{(8,2),(3,6),(7,5),(k,4)\}$, which value of *k* will result in the relation *not* being a function?
1 1
2 2
3 3
4 4

343 Which graph does *not* represent a function?

1 

2 

3 

4 

344 Which relation is *not* a function?

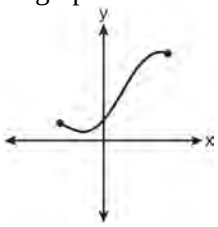
1 $(x-2)^2+y^2=4$

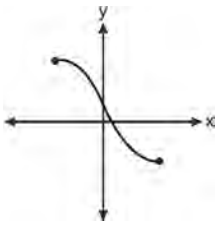
2 $x^2+4x+y=4$

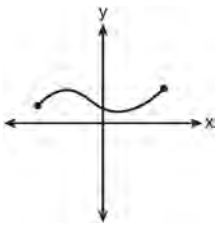
3 $x+y=4$

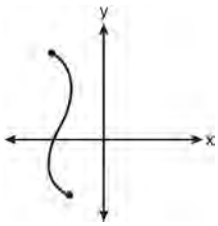
4 $xy=4$

345 Which graph does *not* represent a function?

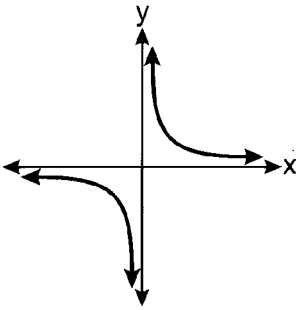
1 

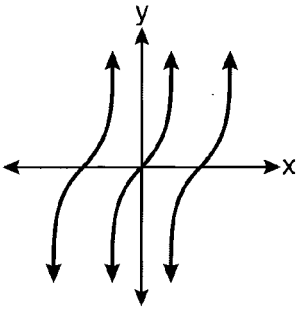
2 

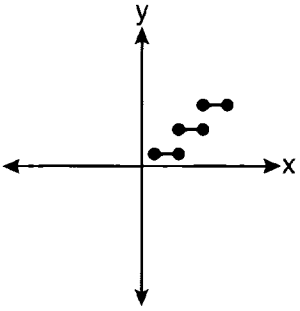
3 

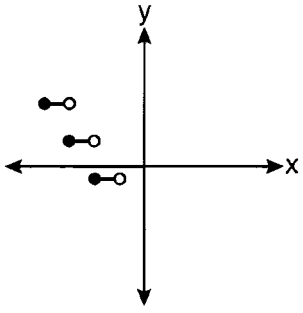
4 

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

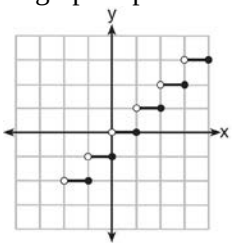
1 

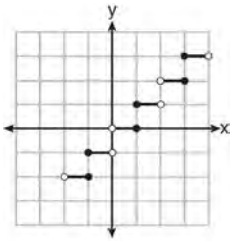
2 

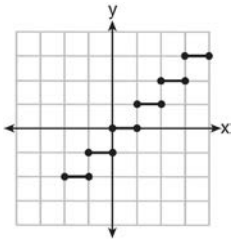
3 

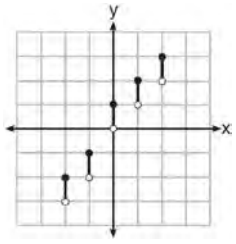
4 

347 Which graph represents a function?

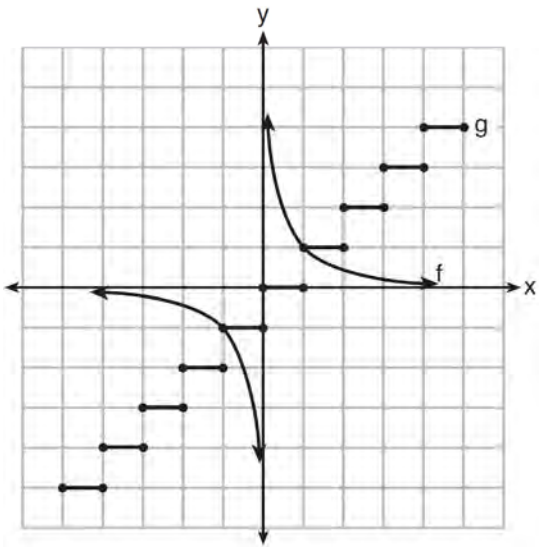
1 

2 

3 

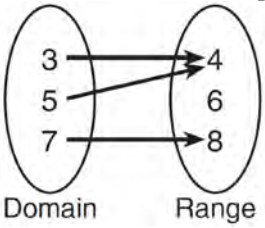
4 

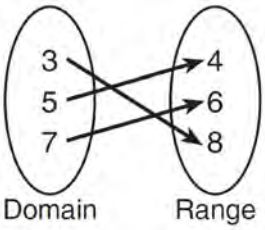
348 Which statement is true about the graphs of *f* and *g* shown below?

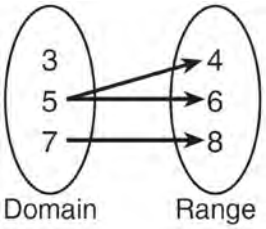


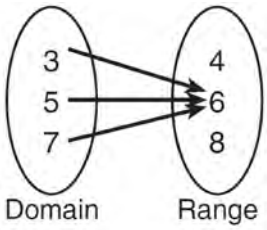
1 *f* is a relation and *g* is a function.
2 *f* is a function and *g* is a relation.
3 Both *f* and *g* are functions.
4 Neither *f* nor *g* is a function.

349 Which relation does *not* represent a function?

1 

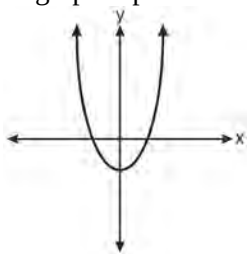
2 

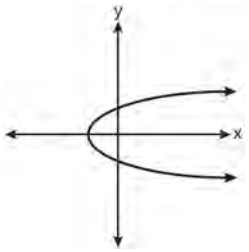
3 

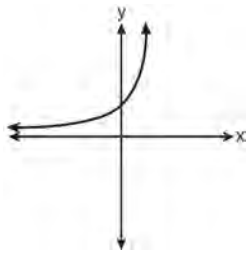
4 

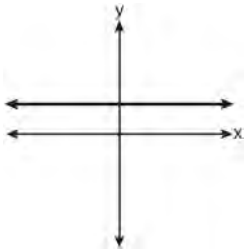
350 Which function is *not* one-to-one?
1 $\{(0,1),(1,2),(2,3),(3,4)\}$
2 $\{(0,0),(1,1),(2,2),(3,3)\}$
3 $\{(0,1),(1,0),(2,3),(3,2)\}$
4 $\{(0,1),(1,0),(2,0),(3,2)\}$

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

1 

2 

3 

4 

352 Which function is one-to-one?

1 $f(x) = |x|$

2 $f(x) = 2^x$

3 $f(x) = x^2$

4 $f(x) = \sin x$

353 Which function is one-to-one?

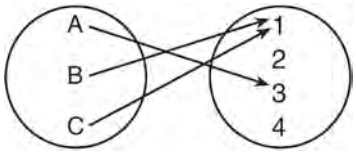
1 $k(x) = x^2 + 2$

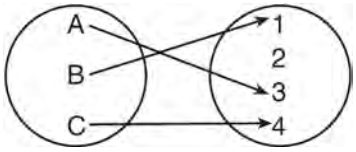
2 $g(x) = x^3 + 2$

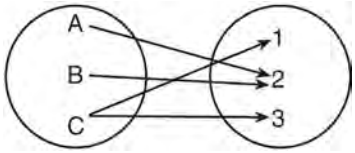
3 $f(x) = |x| + 2$

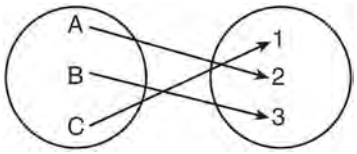
4 $j(x) = x^4 + 2$

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

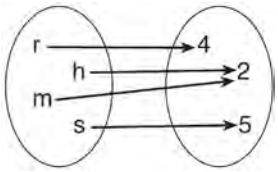
1 

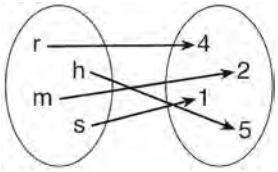
2 

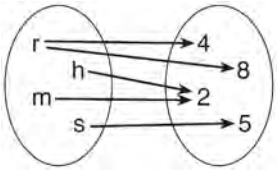
3 

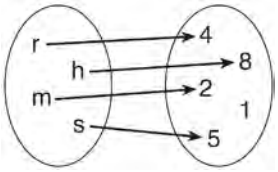
4 

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

1 

2 

3 

4 

356 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

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

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

359 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 $\{y \mid y \in \text{real numbers}\}$

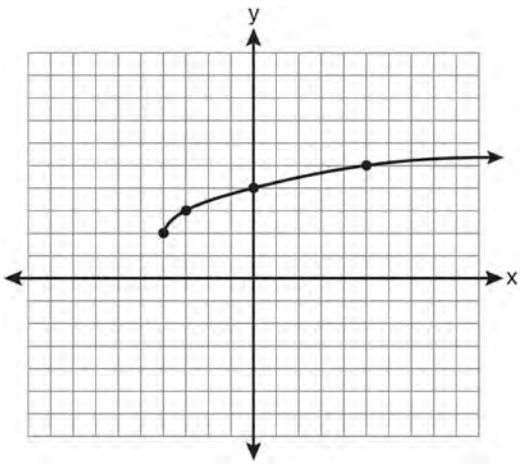
360 If $f(x) = \sqrt{9-x^2}$, what are its domain and range?
1 domain: $\{x \mid -3 \leq x \leq 3\}$; range: $\{y \mid 0 \leq y \leq 3\}$
2 domain: $\{x \mid x \neq \pm 3\}$; range: $\{y \mid 0 \leq y \leq 3\}$
3 domain: $\{x \mid x \leq -3 \text{ or } x \geq 3\}$; range: $\{y \mid y \neq 0\}$
4 domain: $\{x \mid x \neq 3\}$; range: $\{y \mid y \geq 0\}$

361 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 $\{y \mid y \geq 0\}$

362 The domain of $f(x) = -\dfrac{3}{\sqrt{2-x}}$ is the set of all real numbers
1 greater than 2
2 less than 2
3 except 2
4 between –2 and 2

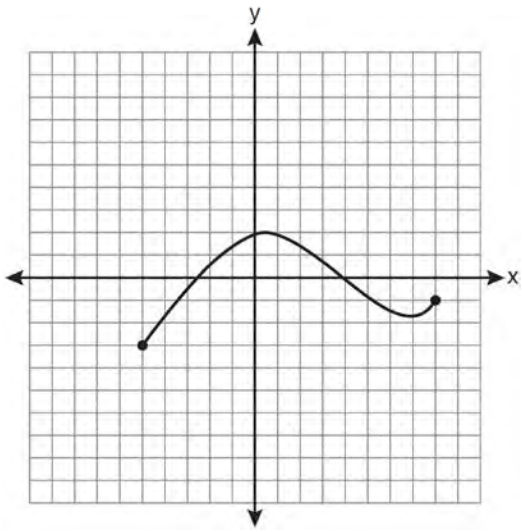
363 What is the domain of the function $g(x) = 3^x - 1$?
1 $(-\infty,3]$
2 $(-\infty,3)$
3 $(-\infty,\infty)$
4 $(-1,\infty)$

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



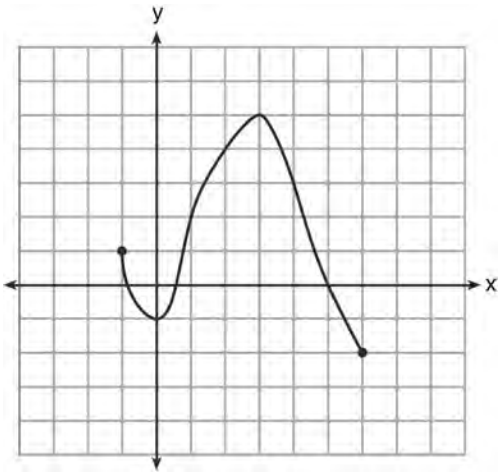
1 $\{x \mid x > -4\}$; $\{y \mid y > 2\}$
2 $\{x \mid x \geq -4\}$; $\{y \mid y \geq 2\}$
3 $\{x \mid x > 2\}$; $\{y \mid y > -4\}$
4 $\{x \mid x \geq 2\}$; $\{y \mid y \geq -4\}$

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



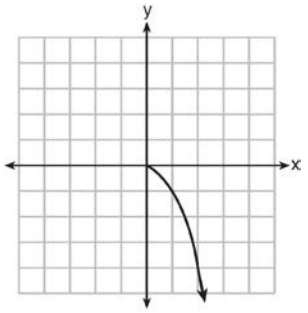
State the domain and range of this function.

366 What is the domain of the function shown below?



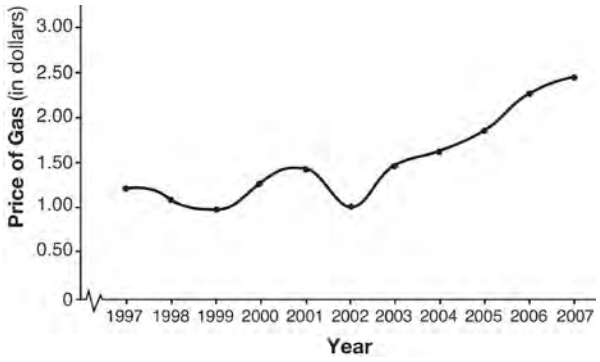
1 $-1 \le x \le 6$
2 $-1 \le y \le 6$
3 $-2 \le x \le 5$
4 $-2 \le y \le 5$

367 What is the range of the function shown below?



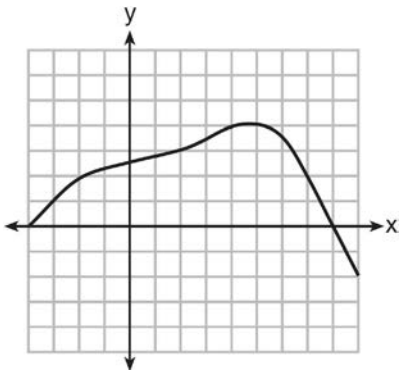
1 $x \le 0$
2 $x \ge 0$
3 $y \le 0$
4 $y \ge 0$

368 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 $1.27 \le y \le 2.38$

369 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

370 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

371 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 $x^2 + 6x - 5$

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

373 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

374 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 $3\sin^2 x$

375 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

376 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 $2x^2 - 3x + 36$

377 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

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

A2.A.44: INVERSE OF FUNCTIONS

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

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

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

382 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.

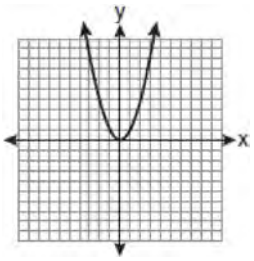
2 m is a function and its inverse is not a function.

3 m is not a function and its inverse is a function.

4 Neither m nor its inverse is a function.

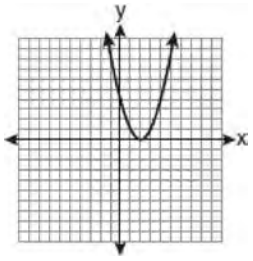
A2.A.46: TRANSFORMATIONS WITH FUNCTIONS AND RELATIONS

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

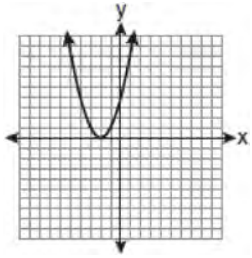


Which graph represents the function $f(x + 2)$?

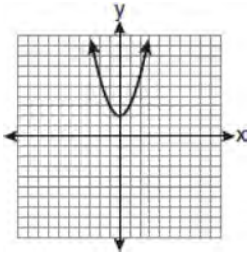
1



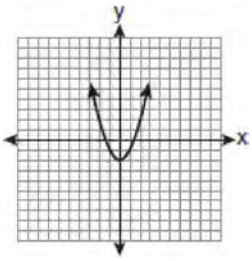
2



3

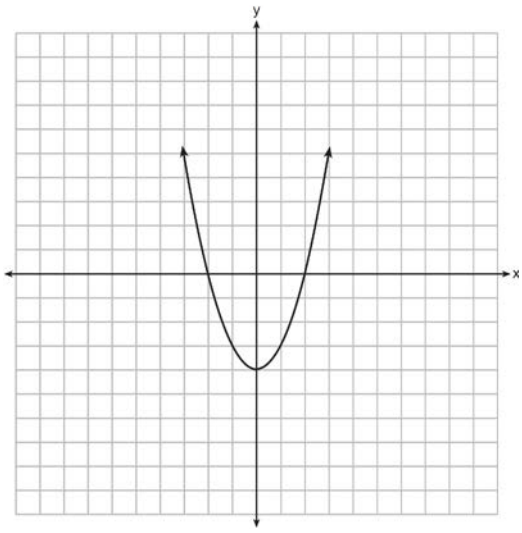


4



384 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 $(-6,-3)$

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



386 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

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

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

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

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

391 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 $35 + (n-1)(4)$

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

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

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

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

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

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

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

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

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

396 Given the sequence: $x, (x+y), (x+2y), \ldots$
Which expression can be used to determine the common difference of this sequence?

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

397 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 $\frac{37}{3}$

398 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

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

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

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

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

402 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 $16384\sqrt{10}$

403 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

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

$$a_1 = -3$$

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

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

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

$$a_1 = 2$$

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

407 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 $48x^5y$

408 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 $\frac{1}{2},1\frac{1}{2},2\frac{1}{2},3\frac{1}{2}$

409 What is the third term of the recursive sequence below?

$$a_1 = -6$$

$$a_n = \frac{1}{2}a_{n-1} - n$$

1 $-\frac{11}{2}$
2 $-\frac{5}{2}$
3 $-\frac{1}{2}$
4 -4

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

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

1 12
2 22
3 24
4 26

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

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

1 −38
2 −12
3 26
4 62

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

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

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

415 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 $4a^2-20a+30$

416 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 $4a^2-14a+13$

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

418 What is the value of $\sum_{n=1}^{3}\cos\frac{n\pi}{2}$?

1 1
2 −1
3 0
4 $-\frac{1}{2}$

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

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

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

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

423 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

424 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

425 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

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

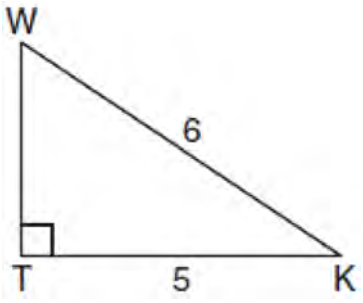
427 The sum of the first eight terms of the series $3 - 12 + 48 - 192 + \ldots$ is

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

TRIGONOMETRY

A2.A.55: TRIGONOMETRIC RATIOS

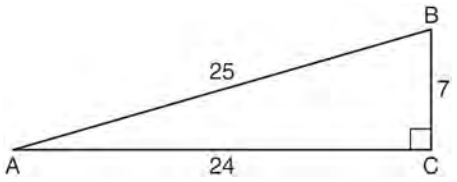
428 In the diagram below of right triangle KTW, $KW = 6$, $KT = 5$, and $m\angle KTW = 90$.



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

1 33°33'
2 33°34'
3 33°55'
4 33°56'

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



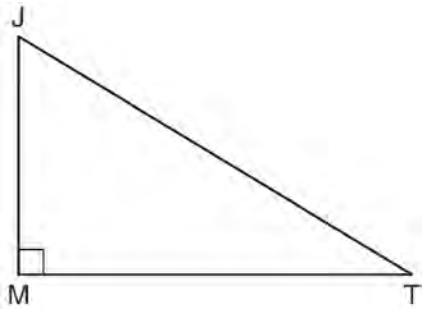
1 $\frac{25}{24}$

2 $\frac{25}{7}$

3 $\frac{24}{7}$

4 $\frac{7}{24}$

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



What is the value of $\cot J$?

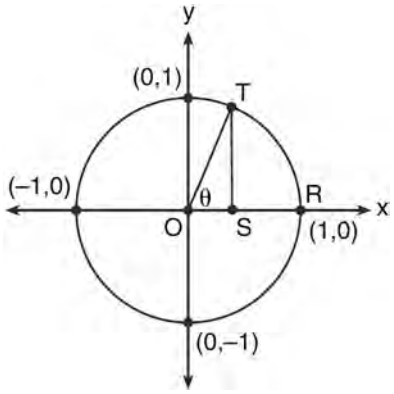
1 $\frac{\sqrt{3}}{3}$

2 2

3 $\sqrt{3}$

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

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



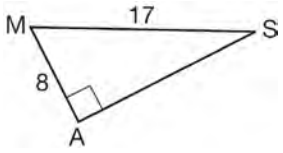
1 $\overline{TO}$

2 $\overline{TS}$

3 $\overline{OR}$

4 $\overline{OS}$

432 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'

433 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

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

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

1 I

2 II

3 III

4 IV

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

437 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

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

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

440 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

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

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

443 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

444 Approximately how many degrees does five radians equal?

1 286

2 900

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

4 5π

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

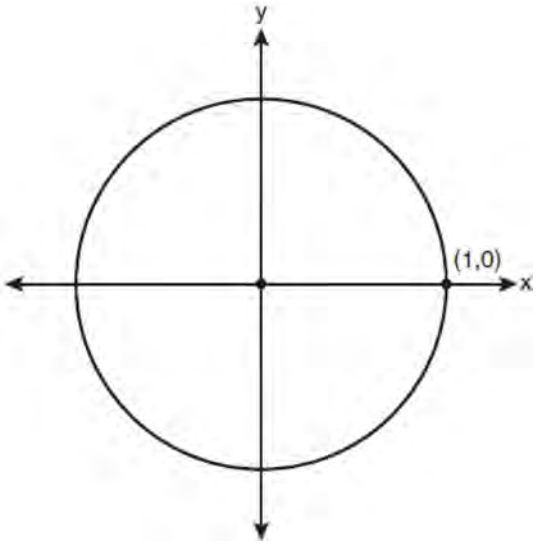
446 Determine, to the *nearest minute*, the degree measure of an angle of $\frac{5}{11}\pi$ radians.

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

448 Express –130° in radian measure, to the *nearest hundredth*.

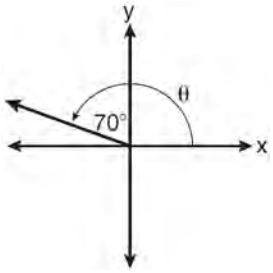
A2.A.60: UNIT CIRCLE, FINDING THE TERMINAL SIDE OF AN ANGLE

449 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 $\sin 240°$.

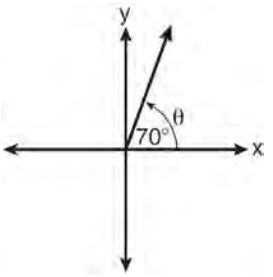


450 In which graph is θ coterminal with an angle of $-70°$?

1



2



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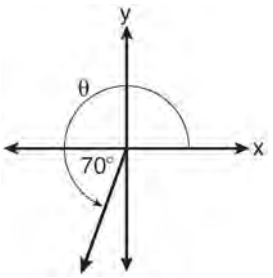
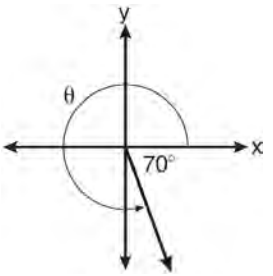
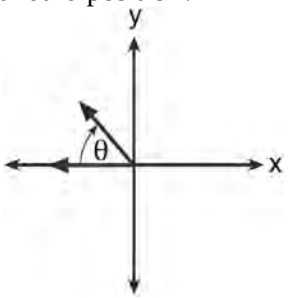
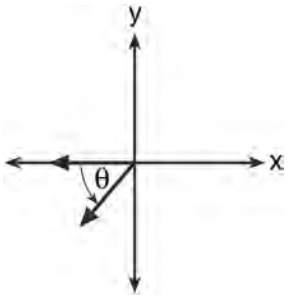


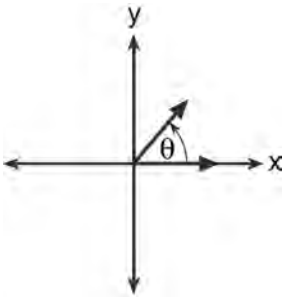
4

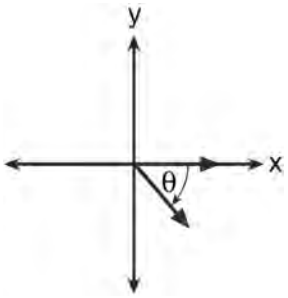


451 If $m\angle\theta = -50$, which diagram represents θ drawn in standard position?

1 

2 

3 

4 

452 Which angle does *not* terminate in Quadrant IV when drawn on a unit circle in standard position?
1 –300°
2 –50°
3 280°
4 1030°

453 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 $\sec P > 0$

454 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

455 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

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

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

458 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

459 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 $\left(1, \sqrt{3}\right)$

460 If the terminal side of angle θ passes through point $(-3,-4)$, what is the value of $\sec\theta$?

1 $\frac{5}{3}$

2 $-\frac{5}{3}$

3 $\frac{5}{4}$

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

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

1 −1.3407
2 −1.3408
3 −1.3548
4 −1.3549

462 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 $\csc(-118°)$

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

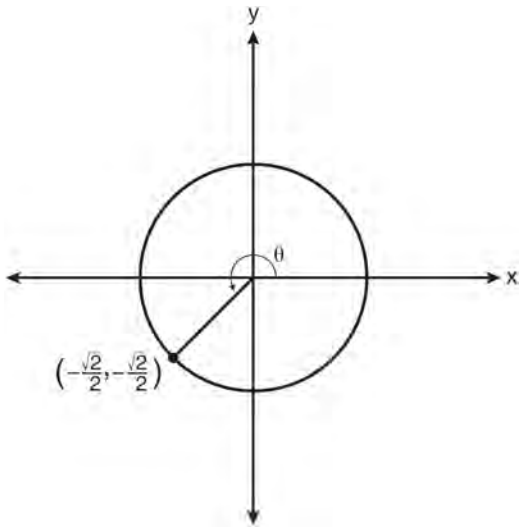
1 −1.3376
2 −1.3408
3 1.5012
4 1.5057

A2.A.64: USING INVERSE TRIGONOMETRIC FUNCTIONS

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

1 −30°
2 60°
3 150°
4 240°

465 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

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

467 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 $3\sqrt{2}$

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

469 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

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

1 $-\cos 55°$

2 $\cos 55°$

3 $-\sin 55°$

4 $\sin 55°$

471 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

472 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

473 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?

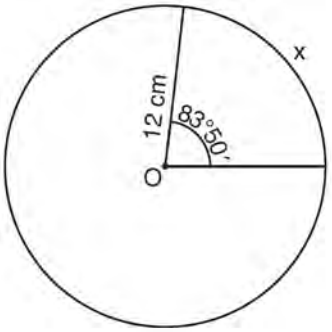
1 $\frac{3\pi}{4}$

2 π

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

4 3π

474 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'.



475 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

476 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.

477 In a circle with a diameter of 24 cm, a central angle of $\frac{4\pi}{3}$ radians intercepts an arc. The length of the arc, in centimeters, is

1 8π
2 9π
3 16π
4 32π

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

478 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 $\cot(90° - A) = \frac{1}{3}$

479 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 $\csc^2\theta$

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

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

482 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.

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

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

484 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 $\cot^2 x(\sec^2 x - 1)$

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

486 If angles A and B are complementary, then $\sec B$ equals
1 $\csc(90° - B)$
2 $\csc(B - 90°)$
3 $\cos(B - 90°)$
4 $\cos(90° - B)$

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

488 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 EXPRESIONS, PROVING TRIGONOMETRIC IDENTITIES

489 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 $\cos x + \sin x$

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

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

492 Prove that the equation shown below is an identity for all values for which the functions are defined:
$\csc\theta \cdot \sin^2\theta \cdot \cot\theta = \cos\theta$

A2.A.76: ANGLE SUM AND DIFFERENCE IDENTITIES

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

494 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 $\tan(A + B)$.

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

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

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

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

499 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

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

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

502 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

503 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 $\frac{7}{9}$

504 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 $\frac{55}{64}$

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

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

506 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

507 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

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

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

510 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 $\{60°, 300°\}$

511 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 $\{225°, 315°\}$

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

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

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

515 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*.

516 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 $\{90°, 210°, 270°, 330°\}$

517 Solve the equation $\cos 2x = \cos x$ algebraically for all values of x in the interval $0° \le x < 360°$.

A2.A.69: PROPERTIES OF TRIGONOMETRIC FUNCTIONS

518 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

519 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

520 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 $y = 3\sin 4x$

521 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

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

1 1
2 2
3 3
4 4

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

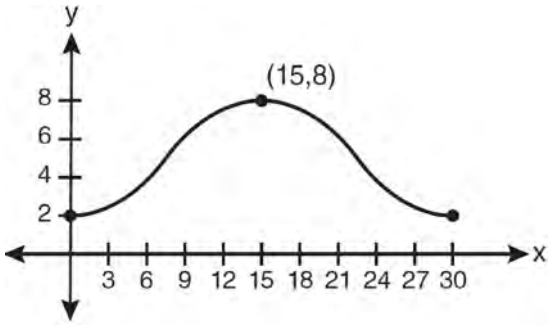
1 $\frac{1}{3}$
2 *2*
3 π
4 6π

524 What are the amplitude and the period of the graph represented by the equation $y = -3\cos\frac{\theta}{3}$?

1 amplitude: –3; period: $\frac{\pi}{3}$
2 amplitude: –3; period: 6π
3 amplitude: 3; period: $\frac{\pi}{3}$
4 amplitude: 3; period: 6π

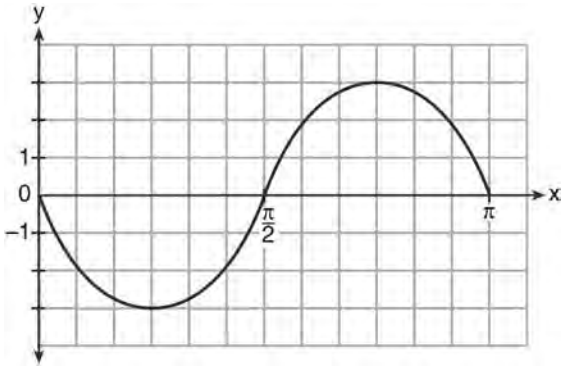
A2.A.72: IDENTIFYING THE EQUATION OF A TRIGONOMETRIC GRAPH

525 Which equation is graphed in the diagram below?

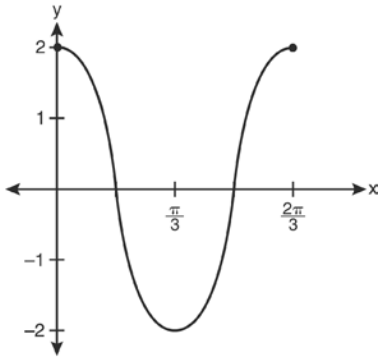


1 $y = 3\cos\left(\frac{\pi}{30}x\right) + 8$
2 $y = 3\cos\left(\frac{\pi}{15}x\right) + 5$
3 $y = -3\cos\left(\frac{\pi}{30}x\right) + 8$
4 $y = -3\cos\left(\frac{\pi}{15}x\right) + 5$

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

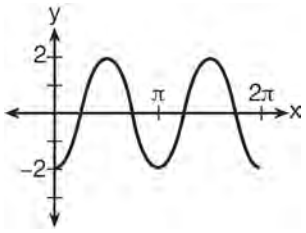


527 Which equation is represented by the graph below?



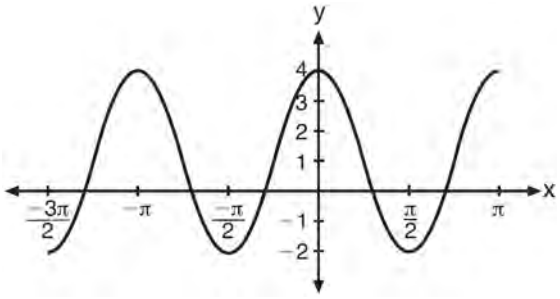
1 $y = 2\cos 3x$
2 $y = 2\sin 3x$
3 $y = 2\cos\frac{2\pi}{3}x$
4 $y = 2\sin\frac{2\pi}{3}x$

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

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

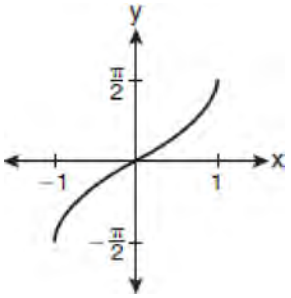


State the values of a, b, and c, and write an equation for the graph.

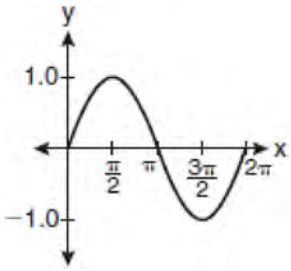
A2.A.65, 70-71: GRAPHING TRIGONOMETRIC FUNCTIONS

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

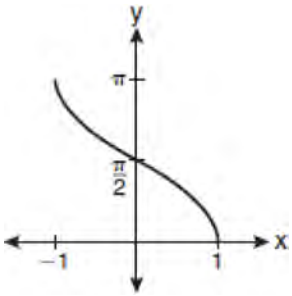
1



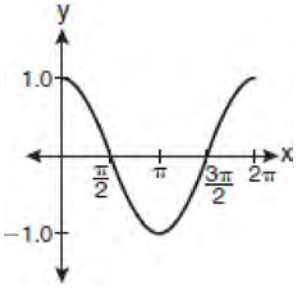
2



3

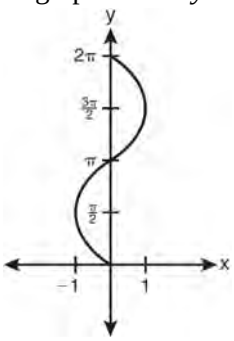


4

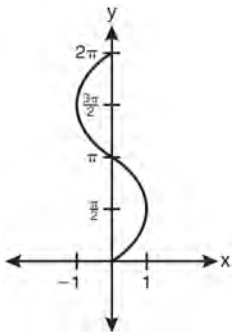


531 Which graph shows $y = \cos^{-1} x$?

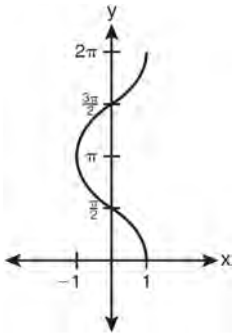
1



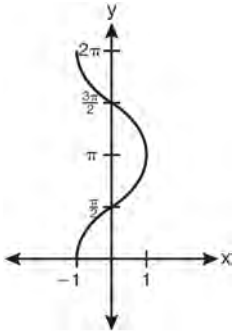
2



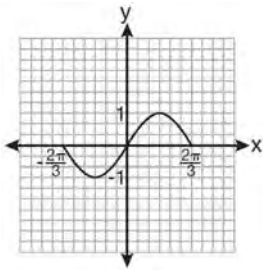
3

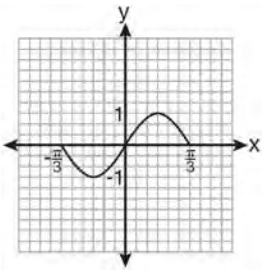


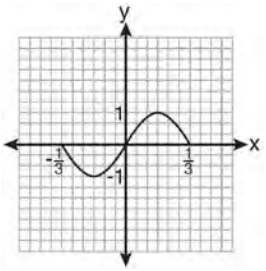
4

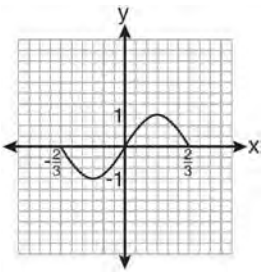


532 Which graph represents one complete cycle of the equation $y = \sin 3\pi x$?

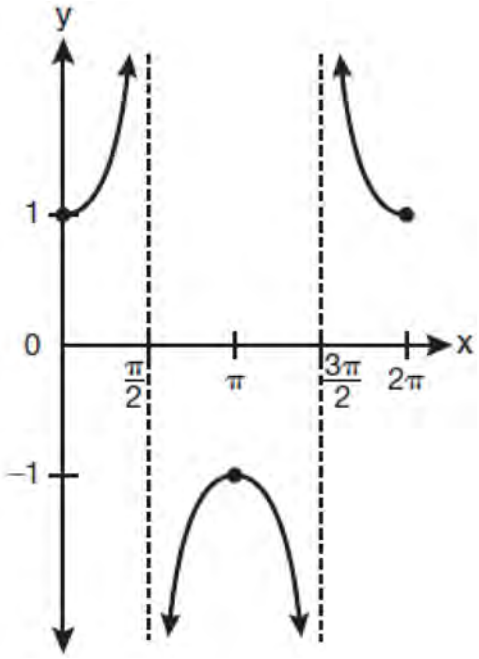
1 

2 

3 

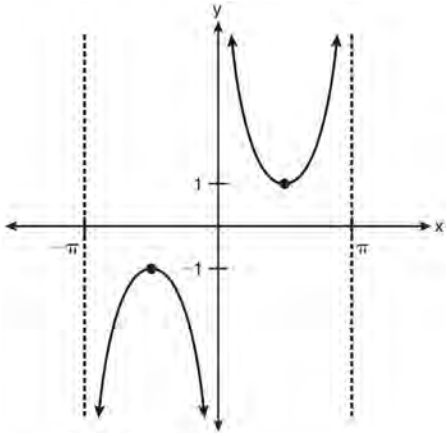
4 

533 Which equation is represented by the graph below?



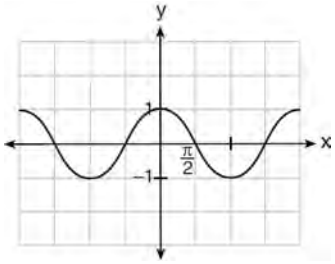
1 $y = \cot x$
2 $y = \csc x$
3 $y = \sec x$
4 $y = \tan x$

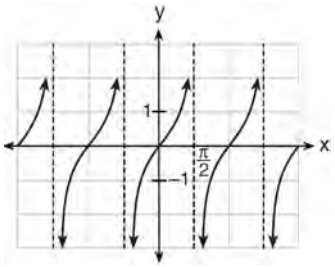
534 Which equation is sketched in the diagram below?

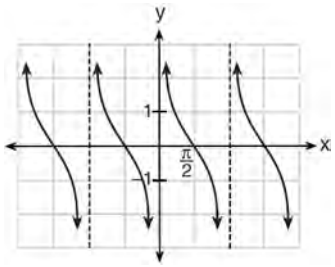


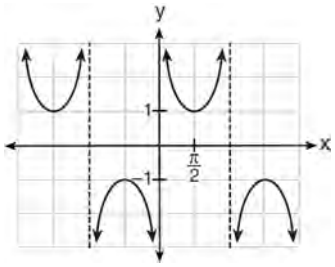
1 $y = \csc x$
2 $y = \sec x$
3 $y = \cot x$
4 $y = \tan x$

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

1 

2 

3 

4 

A2.A.63: DOMAIN AND RANGE

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

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

538 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 $[0, \pi]$.

539 When the inverse of $\tan\theta$ is sketched, its domain is

1 $-1 \le \theta \le 1$
2 $-\frac{\pi}{2} \le \theta \le \frac{\pi}{2}$
3 $0 \le \theta \le \pi$
4 $-\infty < \theta < \infty$

A2.A.74: USING TRIGONOMETRY TO FIND AREA

540 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

541 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*.

542 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

543 In parallelogram $BFLO$, $OL = 3.8$, $LF = 7.4$, and $m\angle O = 126$. If diagonal $\overline{BL}$ is drawn, what is the area of $\triangle BLF$?
1 11.4
2 14.1
3 22.7
4 28.1

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

545 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

546 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*.

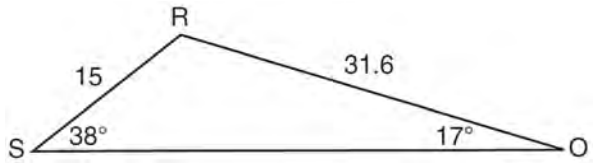
547 Find, to the *nearest tenth of a square foot*, the area of a rhombus that has a side of 6 feet and an angle of 50°.

548 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

549 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.

550 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 $96\sqrt{3}$

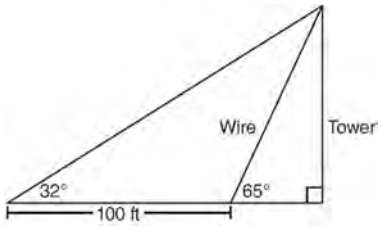
551 Determine the area, to the *nearest integer*, of $\triangle SRO$ shown below.



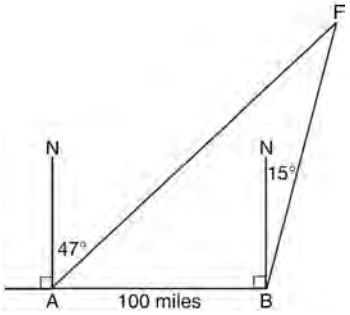
A2.A.73: LAW OF SINES

552 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*.

553 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*.



554 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.]



555 In $\triangle PQR$, p equals

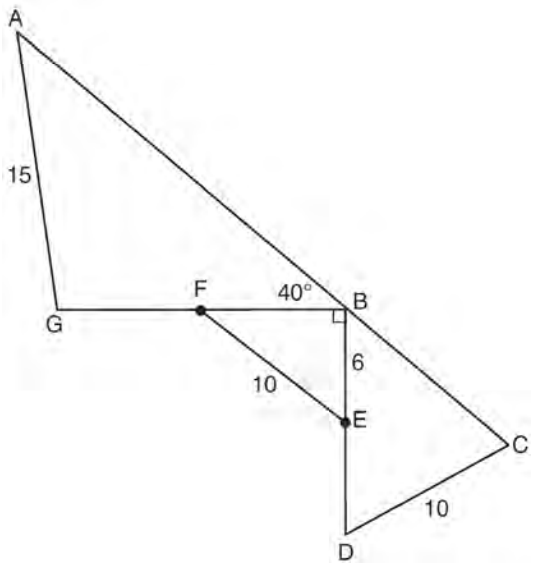
1 $\frac{r \sin P}{\sin Q}$

2 $\frac{r \sin P}{\sin R}$

3 $\frac{r \sin R}{\sin P}$

4 $\frac{q \sin R}{\sin Q}$

556 Given: $DC = 10$, $AG = 15$, $BE = 6$, $FE = 10$, $m\angle ABG = 40$, $m\angle GBD = 90$, $m\angle C < 90$, $\overline{BE} \cong \overline{ED}$, and $\overline{GF} \cong \overline{FB}$



Find $m\angle A$ to the *nearest tenth*. Find *BC* to the *nearest tenth*.

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

557 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

558 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

559 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

560 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

561 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

562 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

563 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

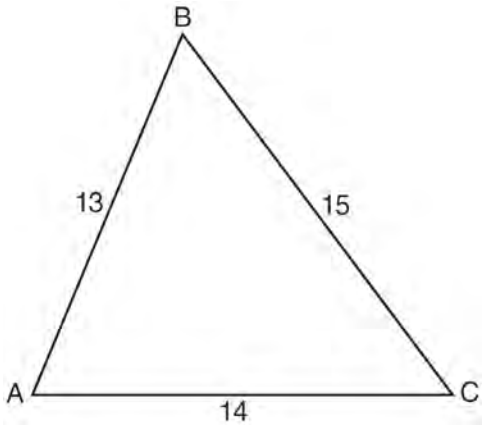
564 In triangle ABC, determine the number of distinct triangles that can be formed if $m\angle A = 85$, side $a = 8$, and side $c = 2$. Justify your answer.

A2.A.73: LAW OF COSINES

565 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.

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

567 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

568 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*.

569 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 $9^2 = 6^2 + h^2 - 2(6)(h)\cos 57°$

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

571 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

572 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.

573 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.

574 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

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

576 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 $(8,3)$

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

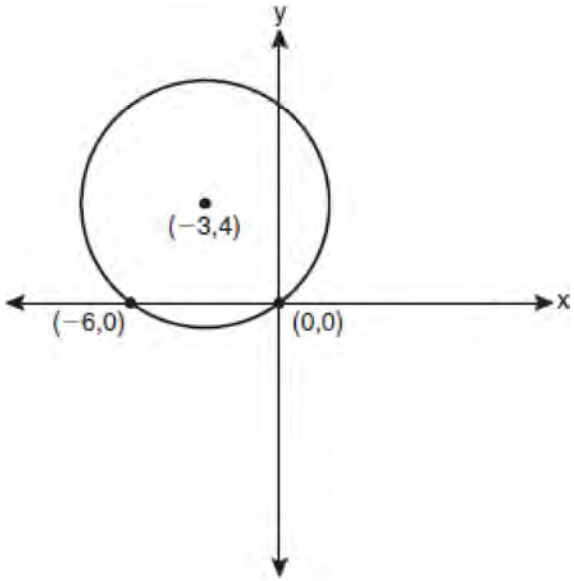
578 Which equation represents a circle with its center at $(2,-3)$ and that passes through the point $(6,2)$?

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 $(x+2)^2 + (y-3)^2 = 41$

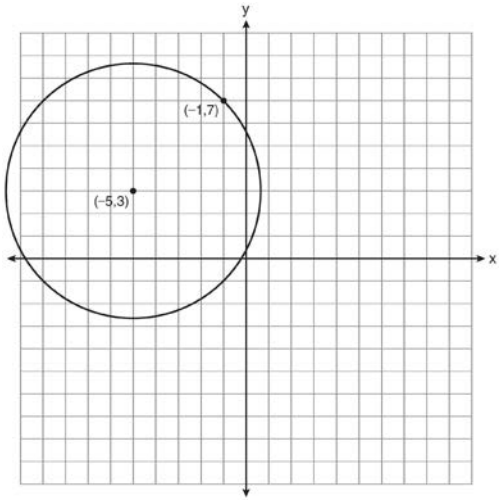
579 What is the equation of a circle with its center at $(0,-2)$ and passing through the point $(3,-5)$?

1 $x^2 + (y+2)^2 = 9$
2 $(x+2)^2 + y^2 = 9$
3 $x^2 + (y+2)^2 = 18$
4 $(x+2)^2 + y^2 = 18$

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

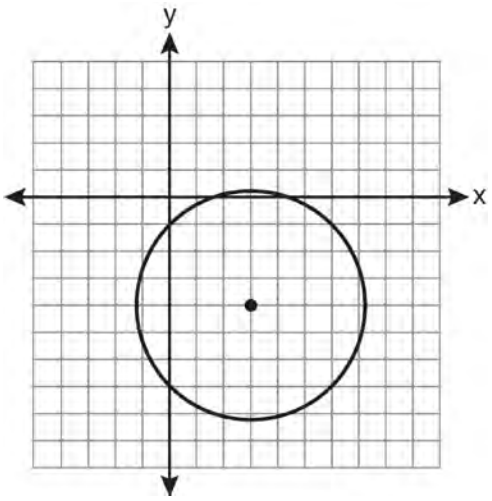


581 A circle shown in the diagram below has a center of $(-5,3)$ and passes through point $(-1,7)$.



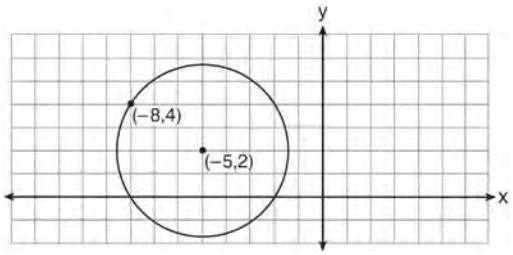
Write an equation that represents the circle.

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

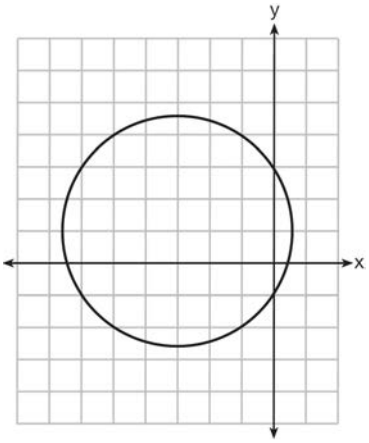


1 $(x-3)^2+(y+4)^2=16$
2 $(x-3)^2+(y+4)^2=18$
3 $(x+3)^2+(y-4)^2=16$
4 $(x+3)^2+(y-4)^2=18$

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

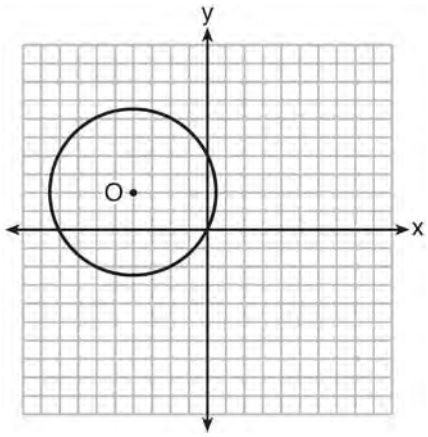


584 Which equation is represented by the graph below?



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

585 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: 011601a2 STA: A2.S.2
TOP: Analysis of Data

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

11 ANS: 4

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

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

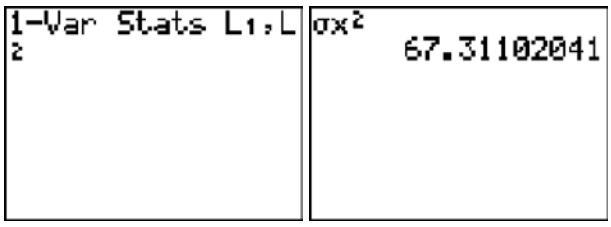
$$4k+36=2k+44$$

$$2k=8$$

$$k=4$$

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

12 ANS: 3



PTS: 2 REF: fall0924a2 STA: A2.S.4 TOP: Dispersion
KEY: basic, group frequency distributions

13 ANS:
7.4

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

14 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

15 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: Central Tendency and Dispersion
KEY: compute

16 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

17 ANS:
$Q_1 = 3.5$ and $Q_3 = 10.5$. $10.5 - 3.5 = 7$.

PTS: 2 REF: 011430a2 STA: A2.S.4 TOP: Central Tendency and Dispersion
KEY: compute

18 ANS: 2
$12 - 7 = 5$

PTS: 2 REF: 011525a2 STA: A2.S.4 TOP: Central Tendency and Dispersion
KEY: frequency

19 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

20 ANS: 2 PTS: 2 REF: 081509a2 STA: A2.S.4
TOP: Dispersion KEY: basic, group frequency distributions

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

22 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

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

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

24 ANS:
$y = 27.2025(1.1509)^x$. $y = 27.2025(1.1509)^{18} \approx 341$

PTS: 4 REF: 011238a2 STA: A2.S.7 TOP: Regression
KEY: exponential

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

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

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

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

27 ANS:
$y = 0.488(1.116)^x$

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

28 ANS:
$y = 733.646(0.786)^x$ $733.646(0.786)^{12} \approx 41$

PTS: 4 REF: 011536a2 STA: A2.S.7 TOP: Regression
KEY: exponential

29 ANS:

$y = 2.19(3.23)^x$ $426.21 = 2.19(3.23)^x$

$$\frac{426.21}{2.19} = (3.23)^x$$

$$\log\frac{426.21}{2.19} = x\log(3.23)$$

$$\frac{\log\frac{426.21}{2.19}}{\log(3.23)} = x$$

$$x \approx 4.5$$

PTS: 4 REF: 011637a2 STA: A2.S.7 TOP: Exponential Regression

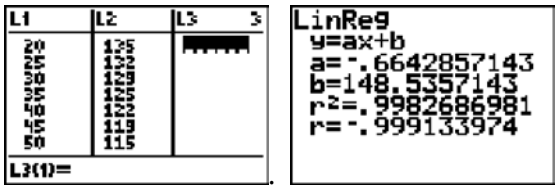
30 ANS: 2 PTS: 2 REF: 061021a2 STA: A2.S.8
TOP: Correlation Coefficient

31 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

32 ANS: 1



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

33 ANS: 2

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

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

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

35 ANS:

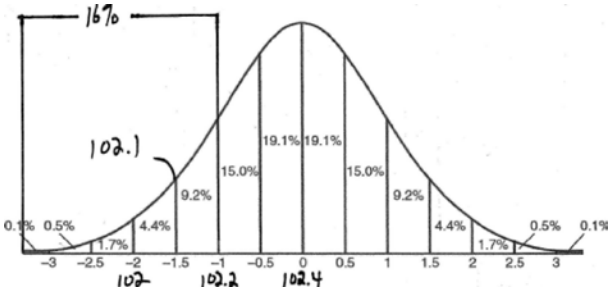
$r_A \approx 0.976$ $r_B \approx 0.994$ Set B has the stronger linear relationship since r is higher.

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

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

37 ANS: 3 PTS: 2 REF: 011616a2 STA: A2.S.8
TOP: Correlation Coefficient

38 ANS: 1



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

39 ANS: 3

$68\% \times 50 = 34$

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

40 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

41 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

42 ANS: 3

$34.1\% + 19.1\% = 53.2\%$

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

43 ANS: 2

$\bar{x} \pm \sigma$

153 ± 22

$131 - 175$

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

44 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

45 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

46 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

47 ANS: 4

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

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

48 ANS: 2

$\frac{60 - 50}{5} = 2$ standards above the mean or 2.3% $2.3\% \cdot 1000 = 23$

PTS: 2 REF: 011614a2 STA: A2.S.5 TOP: Normal Distributions
KEY: predict

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

50 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

51 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

52 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

53 ANS: 1

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

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

54 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

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

56 ANS: 3

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

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

57 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

58 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

59 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

60 ANS:

$\frac{11!}{3! \cdot 2! \cdot 2!} = 1,663,200$

PTS: 2 REF: 011631a2 STA: A2.S.10 TOP: Permutations

61 ANS: 2

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

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

62 ANS: 1

${}_{10}C_4 = 210$

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

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

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

64 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

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

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

66 ANS: 3
$_9C_3 = 84$

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

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

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

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

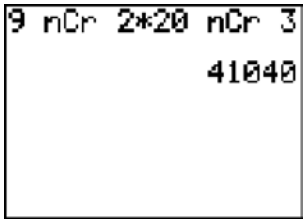
70 ANS: 1 PTS: 2 REF: 061317a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

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

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

73 ANS: 4 PTS: 2 REF: 081526a2 STA: A2.S.9
TOP: Differentiating Permutations and Combinations

74 ANS:



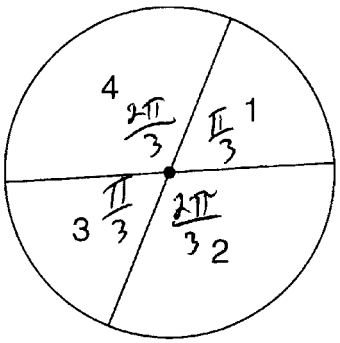
41,040.

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

75 ANS: 3
$_3C_1 \cdot {}_5C_2 = 3 \cdot 10 = 30$

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

76 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

77 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

78 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

79 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

80 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

81 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

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

83 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

84 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

85 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

86 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

87 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

88 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

89 ANS: 4 PTS: 2 REF: 011605a2 STA: A2.S.15
TOP: Binomial Probability KEY: modeling

90 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

91 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

92 ANS: 1

$6x - 7 \leq 5$ $6x - 7 \geq -5$

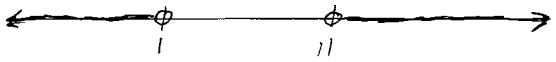
$6x \leq 12$ $6x \geq 2$

$x \leq 2$ $x \geq \frac{1}{3}$

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

93 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

94 ANS: 3

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

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

$4x > 8$ $4x < 2$

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

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

95 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

96 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

97 ANS:
$-4x + 5 < 13$ $-4x + 5 > -13$ $-2 < x < 4.5$

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

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

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

98 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

99 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

100 ANS: 2
$4|2x + 6| < 32$ $2x + 6 < 8$ $2x + 6 > -8$

$|2x + 6| < 8$ $\quad 2x < 2$ $\quad 2\dot{x} > -14$

$x < 1$ $\quad x > -7$

PTS: 2 REF: 011612a2 STA: A2.A.1 TOP: Absolute Value Inequalities
KEY: graph

101 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

102 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

103 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

104 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

105 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

106 ANS: 3

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

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

107 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

108 ANS: 2

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

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

109 ANS: 2

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

PTS: 2 REF: 011613a2 STA: A2.A.20 TOP: Roots of Quadratics

110 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

111 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

112 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

113 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

114 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

115 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

116 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

117 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

118 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

119 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

120 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

121 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

122 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

123 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

124 ANS:

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

PTS: 2 REF: 011629a2 STA: A2.A.7 TOP: Factoring by Grouping

125 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

126 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: Solving Quadratics
KEY: quadratic formula

127 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: Solving Quadratics
KEY: quadratic formula

128 ANS: 2

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

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

PTS: 2 REF: 061424a2 STA: A2.A.25 TOP: Solving Quadratics
KEY: quadratic formula

129 ANS:

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

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

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

PTS: 6 REF: 011539a2 STA: A2.A.25 TOP: Solving Quadratics
KEY: quadratic formula

130 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

131 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

132 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

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

134 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

135 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

136 ANS: 2

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

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

137 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

138 ANS: 4

$4x^2 + 3x - 4 = 0 \quad b^2 - 4ac = 3^2 - 4(4)(-4) = 9 + 64 = 73$

PTS: 2 REF: 011618a2 STA: A2.A.2 TOP: Using the Discriminant
KEY: determine nature of roots given equation

139 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: Solving Quadratics
KEY: completing the square

140 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: Solving Quadratics
KEY: completing the square

141 ANS: 2 PTS: 2 REF: 061122a2 STA: A2.A.24
TOP: Solving Quadratics KEY: completing the square

142 ANS: 2

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

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

$x = -2 \pm 3i$

PTS: 2 REF: 011408a2 STA: A2.A.24 TOP: Solving Quadratics
KEY: completing the square

143 ANS: 1 PTS: 2 REF: 061408a2 STA: A2.A.24
TOP: Solving Quadratics KEY: completing the square

144 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: Solving Quadratics
KEY: completing the square

145 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: Solving Quadratics
KEY: completing the square

146 ANS:

$$x^2 + 10x + 25 = 8 + 25$$

$$(x+5)^2 = 33$$

$$x + 5 = \pm\sqrt{33}$$

$$x = -5 \pm \sqrt{33}$$

PTS: 4 REF: 011636a2 STA: A2.A.24 TOP: Completing the Square

147 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

148 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

149 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

150 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

151 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: algebraically

152 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: algebraically

153 ANS: 3

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

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

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

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

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

$x^2 + x - 20 = 0$

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

$x = -5, 4$

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

154 ANS: 4

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

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

$-8y^2 = -32$

$y^2 = 4$

$y = \pm 2$

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

155 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

156 ANS: 2

$$2x^2 - (x+2)^2 = 8$$

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

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$$x = 6, -2$$

PTS: 2 REF: 011609a2 STA: A2.A.3 TOP: Quadratic-Linear Systems
KEY: equations

157 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
KEY: multiplication

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

159 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
KEY: multiplication

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

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

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

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

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

163 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
KEY: multiplication

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

165 ANS:

$$\frac{2}{3}x^3 + \frac{11}{8}x^2 - \frac{7}{9}x - \frac{2}{9}$$

PTS: 2 REF: 011635a2 STA: A2.N.3 TOP: Operations with Polynomials
KEY: subtraction

166 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

167 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

168 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

169 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

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

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

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

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

174 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

175 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

176 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

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

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

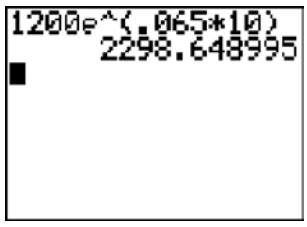
179 ANS: 2

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

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

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

181 ANS:



2,298.65.

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

182 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

183 ANS:

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

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

184 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 Functions

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

186 ANS: 3

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

PTS: 2 REF: 061527a2 STA: A2.A.12 TOP: Functional Notation

187 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 Functions

188 ANS: 4

$A = 5000e^{(.04)(18)} \approx 10272.17$

PTS: 2 REF: 011607a2 STA: A2.A.12 TOP: Evaluating Exponential Expressions

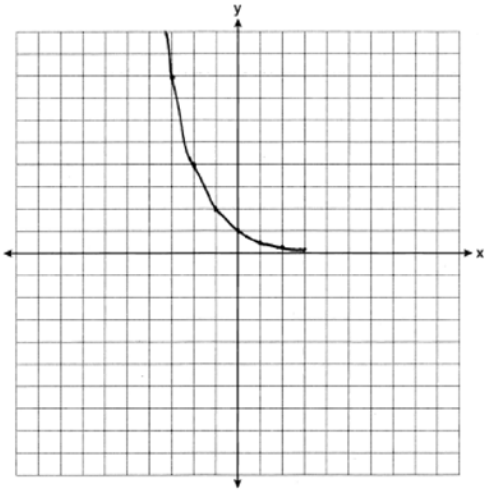
189 ANS: 2

$8^2 = 64$

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

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

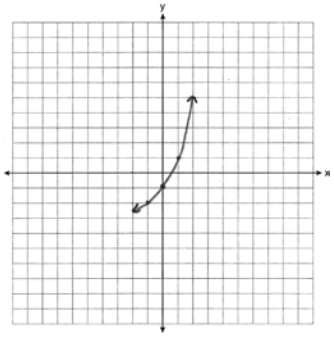
191 ANS:



$y = 0$

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

192 ANS:



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

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

193 ANS: 1 PTS: 2 REF: 011505a2 STA: A2.A.53
TOP: Graphing Exponential Functions

194 ANS: 2

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

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

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

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

197 ANS: 1

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

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

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

199 ANS: 2

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

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

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

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

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

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

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

201 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

202 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

203 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

204 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

205 ANS: 1

$\log T = \log \frac{10x^2}{y} = \log 10 + \log x^2 - \log y = 1 + 2\log x - \log y$

PTS: 2 REF: 011615a2 STA: A2.A.19 TOP: Properties of Logarithms
KEY: splitting logs

206 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

207 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

208 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

209 ANS: 3

$x = 5^4 = 625$

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

210 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

211 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

212 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

213 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

214 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

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

216 ANS:

$$(x+1)^3 = 64$$
$$x + 1 = 4$$
$$x = 3$$

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

217 ANS:

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

$$\frac{x^2 - 7x + 12}{2x - 10} = 8$$
$$x^2 - 7x + 12 = 16x - 80$$
$$x^2 - 23x + 92 = 0$$

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

218 ANS:

$$8^{x+1} = 16$$

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

$$3x + 3 = 4$$

$$3x = 1$$

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

PTS: 2 REF: 011630a2 STA: A2.A.28 TOP: Logarithmic Equations
KEY: basic

219 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

220 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

221 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

222 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

223 ANS: 3

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

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

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

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

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

PTS: 2 REF: 061015a2 STA: A2.A.27 TOP: Exponential Equations

KEY: common base shown

224 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

225 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

226 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

227 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

228 ANS: 4

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

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

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

$$9k + 12 = 4k - 2$$

$$5k = -14$$

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

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

229 ANS:

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

$$4x = \ln 12$$

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

$$\approx 0.62$$

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

230 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

231 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

232 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

233 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

234 ANS: 1

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

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

235 ANS: 3

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

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

236 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

237 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

238 ANS: 1

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

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

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

240 ANS:

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

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

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

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

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

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

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

241 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

242 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

243 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

244 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

245 ANS:

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

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

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

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

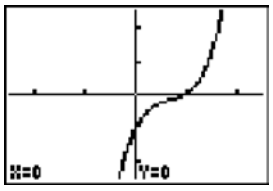
PTS: 4 REF: 081537a2 STA: A2.A.26 TOP: Solving Polynomial Equations

246 ANS: 4 PTS: 2 REF: 061005a2 STA: A2.A.50
TOP: Zeros of Polynomials

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

PTS: 2 REF: 081023a2 STA: A2.A.50 TOP: Zeros of Polynomials

248 ANS: 4



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

249 ANS: 1 PTS: 2 REF: 081501a2 STA: A2.A.50
TOP: Zeros of Polynomials

250 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

251 ANS:

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

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

252 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

253 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

254 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

255 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

256 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

257 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

258 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

259 ANS: 3 PTS: 2 REF: 061407a2 STA: A2.A.14
TOP: Operations with Radicals KEY: with variables | index = 2

260 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

261 ANS: 1

$$c = \sqrt{\left(x+\sqrt{2}\right)^2 + \left(x-\sqrt{2}\right)^2} = \sqrt{x^2+2\sqrt{2}x+2+x^2-2\sqrt{2}x+2} = \sqrt{2x^2+4}$$

PTS: 2 REF: 011626a2 STA: A2.A.14 TOP: Operations with Radicals
KEY: with variables | index = 2

262 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

263 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

264 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

265 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

266 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

267 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

268 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

269 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

270 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

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

272 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

273 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

274 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

275 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

276 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

277 ANS:

$\sqrt{2x+1} = 4$

$2x+1 = 16$

$2x = 15$

$x = \frac{15}{2}$

PTS: 2 REF: 011628a2 STA: A2.A.22 TOP: Solving Radicals
KEY: basic

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

279 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

280 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

281 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

282 ANS: 1

$\sqrt[3]{27a^{-6}b^3c^2} = 3a^{-2}bc^{\frac{2}{3}} = \frac{3bc^{\frac{2}{3}}}{a^2}$

PTS: 2 REF: 011606a2 STA: A2.A.11 TOP: Radicals as Fractional Exponents

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

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

284 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

285 ANS: 4
$\sqrt{-180x^{16}} = 6x^8 i\sqrt{5}$

PTS: 2 REF: 081524a2 STA: A2.N.6 TOP: Square Roots of Negative Numbers

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

287 ANS: 1
$2i^2 + 3i^3 = 2(-1) + 3(-i) = -2 - 3i$

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

288 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

289 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

290 ANS:
$xi^8 - yi^6 = x(1) - y(-1) = x + y$

PTS: 2 REF: 061533a2 STA: A2.N.7 TOP: Imaginary Numbers

291 ANS: 3
$x(27i^6) + x(2i^{12}) = -27x + 2x = -25x$

PTS: 2 REF: 011620a2 STA: A2.N.7 TOP: Imaginary Numbers

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

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

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

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

296 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

297 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

298 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

299 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

300 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

301 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

302 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

303 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

304 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

305 ANS: 3

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

PTS: 2 REF: 011608a2 STA: A2.A.16 TOP: Addition and Subtraction of Rationals

306 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

307 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

308 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

309 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

310 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

311 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

312 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

313 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

314 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

315 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

316 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.17 TOP: Complex Fractions

317 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

318 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

319 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

320 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.17 TOP: Complex Fractions

321 ANS: 4

$$\frac{\frac{3x+y}{xy}}{\frac{2}{xy}} = \frac{3x+y}{xy} \cdot \frac{xy}{2} = \frac{3x+y}{2}$$

PTS: 2 REF: 011603a2 STA: A2.A.17 TOP: Complex Fractions

322 ANS:

$$12 \cdot 6 = 9w$$

$$8 = w$$

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

323 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

324 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

325 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

326 ANS: 3

$20 \cdot 2 = -5t$

$-8 = t$

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

327 ANS:

$25 \cdot 6 = 30q$

$5 = q$

PTS: 2 REF: 011528a2 STA: A2.A.5 TOP: Inverse Variation

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

329 ANS: 4

$3 \cdot 400 = 8x$

$150 = x$

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

330 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

331 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

332 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

333 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

334 ANS: 3

$f(x+3) = 2(x+3)^2 - 3(x+3) + 4 = 2x^2 + 12x + 18 - 3x - 9 + 4 = 2x^2 + 9x + 13$

PTS: 2 REF: 011619a2 STA: A2.A.41 TOP: Functional Notation

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

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

337 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

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

339 ANS: 2 PTS: 2 REF: 061108a2 STA: A2.A.52
TOP: Families of Functions

340 ANS: 2 PTS: 2 REF: 011301a2 STA: A2.A.52
TOP: Families of Functions

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

342 ANS: 3 PTS: 2 REF: 011305a2 STA: A2.A.37
TOP: Defining Functions KEY: ordered pairs

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

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

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

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

347 ANS: 1 PTS: 2 REF: 061409a2 STA: A2.A.38
TOP: Defining Functions KEY: graphs

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

349 ANS: 3 PTS: 2 REF: 011604a2 STA: A2.A.38
TOP: Defining Functions KEY: ordered pairs

350 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

351 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

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

353 ANS: 2 PTS: 2 REF: 061218a2 STA: A2.A.43
TOP: Defining Functions

354 ANS: 4 PTS: 2 REF: 061303a2 STA: A2.A.43
TOP: Defining Functions

355 ANS: 2 PTS: 2 REF: 011407a2 STA: A2.A.43
TOP: Defining Functions

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

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

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

359 ANS: 2 PTS: 2 REF: 011222a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain, absolute value

360 ANS: 1 PTS: 2 REF: 011313a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain, radical

361 ANS: 1 PTS: 2 REF: 011416a2 STA: A2.A.39
TOP: Domain and Range KEY: real domain, rational

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

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

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

365 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
KEY: graph

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

367 ANS: 3 PTS: 2 REF: 061308a2 STA: A2.A.51
TOP: Domain and Range KEY: graph

368 ANS: 3 PTS: 2 REF: 061418a2 STA: A2.A.51
TOP: Domain and Range KEY: graph

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

370 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

371 ANS: 2

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

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

372 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

373 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

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

375 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

376 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

377 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

378 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

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

380 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

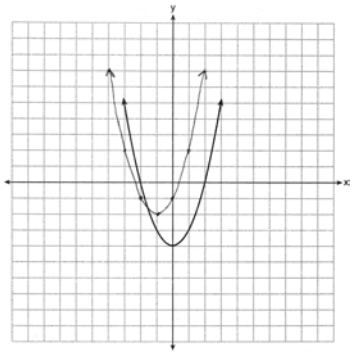
381 ANS: 2 PTS: 2 REF: 061521a2 STA: A2.A.44
TOP: Inverse of Functions KEY: equations

382 ANS: 2 PTS: 2 REF: 081523a2 STA: A2.A.44
TOP: Inverse of Functions KEY: ordered pairs

383 ANS: 2 PTS: 2 REF: fall0926a2 STA: A2.A.46
TOP: Graphing Quadratic Functions

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

385 ANS:



PTS: 2 REF: 061435a2 STA: A2.A.46 TOP: Graphing Quadratic Functions

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

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

388 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

389 ANS: 4

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

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

390 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

391 ANS: 4 PTS: 2 REF: 061520a2 STA: A2.A.29
TOP: Sequences

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

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

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

394 ANS: 1

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

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

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

396 ANS: 2 PTS: 2 REF: 011610a2 STA: A2.A.30
TOP: Sequences

397 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

398 ANS: 3

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

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

399 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

400 ANS: 1

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

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

401 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

402 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

403 ANS: 3

$\frac{40-10}{6-1} = \frac{30}{5} = 6 \quad a_n = 6n + 4$

$a_{20} = 6(20) + 4 = 124$

PTS: 2 REF: 081510a2 STA: A2.A.32 TOP: Sequences

404 ANS:

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

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

405 ANS:

$a_1 = 3. \quad a_2 = 2(3) - 1 = 5. \quad a_3 = 2(5) - 1 = 9.$

PTS: 2 REF: 061233a2 STA: A2.A.33 TOP: Sequences

406 ANS:

$a_2 = 3(2)^{-2} = \frac{3}{4} \quad a_3 = 3\left(\frac{3}{4}\right)^{-2} = \frac{16}{3} \quad a_4 = 3\left(\frac{16}{3}\right)^{-2} = \frac{27}{256}$

PTS: 4 REF: 011537a2 STA: A2.A.33 TOP: Sequences

407 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

408 ANS: 1 PTS: 2 REF: 081520a2 STA: A2.A.33
TOP: Sequences

409 ANS: 1

$a_2 = \frac{1}{2}(-6) - 2 = -5$

$a_3 = \frac{1}{2}(-5) - 3 = -\frac{11}{2}$

PTS: 2 REF: 011623a2 STA: A2.A.33 TOP: Sequences

410 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

411 ANS:

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

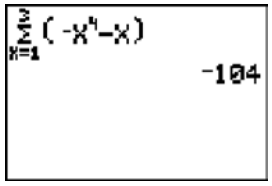
PTS: 2 REF: 011131a2 STA: A2.N.10 TOP: Sigma Notation
KEY: basic

412 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

413 ANS:



–104.

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

414 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

415 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

416 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

417 ANS:

$x - 1 + x - 4 + x - 9 + x - 16 = 4x - 30$

PTS: 2 REF: 081535a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

418 ANS: 2

$\cos\frac{\pi}{2} + \cos\pi + \cos\frac{3\pi}{2} = 0 + -1 + 0 = -1$

PTS: 2 REF: 011617a2 STA: A2.N.10 TOP: Sigma Notation
KEY: advanced

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

420 ANS:

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

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

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

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

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

424 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

425 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: Series
KEY: arithmetic

426 ANS:

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

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

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

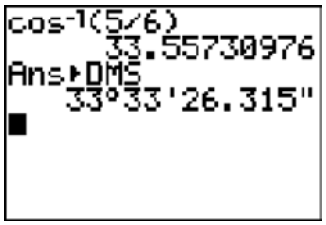
PTS: 2 REF: 011328a2 STA: A2.A.35 TOP: Series
KEY: arithmetic

427 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: Series
KEY: geometric

428 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

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

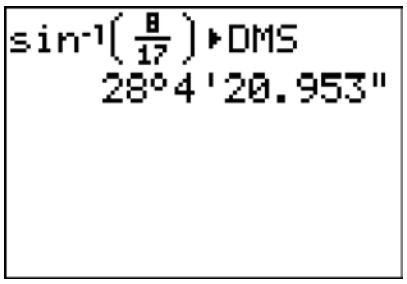
430 ANS: 1

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

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

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

432 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

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

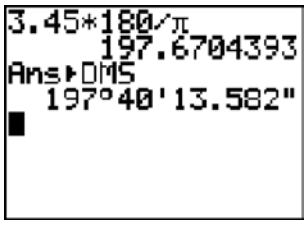
434 ANS: 3

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

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

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

436 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

437 ANS: 2

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

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

438 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

439 ANS:

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

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

440 ANS: 1

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

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

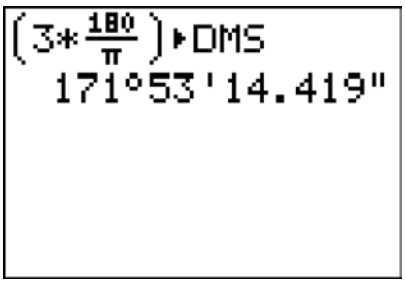
441 ANS:

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

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

442 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

443 ANS: 2

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

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

444 ANS: 1

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

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

445 ANS:

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

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

446 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

447 ANS:

$2.5\left(\frac{180}{\pi}\right) = 143°14'$

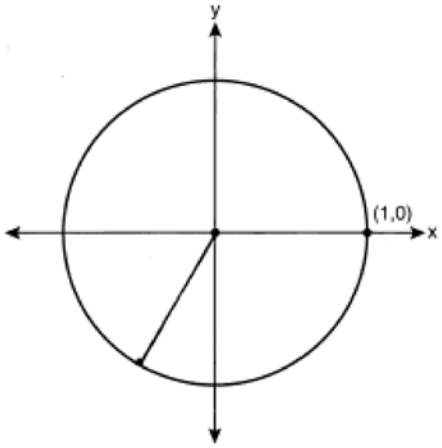
PTS: 2 REF: 081528a2 STA: A2.M.2 TOP: Radian Measure
KEY: degrees

448 ANS:

$-130 \cdot \frac{\pi}{180} \approx -2.27$

PTS: 2 REF: 011632a2 STA: A2.M.2 TOP: Radian Measure
KEY: radians

449 ANS:



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

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

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

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

452 ANS: 1
$-300° + 360° = 60°$, which terminates in Quadrant I.

PTS: 2 REF: 011602a2 STA: A2.A.60 TOP: Unit Circle

453 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

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

455 ANS: 4 PTS: 2 REF: 011312a2 STA: A2.A.56
TOP: Determining Trigonometric Functions KEY: degrees, common angles

456 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

457 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

458 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

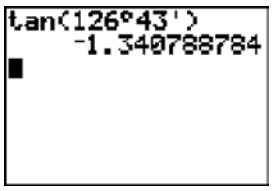
459 ANS: 2
$x = 2 \cdot \frac{\sqrt{3}}{2} = \sqrt{3}$ $y = 2 \cdot \frac{1}{2} = 1$

PTS: 2 REF: 061525a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

460 ANS: 4
$\cos\theta = -\frac{3}{5}$ $\sec\theta = -\frac{5}{3}$

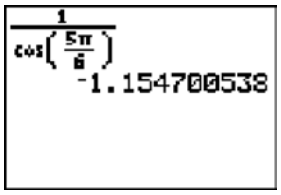
PTS: 2 REF: 011621a2 STA: A2.A.62 TOP: Determining Trigonometric Functions

461 ANS: 2



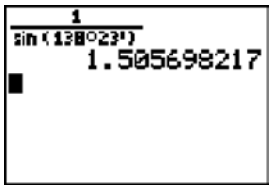
PTS: 2 REF: 061115a2 STA: A2.A.66 TOP: Determining Trigonometric Functions

462 ANS: 1



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

463 ANS: 4



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

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

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

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

467 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

468 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

469 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

470 ANS: 2

$\cos(-305° + 360°) = \cos(55°)$

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

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

472 ANS: 4

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

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

473 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

474 ANS:

$83°50' \cdot \frac{\pi}{180} \approx 1.463$ radians $s = \theta r = 1.463 \cdot 12 \approx 17.6$

PTS: 2 REF: 011435a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

475 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

476 ANS:

$r = \dfrac{6.6}{\frac{2}{3}} = 9.9$

PTS: 2 REF: 081532a2 STA: A2.A.61 TOP: Arc Length
KEY: radius

477 ANS: 3

$s = \theta r = \dfrac{4\pi}{3} \cdot \dfrac{24}{2} = 16\pi$

PTS: 2 REF: 011611a2 STA: A2.A.61 TOP: Arc Length
KEY: arc length

478 ANS: 3

Cofunctions tangent and cotangent are complementary

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

479 ANS: 3

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

PTS: 2 REF: 061123a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

480 ANS:

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

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

481 ANS:

$a + 15 + 2a = 90$

$3a + 15 = 90$

$3a = 75$

$a = 25$

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

482 ANS:

$\dfrac{\cot x \sin x}{\sec x} = \dfrac{\frac{\cos x}{\sin x}\sin x}{\frac{1}{\cos x}} = \cos^2 x$

PTS: 2 REF: 061334a2 STA: A2.A.58 TOP: Reciprocal Trigonometric Relationships

483 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

484 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

485 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

486 ANS: 3

Cofunctions secant and cosecant are complementary

PTS: 2 REF: 011625a2 STA: A2.A.58 TOP: Cofunction Trigonometric Relationships

487 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

488 ANS: 1

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

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

489 ANS: 2 PTS: 2 REF: 011208a2 STA: A2.A.67
TOP: Simplifying Trigonometric Expressions

490 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

491 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

492 ANS:

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

$\cos\theta = \cos\theta$

PTS: 2 REF: 011634a2 STA: A2.A.67 TOP: Proving Trigonometric Identities

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

494 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

495 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

496 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

497 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

498 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

499 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

500 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

501 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

502 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

503 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

504 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

505 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

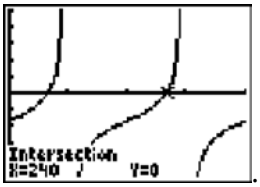
506 ANS: 1

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

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

507 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

508 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

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

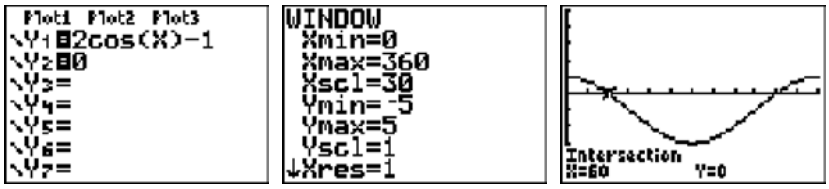
$$1 = \tan C$$

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

$$C = 45, 225$$

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

510 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

511 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

512 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

513 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

514 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

515 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

516 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

517 ANS:

$2\cos^2 x - 1 = \cos x$

$2\cos^2 x - \cos x - 1 = 0$

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

$\cos x = -\frac{1}{2}, 1$

$x = 0, 120, 240$

PTS: 4 REF: 011638a2 STA: A2.A.68 TOP: Trigonometric Equations
KEY: double angle identities

518 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

519 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

520 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

521 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

522 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

523 ANS: 3

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

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

524 ANS: 4 PTS: 2 REF: 011627a2 STA: A2.A.69
TOP: Properties of Graphs of Trigonometric Functions KEY: period

525 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

526 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

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

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

529 ANS:
$a = 3, b = 2, c = 1 \quad y = 3\cos 2x + 1.$

PTS: 2 REF: 011538a2 STA: A2.A.72
TOP: Identifying the Equation of a Trigonometric Graph

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

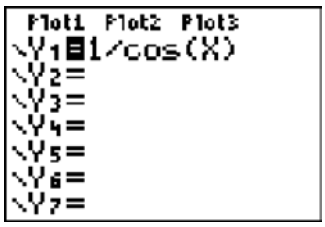
531 ANS: 3 PTS: 2 REF: 061119a2 STA: A2.A.65
TOP: Graphing Trigonometric Functions

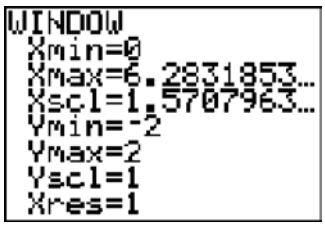
532 ANS: 3

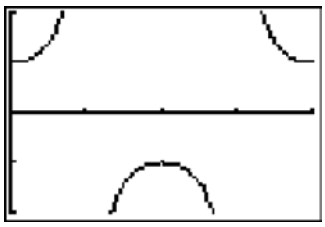
$$\text{period} = \frac{2\pi}{b} = \frac{2\pi}{3\pi} = \frac{2}{3}$$

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

533 ANS: 3

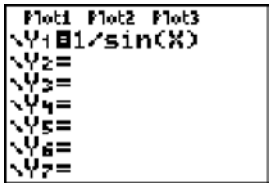


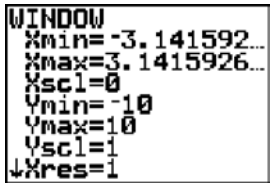


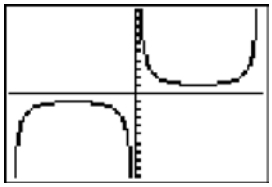


PTS: 2 REF: 061020a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

534 ANS: 1

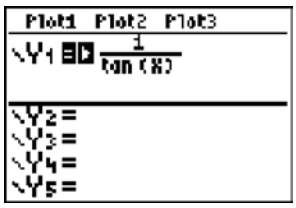


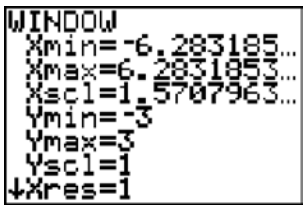


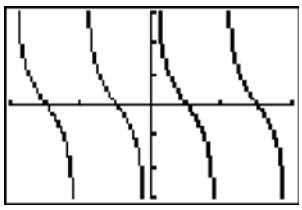


PTS: 2 REF: 011123a2 STA: A2.A.71 TOP: Graphing Trigonometric Functions

535 ANS: 3







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

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

537 ANS: 3 PTS: 2 REF: 061224a2 STA: A2.A.63
TOP: Domain and Range

538 ANS: 4 PTS: 2 REF: 061427a2 STA: A2.A.63
TOP: Domain and Range

539 ANS: 4 PTS: 2 REF: 011622a2 STA: A2.A.63
TOP: Domain and Range

540 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

541 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

542 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

543 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

544 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

545 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

546 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

547 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

548 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

549 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

550 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

551 ANS:

$\frac{1}{2} \cdot 15 \cdot 31.6 \sin 125 \approx 194$

PTS: 2 REF: 011633a2 STA: A2.A.74 TOP: Using Trigonometry to Find Area
KEY: advanced

552 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

553 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

554 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

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

556 ANS:

$\frac{16}{\sin A} = \frac{15}{\sin 40}$ $\frac{10}{\sin 50} = \frac{12}{\sin C}$ $\frac{d}{\sin 63.2} = \frac{12}{\sin 66.8}$

$\sin A = \frac{16 \sin 40}{15}$ $\sin C = \frac{12 \sin 50}{10}$ $d = \frac{12 \sin 63.2}{\sin 66.8}$

$A \approx 43.3$ $C \approx 66.8$ $d \approx 11.7$

PTS: 6 REF: 011639a2 STA: A2.A.73 TOP: Law of Sines
KEY: advanced

557 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

558 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

559 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

560 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

561 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

562 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

563 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

564 ANS:

$\frac{8}{\sin 85} = \frac{2}{\sin C}$ $\quad 85 + 14.4 < 180$ 1 triangle

$C = \sin^{-1}\left(\frac{2\sin 85}{8}\right)$ $\quad 85 + 165.6 \geq 180$

$C \approx 14.4$

PTS: 2 REF: 061529a2 STA: A2.A.75 TOP: Law of Sines - The Ambiguous Case

565 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

566 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

567 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

568 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

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

570 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

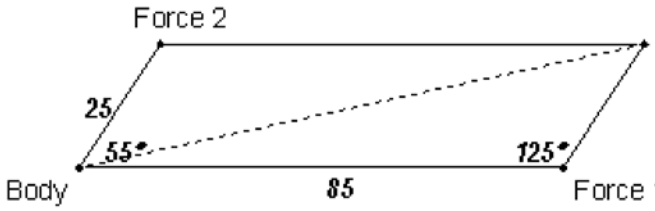
571 ANS:

$a = \sqrt{8^2 + 11^2 - 2(8)(11)\cos 82} \approx 12.67$. 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

572 ANS:



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

$r^2 \approx 10287.7$

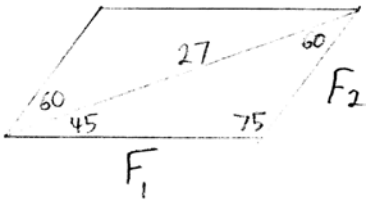
$r \approx 101.43$

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

$x \approx 12$

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

573 ANS:

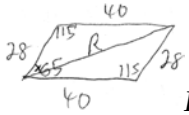


$\frac{27}{\sin 75} = \frac{F_1}{\sin 60}$. $\frac{27}{\sin 75} = \frac{F_2}{\sin 45}$.

$F_1 \approx 24$ $F_2 \approx 20$

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

574 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

575 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

576 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

577 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

578 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

579 ANS: 3

$r = \sqrt{(3-0)^2 + (-5-(-2))^2} = \sqrt{9+9} = \sqrt{18}$

PTS: 2 REF: 011624a2 STA: A2.A.48 TOP: Equations of Circles

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

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

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

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

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

583 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

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

585 ANS: 4 PTS: 2 REF: 011513a2 STA: A2.A.49
TOP: Equations of Circles