JMAP
REGENTS BY STATE STANDARD: TOPIC

NY Algebra I Regents Exam Questions from Spring 2013 to January 2018 Sorted by State Standard: Topic

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Algebra I Regents Exam Questions by Common Core State Standard: Topic

NUMBERS, OPERATIONS AND PROPERTIES

A.REI.A.1: IDENTIFYING PROPERTIES

1 When solving the equation $4(3x^2+2)-9=8x^2+7$, Emily wrote $4(3x^2+2)=8x^2+16$ as her first step. Which property justifies Emily's first step?

1) addition property of equality
2) commutative property of addition
3) multiplication property of equality
4) distributive property of multiplication over addition

2 A part of Jennifer's work to solve the equation $2(6x^2-3)=11x^2-x$ is shown below.

Given: $2(6x^2-3)=11x^2-x$

Step 1: $12x^2-6=11x^2-x$

Which property justifies her first step?

1) identity property of multiplication
2) multiplication property of equality
3) commutative property of multiplication
4) distributive property of multiplication over subtraction

3 When solving the equation $12x^2-7x=6-2(x^2-1)$, Evan wrote $12x^2-7x=6-2x^2+2$ as his first step. Which property justifies this step?

1) subtraction property of equality
2) multiplication property of equality
3) associative property of multiplication
4) distributive property of multiplication over subtraction

GRAPHS AND STATISTICS

S.ID.A.2-3: CENTRAL TENDENCY AND DISPERSION

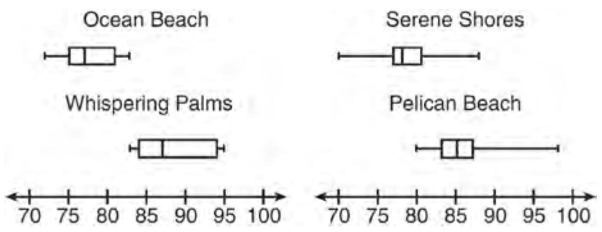
4 Christopher looked at his quiz scores shown below for the first and second semester of his Algebra class.

Semester 1: 78, 91, 88, 83, 94
Semester 2: 91, 96, 80, 77, 88, 85, 92

Which statement about Christopher's performance is correct?

1) The interquartile range for semester 1 is greater than the interquartile range for semester 2.
2) The median score for semester 1 is greater than the median score for semester 2.
3) The mean score for semester 2 is greater than the mean score for semester 1.
4) The third quartile for semester 2 is greater than the third quartile for semester 1.

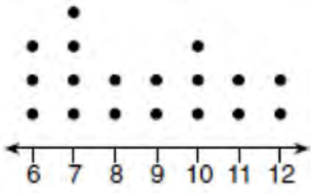
5 Corinne is planning a beach vacation in July and is analyzing the daily high temperatures for her potential destination. She would like to choose a destination with a high median temperature and a small interquartile range. She constructed box plots shown in the diagram below.



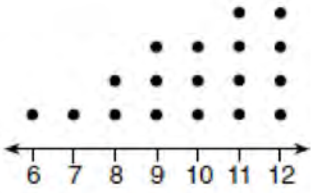
Which destination has a median temperature above 80 degrees and the smallest interquartile range?

1) Ocean Beach
2) Whispering Palms
3) Serene Shores
4) Pelican Beach

6 Noah conducted a survey on sports participation. He created the following two dot plots to represent the number of students participating, by age, in soccer and basketball.



Soccer Players' Ages



Basketball Players' Ages

Which statement about the given data sets is correct?

1) The data for soccer players are skewed right.
2) The data for soccer players have less spread than the data for basketball players.
3) The data for basketball players have the same median as the data for soccer players.
4) The data for basketball players have a greater mean than the data for soccer players.

7 The two sets of data below represent the number of runs scored by two different youth baseball teams over the course of a season.

Team A: 4, 8, 5, 12, 3, 9, 5, 2
Team B: 5, 9, 11, 4, 6, 11, 2, 7

Which set of statements about the mean and standard deviation is true?

1) mean $A <$ mean B
standard deviation $A >$ standard deviation B
2) mean $A >$ mean B
standard deviation $A <$ standard deviation B
3) mean $A <$ mean B
standard deviation $A <$ standard deviation B
4) mean $A >$ mean B
standard deviation $A >$ standard deviation B

8 Isaiah collects data from two different companies, each with four employees. The results of the study, based on each worker's age and salary, are listed in the tables below.

Company 1	
Worker's Age in Years	**Salary in Dollars**
25	30,000
27	32,000
28	35,000
33	38,000

Company 2	
Worker's Age in Years	**Salary in Dollars**
25	29,000
28	35,500
29	37,000
31	65,000

Which statement is true about these data?

1) The median salaries in both companies are greater than $37,000.
2) The mean salary in company 1 is greater than the mean salary in company 2.
3) The salary range in company 2 is greater than the salary range in company 1.
4) The mean age of workers at company 1 is greater than the mean age of workers at company 2.

9 The table below shows the annual salaries for the 24 members of a professional sports team in terms of millions of dollars.

0.5	0.5	0.6	0.7	0.75	0.8
1.0	1.0	1.1	1.25	1.3	1.4
1.4	1.8	2.5	3.7	3.8	4
4.2	4.6	5.1	6	6.3	7.2

The team signs an additional player to a contract worth 10 million dollars per year. Which statement about the median and mean is true?

1) Both will increase.
2) Only the median will increase.
3) Only the mean will increase.
4) Neither will change.

10 The heights, in inches, of 12 students are listed below.

61,67,72,62,65,59,60,79,60,61,64,63

Which statement best describes the spread of these data?

1) The set of data is evenly spread.
2) The median of the data is 59.5.
3) The set of data is skewed because 59 is the only value below 60.
4) 79 is an outlier, which would affect the standard deviation of these data.

11 The 15 members of the French Club sold candy bars to help fund their trip to Quebec. The table below shows the number of candy bars each member sold.

Number of Candy Bars Sold				
0	35	38	41	43
45	50	53	53	55
68	68	68	72	120

When referring to the data, which statement is *false*?

1) The mode is the best measure of central tendency for the data.
2) The data have two outliers.
3) The median is 53.
4) The range is 120.

S.ID.B.5: FREQUENCY TABLES

12 The school newspaper surveyed the student body for an article about club membership. The table below shows the number of students in each grade level who belong to one or more clubs.

	1 Club	**2 Clubs**	**3 or More Clubs**
9th	90	33	12
10th	125	12	15
11th	87	22	18
12th	75	27	23

If there are 180 students in ninth grade, what percentage of the ninth grade students belong to more than one club?

13 A survey of 100 students was taken. It was found that 60 students watched sports, and 34 of these students did not like pop music. Of the students who did *not* watch sports, 70% liked pop music. Complete the two-way frequency table.

	Watch Sports	**Don't Watch Sports**	**Total**
Like Pop			
Don't Like Pop			
Total			

14 A statistics class surveyed some students during one lunch period to obtain opinions about television programming preferences. The results of the survey are summarized in the table below.

Programming Preferences		
	Comedy	**Drama**
Male	70	35
Female	48	42

Based on the sample, predict how many of the school's 351 males would prefer comedy. Justify your answer.

15 A public opinion poll was taken to explore the relationship between age and support for a candidate in an election. The results of the poll are summarized in the table below.

Age	**For**	**Against**	**No Opinion**
21-40	30	12	8
41-60	20	40	15
Over 60	25	35	15

What percent of the 21-40 age group was for the candidate?

1) 15
2) 25
3) 40
4) 60

16 A radio station did a survey to determine what kind of music to play by taking a sample of middle school, high school, and college students. They were asked which of three different types of music they prefer on the radio: hip-hop, alternative, or classic rock. The results are summarized in the table below.

	Hip-Hop	**Alternative**	**Classic Rock**
Middle School	28	18	4
High School	22	22	6
College	16	20	14

What percentage of college students prefer classic rock?

1) 14%
2) 28%
3) 33%
4) 58%

S.ID.A.1: FREQUENCY HISTOGRAMS, BOX PLOTS AND DOT PLOTS

17 The heights, in feet, of former New York Knicks basketball players are listed below.

6.4 6.9 6.3 6.2 6.3 6.0 6.1 6.3 6.8 6.2
6.5 7.1 6.4 6.3 6.5 6.5 6.4 7.0 6.4 6.3
6.2 6.3 7.0 6.4 6.5 6.5 6.5 6.0 6.2

Using the heights given, complete the frequency table below.

Interval	**Frequency**
6.0-6.1	
6.2-6.3	
6.4-6.5	
6.6-6.7	
6.8-6.9	
7.0-7.1	

Based on the frequency table created, draw and label a frequency histogram on the grid below.

Determine and state which interval contains the upper quartile. Justify your response.

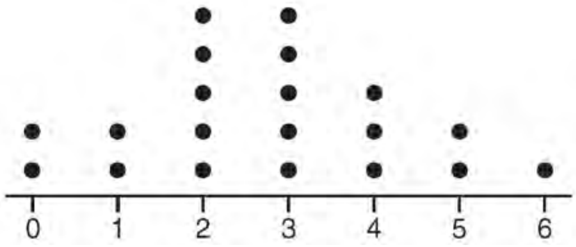
18 Robin collected data on the number of hours she watched television on Sunday through Thursday nights for a period of 3 weeks. The data are shown in the table below.

	Sun	**Mon**	**Tues**	**Wed**	**Thurs**
Week 1	4	3	3.5	2	2
Week 2	4.5	5	2.5	3	1.5
Week 3	4	3	1	1.5	2.5

Using an appropriate scale on the number line below, construct a box plot for the 15 values.

19 Which statistic can *not* be determined from a box plot representing the scores on a math test in Mrs. DeRidder's algebra class?
1) the lowest score
2) the median score
3) the highest score
4) the score that occurs most frequently

20 The dot plot shown below represents the number of pets owned by students in a class.



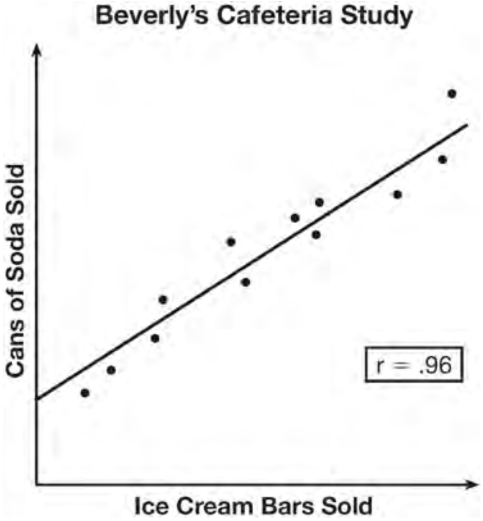
Which statement about the data is *not* true?
1) The median is 3.
2) The interquartile range is 2.
3) The mean is 3.
4) The data contain no outliers.

S.ID.C.9: ANALYSIS OF DATA

21 Which situation does *not* describe a causal relationship?
1) The higher the volume on a radio, the louder the sound will be.
2) The faster a student types a research paper, the more pages the paper will have.
3) The shorter the distance driven, the less gasoline that will be used.
4) The slower the pace of a runner, the longer it will take the runner to finish the race.

22 What type of relationship exists between the number of pages printed on a printer and the amount of ink used by that printer?
1) positive correlation, but not causal
2) positive correlation, and causal
3) negative correlation, but not causal
4) negative correlation, and causal

23 Beverly did a study this past spring using data she collected from a cafeteria. She recorded data weekly for ice cream sales and soda sales. Beverly found the line of best fit and the correlation coefficient, as shown in the diagram below.



Given this information, which statement(s) can correctly be concluded?
I. Eating more ice cream causes a person to become thirsty.
II. Drinking more soda causes a person to become hungry.
III. There is a strong correlation between ice cream sales and soda sales.
1) I, only
2) III, only
3) I and III
4) II and III

S.ID.B.6: REGRESSION

24 Emma recently purchased a new car. She decided to keep track of how many gallons of gas she used on five of her business trips. The results are shown in the table below.

Miles Driven	**Number of Gallons Used**
150	7
200	10
400	19
600	29
1000	51

Write the linear regression equation for these data where miles driven is the independent variable. (Round all values to the *nearest hundredth*.)

25 About a year ago, Joey watched an online video of a band and noticed that it had been viewed only 843 times. One month later, Joey noticed that the band's video had 1708 views. Joey made the table below to keep track of the cumulative number of views the video was getting online.

Months Since First Viewing	**Total Views**
0	843
1	1708
2	forgot to record
3	7124
4	14,684
5	29,787
6	62,381

a) Write a regression equation that best models these data. Round all values to the *nearest hundredth*. Justify your choice of regression equation. b) As shown in the table, Joey forgot to record the number of views after the second month. Use the equation from part *a* to estimate the number of full views of the online video that Joey forgot to record.

26 The table below shows the number of grams of carbohydrates, x, and the number of Calories, y, of six different foods.

Carbohydrates (x)	**Calories** (y)
8	120
9.5	138
10	147
6	88
7	108
4	62

Which equation best represents the line of best fit for this set of data?

1) $y = 15x$
2) $y = 0.07x$
3) $y = 0.1x - 0.4$
4) $y = 14.1x + 5.8$

27 An application developer released a new app to be downloaded. The table below gives the number of downloads for the first four weeks after the launch of the app.

Number of Weeks	1	2	3	4
Number of Downloads	120	180	270	405

Write an exponential equation that models these data. Use this model to predict how many downloads the developer would expect in the 26th week if this trend continues. Round your answer to the nearest download. Would it be reasonable to use this model to predict the number of downloads past one year? Explain your reasoning.

28 The table below shows the attendance at a museum in select years from 2007 to 2013.

Attendance at Museum					
Year	2007	2008	2009	2011	2013
Attendance (millions)	8.3	8.5	8.5	8.8	9.3

State the linear regression equation represented by the data table when $x = 0$ is used to represent the year 2007 and y is used to represent the attendance. Round all values to the *nearest hundredth*. State the correlation coefficient to the *nearest hundredth* and determine whether the data suggest a strong or weak association.

29 Erica, the manager at Stellarbeans, collected data on the daily high temperature and revenue from coffee sales. Data from nine days this past fall are shown in the table below.

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Day 6**	**Day 7**	**Day 8**	**Day 9**
High Temperature, t	54	50	62	67	70	58	52	46	48
Coffee Sales, f(t)	\$2900	\$3080	\$2500	\$2380	\$2200	\$2700	\$3000	\$3620	\$3720

State the linear regression function, $f(t)$, that estimates the day's coffee sales with a high temperature of t. Round all values to the *nearest integer*. State the correlation coefficient, r, of the data to the *nearest hundredth*. Does r indicate a strong linear relationship between the variables? Explain your reasoning.

30 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*. Using this equation, predict the slope of a beach, to the *nearest tenth of a degree*, on a beach with grains of sand having a median diameter of 0.65 mm.

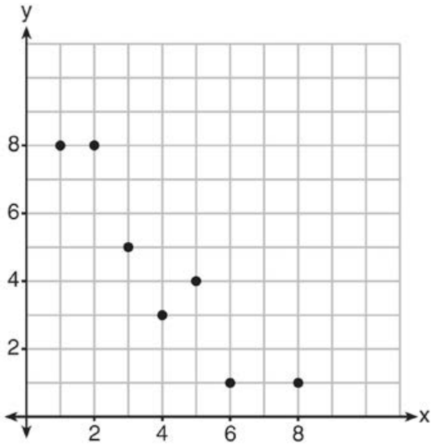
31 Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below.

Number of Knots	4	5	6	7	8
Length of Rope (cm)	64	58	49	39	31

State, to the *nearest tenth*, the linear regression equation that approximates the length, y, of the rope after tying x knots. Explain what the y-intercept means in the context of the problem. Explain what the slope means in the context of the problem.

S.ID.C.8: CORRELATION COEFFICIENT

32 What is the correlation coefficient of the linear fit of the data shown below, to the *nearest hundredth*?



1) 1.00
2) 0.93
3) –0.93
4) –1.00

33 Analysis of data from a statistical study shows a linear relationship in the data with a correlation coefficient of -0.524. Which statement best summarizes this result?

1) There is a strong positive correlation between the variables.
2) There is a strong negative correlation between the variables.
3) There is a moderate positive correlation between the variables.
4) There is a moderate negative correlation between the variables.

34 Bella recorded data and used her graphing calculator to find the equation for the line of best fit. She then used the correlation coefficient to determine the strength of the linear fit. Which correlation coefficient represents the strongest linear relationship?

1) 0.9
2) 0.5
3) -0.3
4) -0.8

35 The results of a linear regression are shown below.

$y = ax + b$

$a = -1.15785$

$b = 139.3171772$

$r = -0.896557832$

$r^2 = 0.8038159461$

Which phrase best describes the relationship between *x* and *y*?

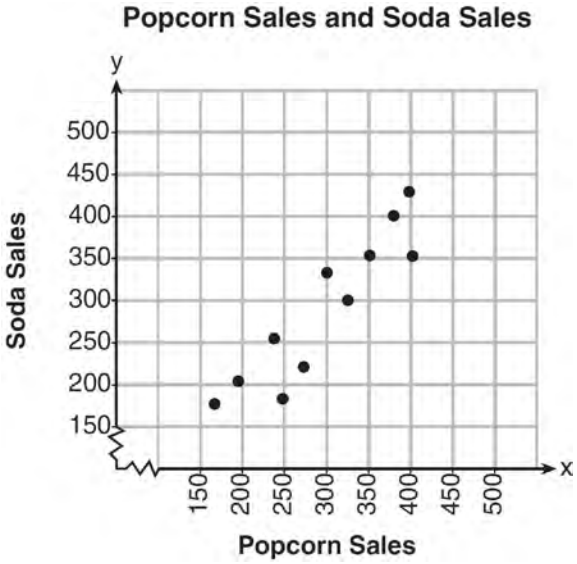
1) strong negative correlation
2) strong positive correlation
3) weak negative correlation
4) weak positive correlation

36 A nutritionist collected information about different brands of beef hot dogs. She made a table showing the number of Calories and the amount of sodium in each hot dog.

Calories per Beef Hot Dog	**Milligrams of Sodium per Beef Hot Dog**
186	495
181	477
176	425
149	322
184	482
190	587
158	370
139	322

a) Write the correlation coefficient for the line of best fit. Round your answer to the *nearest hundredth.*
b) Explain what the correlation coefficient suggests in the context of this problem.

37 The scatterplot below compares the number of bags of popcorn and the number of sodas sold at each performance of the circus over one week.



Which conclusion can be drawn from the scatterplot?

1) There is a negative correlation between popcorn sales and soda sales.
2) There is a positive correlation between popcorn sales and soda sales.
3) There is no correlation between popcorn sales and soda sales.
4) Buying popcorn causes people to buy soda.

38 The table below shows 6 students' overall averages and their averages in their math class.

Overall Student Average	92	98	84	80	75	82
Math Class Average	91	95	85	85	75	78

If a linear model is applied to these data, which statement best describes the correlation coefficient?

1) It is close to −1.
2) It is close to 1.
3) It is close to 0.
4) It is close to 0.5.

39 At Mountain Lakes High School, the mathematics and physics scores of nine students were compared as shown in the table below.

Mathematics	55	93	89	60	90	45	64	76	89
Physics	66	89	94	52	84	56	66	73	92

State the correlation coefficient, to the *nearest hundredth*, for the line of best fit for these data. Explain what the correlation coefficient means with regard to the context of this situation.

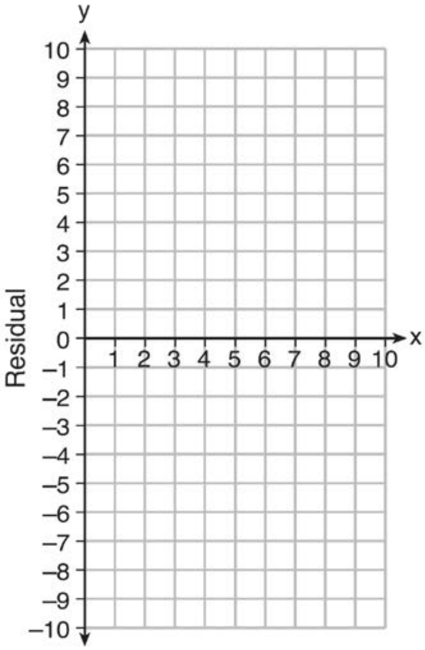
S.ID.B.6: RESIDUALS

40 Use the data below to write the regression equation ($y = ax + b$) for the raw test score based on the hours tutored. Round all values to the *nearest hundredth*.

Tutor Hours, x	**Raw Test Score**	**Residual** (Actual-Predicted)
1	30	1.3
2	37	1.9
3	35	–6.4
4	47	–0.7
5	56	2.0
6	67	6.6
7	62	–4.7

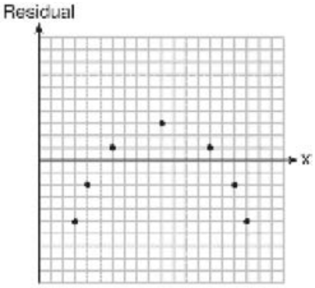
Equation: ___________________________

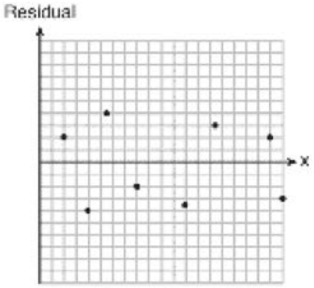
Create a residual plot on the axes below, using the residual scores in the table above.



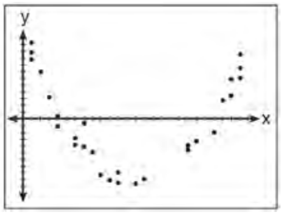
Based on the residual plot, state whether the equation is a good fit for the data. Justify your answer.

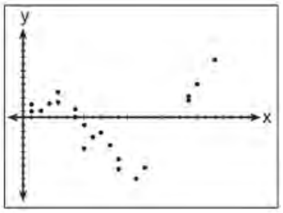
41 Which statistic would indicate that a linear function would *not* be a good fit to model a data set?

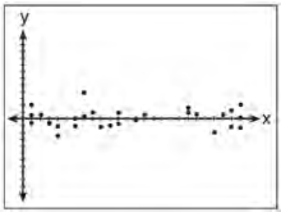
1) $r = -0.93$
2) $r = 1$
3) 

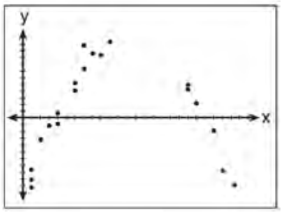
4) 

42 After performing analyses on a set of data, Jackie examined the scatter plot of the residual values for each analysis. Which scatter plot indicates the best linear fit for the data?

1) 

2) 

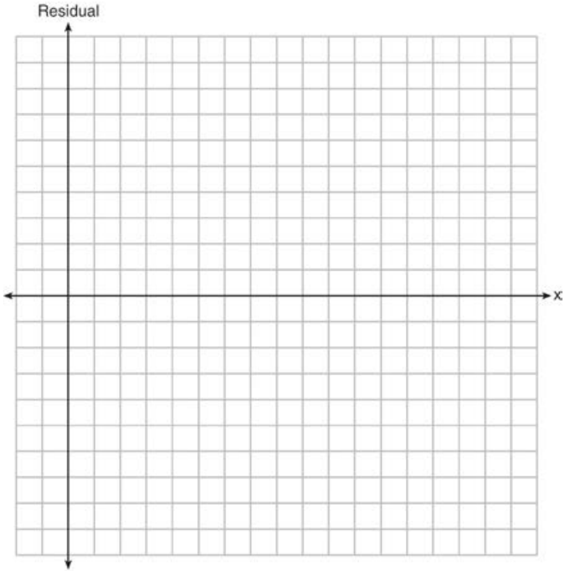
3) 

4) 

43 The table below represents the residuals for a line of best fit.

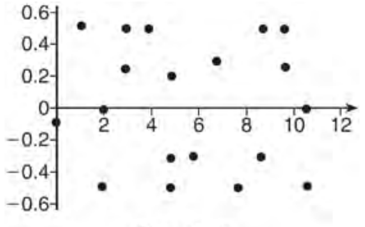
x	2	3	3	4	6	7	8	9	9	10
Residual	2	1	–1	–2	–3	–2	–1	2	0	3

Plot these residuals on the set of axes below.

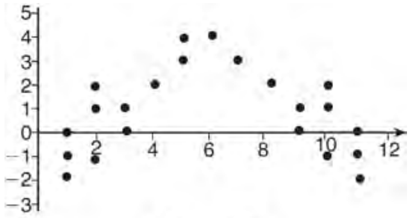


Using the plot, assess the fit of the line for these residuals and justify your answer.

44 The residual plots from two different sets of bivariate data are graphed below.



Graph A



Graph B

Explain, using evidence from graph A and graph B, which graph indicates that the model for the data is a good fit.

EXPRESSIONS AND EQUATIONS

A.SSE.A.1: DEPENDENT AND INDEPENDENT VARIABLES

45 The formula for the surface area of a right rectangular prism is $A = 2lw + 2hw + 2lh$, where l, w, and h represent the length, width, and height, respectively. Which term of this formula is *not* dependent on the height?

1) A
2) $2lw$
3) $2hw$
4) $2lh$

A.SSE.A.1: MODELING EXPRESSIONS

46 To watch a varsity basketball game, spectators must buy a ticket at the door. The cost of an adult ticket is \$3.00 and the cost of a student ticket is \$1.50. If the number of adult tickets sold is represented by a and student tickets sold by s, which expression represents the amount of money collected at the door from the ticket sales?

1) $4.50as$
2) $4.50(a + s)$
3) $(3.00a)(1.50s)$
4) $3.00a + 1.50s$

47 An expression of the fifth degree is written with a leading coefficient of seven and a constant of six. Which expression is correctly written for these conditions?

1) $6x^5 + x^4 + 7$
2) $7x^6 - 6x^4 + 5$
3) $6x^7 - x^5 + 5$
4) $7x^5 + 2x^2 + 6$

48 When multiplying polynomials for a math assignment, Pat found the product to be $-4x + 8x^2 - 2x^3 + 5$. He then had to state the leading coefficient of this polynomial. Pat wrote down -4. Do you agree with Pat's answer? Explain your reasoning.

49 Andy has \$310 in his account. Each week, w, he withdraws \$30 for his expenses. Which expression could be used if he wanted to find out how much money he had left after 8 weeks?
1) $310 - 8w$
2) $280 + 30(w - 1)$
3) $310w - 30$
4) $280 - 30(w - 1)$

50 Konnor wants to burn 250 Calories while exercising for 45 minutes at the gym. On the treadmill, he can burn 6 Cal/min. On the stationary bike, he can burn 5 Cal/min. If t represents the number of minutes on the treadmill and b represents the number of minutes on the stationary bike, which expression represents the number of Calories that Konnor can burn on the stationary bike?
1) b
2) $5b$
3) $45 - b$
4) $250 - 5b$

A.REI.B.3: SOLVING LINEAR EQUATIONS

51 Which value of x satisfies the equation $\frac{7}{3}\left(x + \frac{9}{28}\right) = 20$?
1) 8.25
2) 8.89
3) 19.25
4) 44.92

52 What is the value of x in the equation $\frac{x-2}{3} + \frac{1}{6} = \frac{5}{6}$?
1) 4
2) 6
3) 8
4) 11

53 An equation is given below.

$$4(x - 7) = 0.3(x + 2) + 2.11$$

The solution to the equation is
1) 8.3
2) 8.7
3) 3
4) -3

54 Which value of x satisfies the equation $\frac{5}{6}\left(\frac{3}{8} - x\right) = 16$?
1) -19.575
2) -18.825
3) -16.3125
4) -15.6875

55 The value of x which makes $\frac{2}{3}\left(\frac{1}{4}x - 2\right) = \frac{1}{5}\left(\frac{4}{3}x - 1\right)$ true is
1) -10
2) -2
3) $-9.\overline{09}$
4) $-11.\overline{3}$

A.CED.A.1-3: MODELING LINEAR EQUATIONS

56 Donna wants to make trail mix made up of almonds, walnuts and raisins. She wants to mix one part almonds, two parts walnuts, and three parts raisins. Almonds cost \$12 per pound, walnuts cost \$9 per pound, and raisins cost \$5 per pound. Donna has \$15 to spend on the trail mix. Determine how many pounds of trail mix she can make. [Only an algebraic solution can receive full credit.]

57 Kendal bought x boxes of cookies to bring to a party. Each box contains 12 cookies. She decides to keep two boxes for herself. She brings 60 cookies to the party. Which equation can be used to find the number of boxes, x, Kendal bought?

1) $2x - 12 = 60$
2) $12x - 2 = 60$
3) $12x - 24 = 60$
4) $24 - 12x = 60$

58 John has four more nickels than dimes in his pocket, for a total of \$1.25. Which equation could be used to determine the number of dimes, x, in his pocket?

1) $0.10(x + 4) + 0.05(x) = \$1.25$
2) $0.05(x + 4) + 0.10(x) = \$1.25$
3) $0.10(4x) + 0.05(x) = \$1.25$
4) $0.05(4x) + 0.10(x) = \$1.25$

59 A gardener is planting two types of trees:

Type *A* is three feet tall and grows at a rate of 15 inches per year.

Type *B* is four feet tall and grows at a rate of 10 inches per year.

Algebraically determine exactly how many years it will take for these trees to be the same height.

60 A parking garage charges a base rate of \$3.50 for up to 2 hours, and an hourly rate for each additional hour. The sign below gives the prices for up to 5 hours of parking.

Parking Rates	
2 hours	\$3.50
3 hours	\$9.00
4 hours	\$14.50
5 hours	\$20.00

Which linear equation can be used to find x, the additional hourly parking rate?

1) $9.00 + 3x = 20.00$
2) $9.00 + 3.50x = 20.00$
3) $2x + 3.50 = 14.50$
4) $2x + 9.00 = 14.50$

61 Sandy programmed a website's checkout process with an equation to calculate the amount customers will be charged when they download songs. The website offers a discount. If one song is bought at the full price of $1.29, then each additional song is $.99. State an equation that represents the cost, C, when s songs are downloaded. Sandy figured she would be charged $52.77 for 52 songs. Is this the correct amount? Justify your answer.

62 A cell phone company charges $60.00 a month for up to 1 gigabyte of data. The cost of additional data is $0.05 per megabyte. If d represents the number of additional megabytes used and c represents the total charges at the end of the month, which linear equation can be used to determine a user's monthly bill?
1) $c = 60 - 0.05d$
2) $c = 60.05d$
3) $c = 60d - 0.05$
4) $c = 60 + 0.05d$

63 A typical cell phone plan has a fixed base fee that includes a certain amount of data and an overage charge for data use beyond the plan. A cell phone plan charges a base fee of $62 and an overage charge of $30 per gigabyte of data that exceed 2 gigabytes. If C represents the cost and g represents the total number of gigabytes of data, which equation could represent this plan when more than 2 gigabytes are used?
1) $C = 30 + 62(2 - g)$
2) $C = 30 + 62(g - 2)$
3) $C = 62 + 30(2 - g)$
4) $C = 62 + 30(g - 2)$

A.CED.A.4: TRANSFORMING FORMULAS

64 The formula for the volume of a cone is $V = \frac{1}{3}\pi r^2 h$. The radius, r, of the cone may be expressed as
1) $\sqrt{\frac{3V}{\pi h}}$
2) $\sqrt{\frac{V}{3\pi h}}$
3) $3\sqrt{\frac{V}{\pi h}}$
4) $\frac{1}{3}\sqrt{\frac{V}{\pi h}}$

65 The formula for the area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Express b_1 in terms of A, h, and b_2. The area of a trapezoid is 60 square feet, its height is 6 ft, and one base is 12 ft. Find the number of feet in the other base.

66 The equation for the volume of a cylinder is $V = \pi r^2 h$. The positive value of r, in terms of h and V, is
1) $r = \sqrt{\frac{V}{\pi h}}$
2) $r = \sqrt{V\pi h}$
3) $r = 2V\pi h$
4) $r = \frac{V}{2\pi}$

67 The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where a is acceleration due to gravity and t is the amount of time the object has fallen. What is t in terms of a and d?

1) $t = \sqrt{\frac{da}{2}}$
2) $t = \sqrt{\frac{2d}{a}}$
3) $t = \left(\frac{da}{d}\right)^2$
4) $t = \left(\frac{2d}{a}\right)^2$

68 The volume of a large can of tuna fish can be calculated using the formula $V = \pi r^2 h$. Write an equation to find the radius, r, in terms of V and h. Determine the diameter, to the *nearest inch*, of a large can of tuna fish that has a volume of 66 cubic inches and a height of 3.3 inches.

69 Michael borrows money from his uncle, who is charging him simple interest using the formula $I = \mathrm{Pr}t$. To figure out what the interest rate, r, is, Michael rearranges the formula to find r. His new formula is r equals

1) $\frac{I-P}{t}$
2) $\frac{P-I}{t}$
3) $\frac{I}{Pt}$
4) $\frac{Pt}{I}$

70 The formula for the sum of the degree measures of the interior angles of a polygon is $S = 180(n-2)$. Solve for n, the number of sides of the polygon, in terms of S.

71 Solve the equation below for x in terms of a.

$$4(ax+3) - 3ax = 25 + 3a$$

72 Boyle's Law involves the pressure and volume of gas in a container. It can be represented by the formula $P_1V_1 = P_2V_2$. When the formula is solved for P_2, the result is

1) $P_1V_1V_2$
2) $\frac{V_2}{P_1V_1}$
3) $\frac{P_1V_1}{V_2}$
4) $\frac{P_1V_2}{V_1}$

73 The formula for blood flow rate is given by $F = \frac{p_1 - p_2}{r}$, where F is the flow rate, p_1 the initial pressure, p_2 the final pressure, and r the resistance created by blood vessel size. Which formula can *not* be derived from the given formula?

1) $p_1 = Fr + p_2$
2) $p_2 = p_1 - Fr$
3) $r = F(p_2 - p_1)$
4) $r = \frac{p_1 - p_2}{F}$

74 Using the formula for the volume of a cone, express r in terms of V, h, and π.

75 The formula $F_g = \frac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

N.Q.A.1: CONVERSIONS

76 Peyton is a sprinter who can run the 40-yard dash in 4.5 seconds. He converts his speed into miles per hour, as shown below.

$$\frac{40\text{ yd}}{4.5\text{ sec}} \cdot \frac{3\text{ ft}}{1\text{ yd}} \cdot \frac{5280\text{ ft}}{1\text{ mi}} \cdot \frac{60\text{ sec}}{1\text{ min}} \cdot \frac{60\text{ min}}{1\text{ hr}}$$

Which ratio is *incorrectly* written to convert his speed?

1) $\frac{3\text{ ft}}{1\text{ yd}}$
2) $\frac{5280\text{ ft}}{1\text{ mi}}$
3) $\frac{60\text{ sec}}{1\text{ min}}$
4) $\frac{60\text{ min}}{1\text{ hr}}$

77 Dan took 12.5 seconds to run the 100-meter dash. He calculated the time to be approximately

1) 0.2083 minute
2) 750 minutes
3) 0.2083 hour
4) 0.52083 hour

78 Faith wants to use the formula $C(f) = \frac{5}{9}(f - 32)$ to convert degrees Fahrenheit, f, to degrees Celsius, $C(f)$. If Faith calculated $C(68)$, what would her result be?

1) 20° Celsius
2) 20° Fahrenheit
3) 154° Celsius
4) 154° Fahrenheit

79 A typical marathon is 26.2 miles. Allan averages 12 kilometers per hour when running in marathons. Determine how long it would take Allan to complete a marathon, to the *nearest tenth of an hour*. Justify your answer.

80 A construction worker needs to move 120 ft^3 of dirt by using a wheelbarrow. One wheelbarrow load holds 8 ft^3 of dirt and each load takes him 10 minutes to complete. One correct way to figure out the number of hours he would need to complete this job is

1) $\frac{120\text{ ft}^3}{1} \bullet \frac{10\text{ min}}{1\text{ load}} \bullet \frac{60\text{ min}}{1\text{ hr}} \bullet \frac{1\text{ load}}{8\text{ ft}^3}$
2) $\frac{120\text{ ft}^3}{1} \bullet \frac{60\text{ min}}{1\text{ hr}} \bullet \frac{8\text{ ft}^3}{10\text{ min}} \bullet \frac{1}{1\text{ load}}$
3) $\frac{120\text{ ft}^3}{1} \bullet \frac{1\text{ load}}{10\text{ min}} \bullet \frac{8\text{ ft}^3}{1\text{ load}} \bullet \frac{1\text{ hr}}{60\text{ min}}$
4) $\frac{120\text{ ft}^3}{1} \bullet \frac{1\text{ load}}{8\text{ ft}^3} \bullet \frac{10\text{ min}}{1\text{ load}} \bullet \frac{1\text{ hr}}{60\text{ min}}$

RATE

N.Q.A.2: USING RATE

81 Patricia is trying to compare the average rainfall of New York to that of Arizona. A comparison between these two states for the months of July through September would be best measured in

1) feet per hour
2) inches per hour
3) inches per month
4) feet per month

82 A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the *nearest jump*, how many jumps it would take this athlete to jump one mile.

83 The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

A.CED.A.2: SPEED

84 An airplane leaves New York City and heads toward Los Angeles. As it climbs, the plane gradually increases its speed until it reaches cruising altitude, at which time it maintains a constant speed for several hours as long as it stays at cruising altitude. After flying for 32 minutes, the plane reaches cruising altitude and has flown 192 miles. After flying for a total of 92 minutes, the plane has flown a total of 762 miles. Determine the speed of the plane, at cruising altitude, in miles per minute. Write an equation to represent the number of miles the plane has flown, y, during x minutes at cruising altitude, only. Assuming that the plane maintains its speed at cruising altitude, determine the total number of miles the plane has flown 2 hours into the flight.

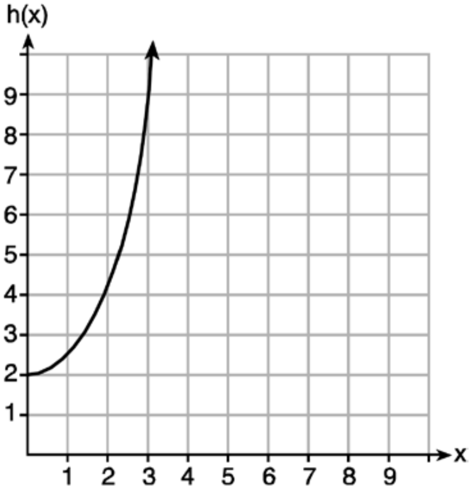
85 Loretta and her family are going on vacation. Their destination is 610 miles from their home. Loretta is going to share some of the driving with her dad. Her average speed while driving is 55 mph and her dad's average speed while driving is 65 mph. The plan is for Loretta to drive for the first 4 hours of the trip and her dad to drive for the remainder of the trip. Determine the number of hours it will take her family to reach their destination. After Loretta has been driving for 2 hours, she gets tired and asks her dad to take over. Determine, to the *nearest tenth of an hour*, how much time the family will save by having Loretta's dad drive for the remainder of the trip.

F.IF.B.6: RATE OF CHANGE

86 Given the functions g(*x*), f(*x*), and h(*x*) shown below:

$$g(x) = x^2 - 2x$$

x	f(x)
0	1
1	2
2	5
3	7



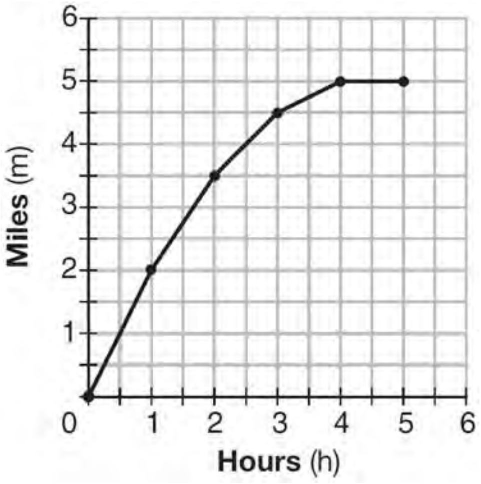
The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \le x \le 3$ is

1) f(*x*), g(*x*), h(*x*)
2) h(*x*), g(*x*), f(*x*)
3) g(*x*), f(*x*), h(*x*)
4) h(*x*), f(*x*), g(*x*)

87 An astronaut drops a rock off the edge of a cliff on the Moon. The distance, $d(t)$, in meters, the rock travels after t seconds can be modeled by the function $d(t) = 0.8t^2$. What is the average speed, in meters per second, of the rock between 5 and 10 seconds after it was dropped?

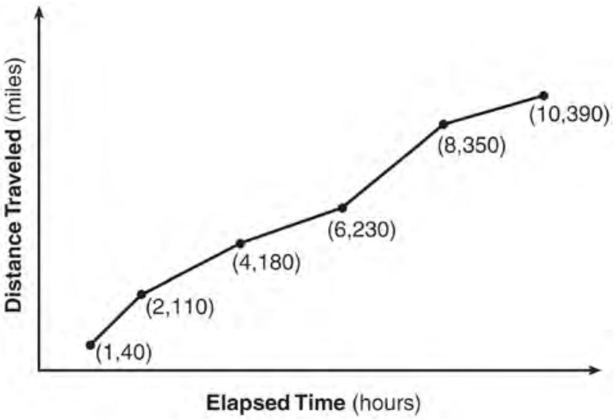
1) 12
2) 20
3) 60
4) 80

88 The graph below shows the distance in miles, m, hiked from a camp in h hours.



Which hourly interval had the greatest rate of change?
1) hour 0 to hour 1
2) hour 1 to hour 2
3) hour 2 to hour 3
4) hour 3 to hour 4

89 The Jamison family kept a log of the distance they traveled during a trip, as represented by the graph below.



During which interval was their average speed the greatest?
1) the first hour to the second hour
2) the second hour to the fourth hour
3) the sixth hour to the eighth hour
4) the eighth hour to the tenth hour

90 The table below shows the average diameter of a pupil in a person's eye as he or she grows older.

Age (years)	**Average Pupil Diameter** (mm)
20	4.7
30	4.3
40	3.9
50	3.5
60	3.1
70	2.7
80	2.3

What is the average rate of change, in millimeters per year, of a person's pupil diameter from age 20 to age 80?
1) 2.4
2) 0.04
3) –2.4
4) –0.04

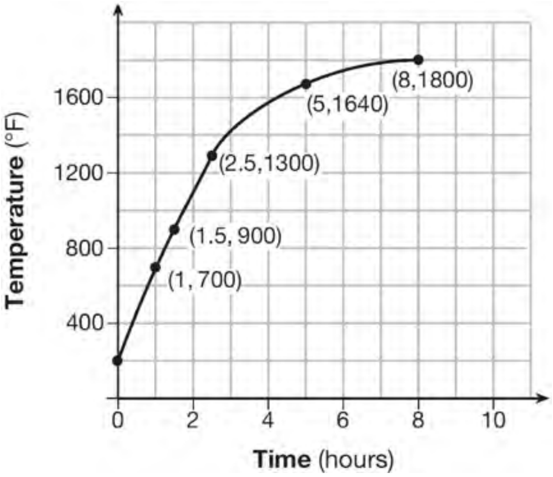
91 Joey enlarged a 3-inch by 5-inch photograph on a copy machine. He enlarged it four times. The table below shows the area of the photograph after each enlargement.

Enlargement	0	1	2	3	4
Area (square inches)	15	18.8	23.4	29.3	36.6

What is the average rate of change of the area from the original photograph to the fourth enlargement, to the *nearest tenth*?

1) 4.3
2) 4.5
3) 5.4
4) 6.0

92 Firing a piece of pottery in a kiln takes place at different temperatures for different amounts of time. The graph below shows the temperatures in a kiln while firing a piece of pottery after the kiln is preheated to 200ºF.



During which time interval did the temperature in the kiln show the greatest average rate of change?

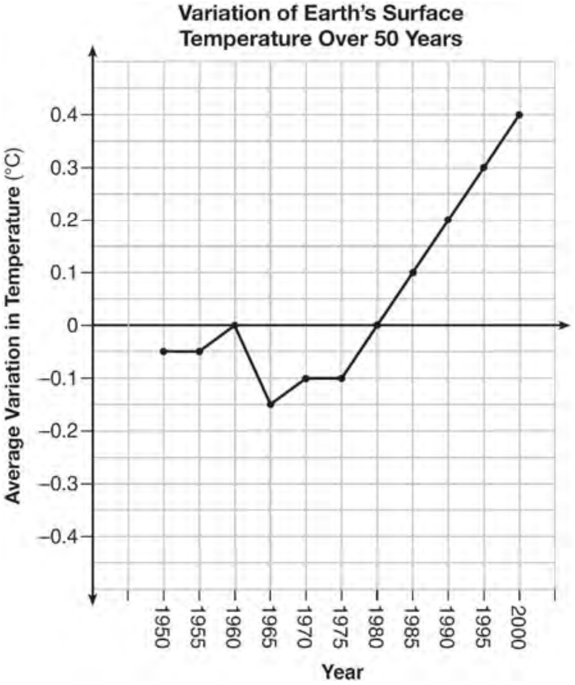
1) 0 to 1 hour
2) 1 hour to 1.5 hours
3) 2.5 hours to 5 hours
4) 5 hours to 8 hours

93 The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?

Year	1898	1971	1985	2006	2012
Cost (¢)	1	6	14	24	35

1) 1898-1971
2) 1971-1985
3) 1985-2006
4) 2006-2012

94 The graph below shows the variation in the average temperature of Earth's surface from 1950-2000, according to one source.



During which years did the temperature variation change the most per unit time? Explain how you determined your answer.

95 The table below shows the year and the number of households in a building that had high-speed broadband internet access.

Number of Households	11	16	23	33	42	47
Year	2002	2003	2004	2005	2006	2007

For which interval of time was the average rate of change the *smallest*?

1) 2002 - 2004
2) 2003 - 2005
3) 2004 - 2006
4) 2005 - 2007

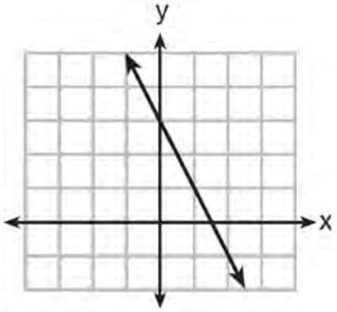
96 Which function has a constant rate of change equal to –3?

1)

x	y
0	2
1	5
2	8
3	11

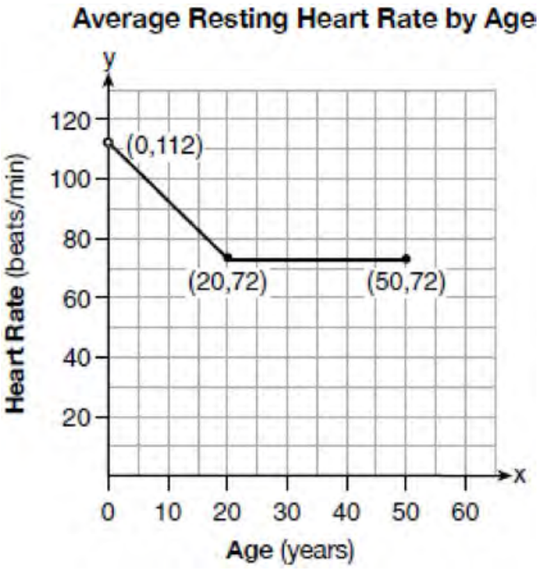
2) $\{(1,5),(2,2),(3,-5),(4,4)\}$

3)



4) $2y = -6x + 10$

97 A graph of average resting heart rates is shown below. The average resting heart rate for adults is 72 beats per minute, but doctors consider resting rates from 60-100 beats per minute within normal range.



Which statement about average resting heart rates is *not* supported by the graph?

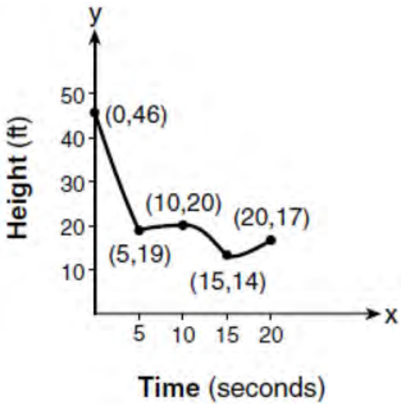
1) A 10-year-old has the same average resting heart rate as a 20-year-old.
2) A 20-year-old has the same average resting heart rate as a 30-year-old.
3) A 40-year-old may have the same average resting heart rate for ten years.
4) The average resting heart rate for teenagers steadily decreases.

98 A family is traveling from their home to a vacation resort hotel. The table below shows their distance from home as a function of time.

Time (hrs)	0	2	5	7
Distance (mi)	0	140	375	480

Determine the average rate of change between hour 2 and hour 7, including units.

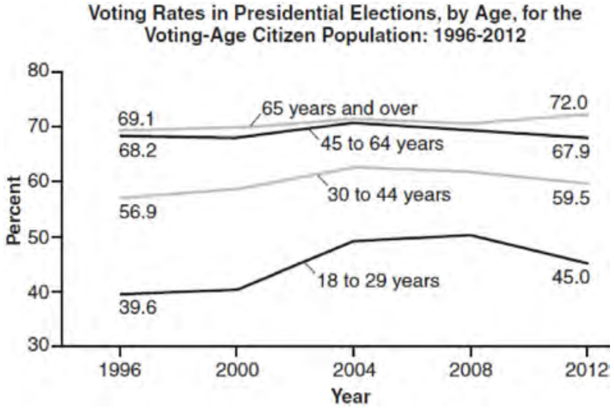
99 The graph below models the height of a remote-control helicopter over 20 seconds during flight.



Over which interval does the helicopter have the *slowest* average rate of change?

1) 0 to 5 seconds
2) 5 to 10 seconds
3) 10 to 15 seconds
4) 15 to 20 seconds

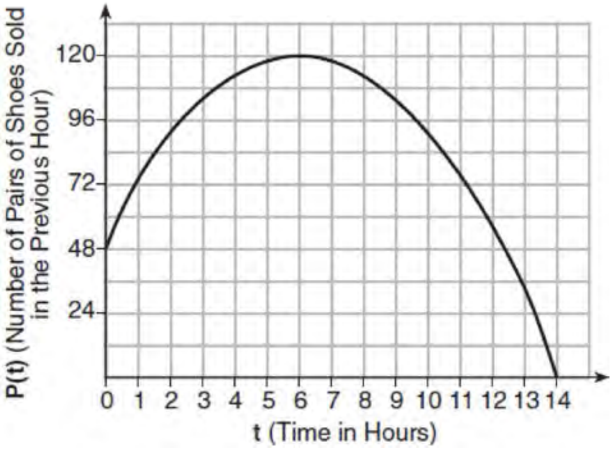
100 Voting rates in presidential elections from 1996-2012 are modeled below.



Which statement does *not* correctly interpret voting rates by age based on the given graph?

1) For citizens 18-29 years of age, the rate of change in voting rate was greatest between years 2000-2004.
2) From 1996-2012, the average rate of change was positive for only two age groups.
3) About 70% of people 45 and older voted in the 2004 election.
4) The voting rates of eligible age groups lies between 35 and 75 percent during presidential elections every 4 years from 1996-2012.

101 A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.



The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect*. State the entire interval for which the number of pairs of shoes sold is increasing. Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

LINEAR EQUATIONS

F.BF.A.1, F.LE.A.2, F.LE.B.5, S.ID.C.7: MODELING LINEAR FUNCTIONS

102 Caitlin has a movie rental card worth \$175. After she rents the first movie, the card's value is \$172.25. After she rents the second movie, its value is \$169.50. After she rents the third movie, the card is worth \$166.75. Assuming the pattern continues, write an equation to define $A(n)$, the amount of money on the rental card after n rentals. Caitlin rents a movie every Friday night. How many weeks in a row can she afford to rent a movie, using her rental card only? Explain how you arrived at your answer.

103 In 2013, the United States Postal Service charged \$0.46 to mail a letter weighing up to 1 oz. and \$0.20 per ounce for each additional ounce. Which function would determine the cost, in dollars, $c(z)$, of mailing a letter weighing z ounces where z is an integer greater than 1?

1) $c(z) = 0.46z + 0.20$
2) $c(z) = 0.20z + 0.46$
3) $c(z) = 0.46(z - 1) + 0.20$
4) $c(z) = 0.20(z - 1) + 0.46$

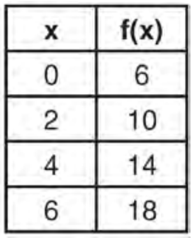
104 Alex is selling tickets to a school play. An adult ticket costs \$6.50 and a student ticket costs \$4.00. Alex sells x adult tickets and 12 student tickets. Write a function, $f(x)$, to represent how much money Alex collected from selling tickets.

105 Jackson is starting an exercise program. The first day he will spend 30 minutes on a treadmill. He will increase his time on the treadmill by 2 minutes each day. Write an equation for $T(d)$, the time, in minutes, on the treadmill on day d. Find $T(6)$, the minutes he will spend on the treadmill on day 6.

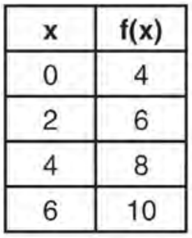
106 Last weekend, Emma sold lemonade at a yard sale. The function $P(c) = .50c - 9.96$ represented the profit, $P(c)$, Emma earned selling c cups of lemonade. Sales were strong, so she raised the price for this weekend by 25 cents per cup. Which function represents her profit for this weekend?

1) $P(c) = .25c - 9.96$
2) $P(c) = .50c - 9.71$
3) $P(c) = .50c - 10.21$
4) $P(c) = .75c - 9.96$

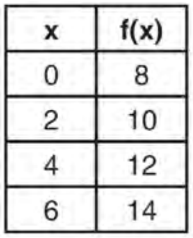
107 Which chart could represent the function $f(x) = -2x + 6$?

1) 

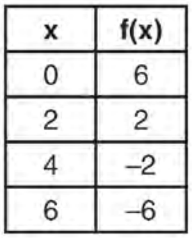
x	f(x)
0	6
2	10
4	14
6	18

2) 

x	f(x)
0	4
2	6
4	8
6	10

3) 

x	f(x)
0	8
2	10
4	12
6	14

4) 

x	f(x)
0	6
2	2
4	–2
6	–6

108 Jim is a furniture salesman. His weekly pay is \$300 plus 3.5% of his total sales for the week. Jim sells x dollars' worth of furniture during the week. Write a function, $p(x)$, which can be used to determine his pay for the week. Use this function to determine Jim's pay to the *nearest cent* for a week when his sales total is \$8250.

109 Each day Toni records the height of a plant for her science lab. Her data are shown in the table below.

Day (n)	1	2	3	4	5
Height (cm)	3.0	4.5	6.0	7.5	9.0

The plant continues to grow at a constant daily rate. Write an equation to represent $h(n)$, the height of the plant on the nth day.

110 Tanya is making homemade greeting cards. The data table below represents the amount she spends in dollars, $f(x)$, in terms of the number of cards she makes, x.

x	**f(x)**
4	7.50
6	9
9	11.25
10	12

Write a linear function, $f(x)$, that represents the data. Explain what the slope and y-intercept of $f(x)$ mean in the given context.

111 A company that manufactures radios first pays a start-up cost, and then spends a certain amount of money to manufacture each radio. If the cost of manufacturing r radios is given by the function $c(r) = 5.25r + 125$, then the value 5.25 best represents

1) the start-up cost
2) the profit earned from the sale of one radio
3) the amount spent to manufacture each radio
4) the average number of radios manufactured

112 A satellite television company charges a one-time installation fee and a monthly service charge. The total cost is modeled by the function $y = 40 + 90x$. Which statement represents the meaning of each part of the function?

1) y is the total cost, x is the number of months of service, \$90 is the installation fee, and \$40 is the service charge per month.
2) y is the total cost, x is the number of months of service, \$40 is the installation fee, and \$90 is the service charge per month.
3) x is the total cost, y is the number of months of service, \$40 is the installation fee, and \$90 is the service charge per month.
4) x is the total cost, y is the number of months of service, \$90 is the installation fee, and \$40 is the service charge per month.

113 The owner of a small computer repair business has one employee, who is paid an hourly rate of \$22. The owner estimates his weekly profit using the function $P(x) = 8600 - 22x$. In this function, x represents the number of

1) computers repaired per week
2) hours worked per week
3) customers served per week
4) days worked per week

114 The cost of airing a commercial on television is modeled by the function $C(n) = 110n + 900$, where n is the number of times the commercial is aired. Based on this model, which statement is true?

1) The commercial costs \$0 to produce and \$110 per airing up to \$900.
2) The commercial costs \$110 to produce and \$900 each time it is aired.
3) The commercial costs \$900 to produce and \$110 each time it is aired.
4) The commercial costs \$1010 to produce and can air an unlimited number of times.

115 The cost of belonging to a gym can be modeled by $C(m) = 50m + 79.50$, where $C(m)$ is the total cost for m months of membership. State the meaning of the slope and y-intercept of this function with respect to the costs associated with the gym membership.

116 A car leaves Albany, NY, and travels west toward Buffalo, NY. The equation $D = 280 - 59t$ can be used to represent the distance, D, from Buffalo after t hours. In this equation, the 59 represents the

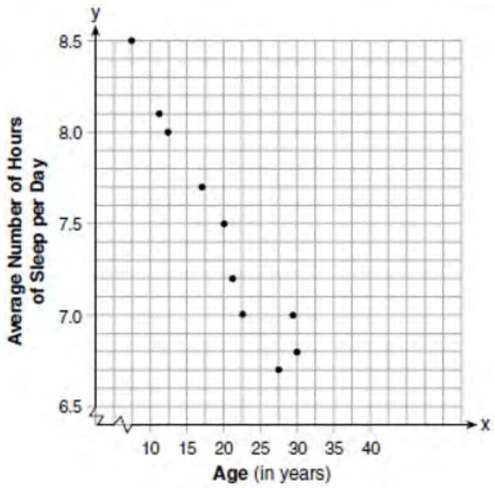
1) car's distance from Albany
2) speed of the car
3) distance between Buffalo and Albany
4) number of hours driving

117 A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by $c(t) = 125t + 95$. Which statements about this function are true?

I. A house call fee costs \$95.
II. The plumber charges \$125 per hour.
III. The number of hours the job takes is represented by t.

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

118 A student plotted the data from a sleep study as shown in the graph below.



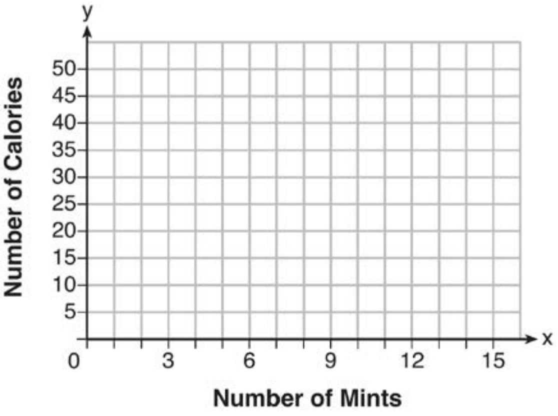
The student used the equation of the line $y = -0.09x + 9.24$ to model the data. What does the rate of change represent in terms of these data?

1) The average number of hours of sleep per day increases 0.09 hour per year of age.
2) The average number of hours of sleep per day decreases 0.09 hour per year of age.
3) The average number of hours of sleep per day increases 9.24 hours per year of age.
4) The average number of hours of sleep per day decreases 9.24 hours per year of age.

119 During a recent snowstorm in Red Hook, NY, Jaime noted that there were 4 inches of snow on the ground at 3:00 p.m., and there were 6 inches of snow on the ground at 7:00 p.m. If she were to graph these data, what does the slope of the line connecting these two points represent in the context of this problem?

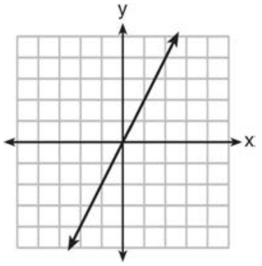
A.CED.A.2, F.IF.B.4: GRAPHING LINEAR FUNCTIONS

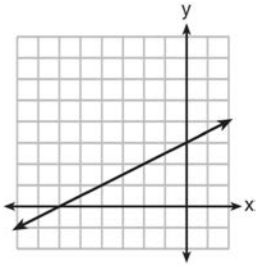
120 Max purchased a box of green tea mints. The nutrition label on the box stated that a serving of three mints contains a total of 10 Calories. On the axes below, graph the function, C, where $C(x)$ represents the number of Calories in x mints.

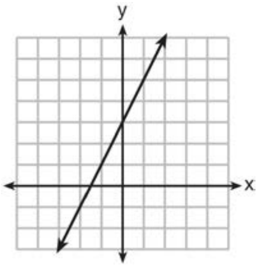


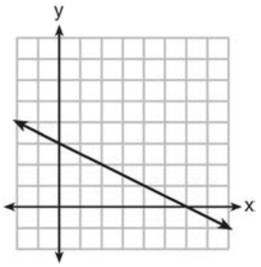
Write an equation that represents $C(x)$. A full box of mints contains 180 Calories. Use the equation to determine the total number of mints in the box.

121 Which graph shows a line where each value of y is three more than half of x?

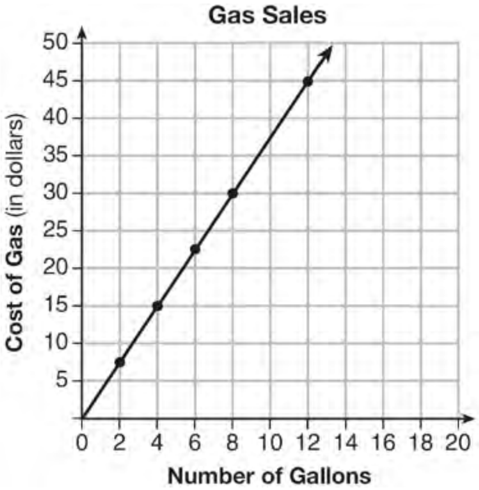
1) 

2) 

3) 

4) 

122 The graph below was created by an employee at a gas station.



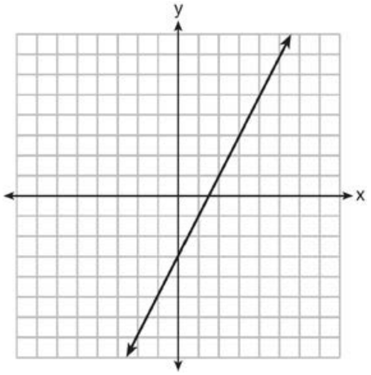
Which statement can be justified by using the graph?

1) If 10 gallons of gas was purchased, \$35 was paid.
2) For every gallon of gas purchased, \$3.75 was paid.
3) For every 2 gallons of gas purchased, \$5.00 was paid.
4) If zero gallons of gas were purchased, zero miles were driven.

123 The value of the x-intercept for the graph of $4x - 5y = 40$ is

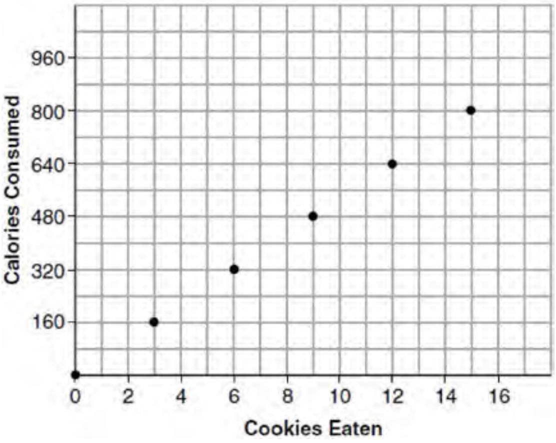
1) 10
2) $\frac{4}{5}$
3) $-\frac{4}{5}$
4) -8

124 Which function has the same y-intercept as the graph below?



1) $y = \frac{12 - 6x}{4}$
2) $27 + 3y = 6x$
3) $6y + x = 18$
4) $y + 3 = 6x$

125 Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph below showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

A.REI.D.10: WRITING LINEAR EQUATIONS

126 The graph of a linear equation contains the points $(3,11)$ and $(-2,1)$. Which point also lies on the graph?
1) $(2,1)$
2) $(2,4)$
3) $(2,6)$
4) $(2,9)$

127 Sue and Kathy were doing their algebra homework. They were asked to write the equation of the line that passes through the points $(-3,4)$ and $(6,1)$. Sue wrote $y-4=-\frac{1}{3}(x+3)$ and Kathy wrote $y=-\frac{1}{3}x+3$. Justify why both students are correct.

128 How many of the equations listed below represent the line passing through the points $(2,3)$ and $(4,-7)$?

$$5x+y=13$$
$$y+7=-5(x-4)$$
$$y=-5x+13$$
$$y-7=5(x-4)$$

1) 1
2) 2
3) 3
4) 4

INEQUALITIES

A.REI.B.3: SOLVING LINEAR INEQUALITIES

129 The inequality $7-\frac{2}{3}x<x-8$ is equivalent to
1) $x>9$
2) $x>-\frac{3}{5}$
3) $x<9$
4) $x<-\frac{3}{5}$

130 Given that $a>b$, solve for x in terms of a and b:

$$b(x-3)\ge ax+7b$$

131 When $3x+2\le 5(x-4)$ is solved for x, the solution is
1) $x\le 3$
2) $x\ge 3$
3) $x\le -11$
4) $x\ge 11$

132 What is the solution to $2h+8>3h-6$
1) $h<14$
2) $h<\frac{14}{5}$
3) $h>14$
4) $h>\frac{14}{5}$

133 Solve the inequality below:

$$1.8-0.4y\ge 2.2-2y$$

134 What is the solution to the inequality $2+\frac{4}{9}x \ge 4+x$?

1) $x \le -\frac{18}{5}$
2) $x \ge -\frac{18}{5}$
3) $x \le \frac{54}{5}$
4) $x \ge \frac{54}{5}$

A.REI.B.3: INTERPRETING SOLUTIONS

135 Given $2x + ax - 7 > -12$, determine the largest integer value of a when $x = -1$.

136 Solve the inequality below to determine and state the smallest possible value for x in the solution set.

$$3(x+3) \le 5x - 3$$

137 Determine the smallest integer that makes $-3x + 7 - 5x < 15$ true.

138 Solve for x algebraically:
$7x - 3(4x - 8) \le 6x + 12 - 9x$
If x is a number in the interval $[4,8]$, state all integers that satisfy the given inequality. Explain how you determined these values.

139 Which value would be a solution for x in the inequality $47 - 4x < 7$?

1) -13
2) -10
3) 10
4) 11

140 Given the set $\{x \mid -2 \le x \le 2, \text{where } x \text{ is an integer}\}$, what is the solution of $-2(x-5) < 10$?

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

A.CED.A.1,3: MODELING LINEAR INEQUALITIES

141 Connor wants to attend the town carnival. The price of admission to the carnival is $4.50, and each ride costs an additional 79 cents. If he can spend at most $16.00 at the carnival, which inequality can be used to solve for r, the number of rides Connor can go on, and what is the maximum number of rides he can go on?

1) $0.79 + 4.50r \le 16.00$; 3 rides
2) $0.79 + 4.50r \le 16.00$; 4 rides
3) $4.50 + 0.79r \le 16.00$; 14 rides
4) $4.50 + 0.79r \le 16.00$; 15 rides

142 Natasha is planning a school celebration and wants to have live music and food for everyone who attends. She has found a band that will charge her \$750 and a caterer who will provide snacks and drinks for \$2.25 per person. If her goal is to keep the average cost per person between \$2.75 and \$3.25, how many people, p, must attend?

1) $225 < p < 325$
2) $325 < p < 750$
3) $500 < p < 1000$
4) $750 < p < 1500$

143 The cost of a pack of chewing gum in a vending machine is \$0.75. The cost of a bottle of juice in the same machine is \$1.25. Julia has \$22.00 to spend on chewing gum and bottles of juice for her team and she must buy seven packs of chewing gum. If b represents the number of bottles of juice, which inequality represents the maximum number of bottles she can buy?

1) $0.75b + 1.25(7) \geq 22$
2) $0.75b + 1.25(7) \leq 22$
3) $0.75(7) + 1.25b \geq 22$
4) $0.75(7) + 1.25b \leq 22$

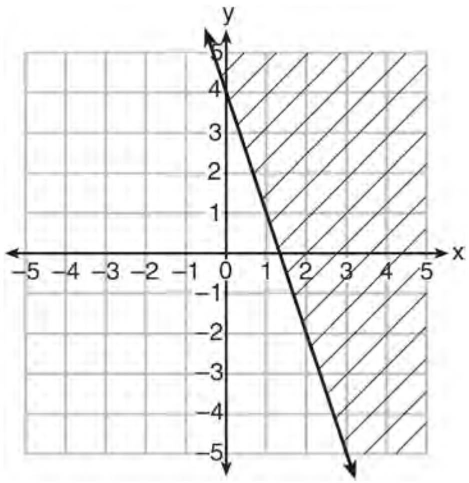
144 The acidity in a swimming pool is considered normal if the average of three pH readings, p, is defined such that $7.0 < p < 7.8$. If the first two readings are 7.2 and 7.6, which value for the third reading will result in an overall rating of normal?

1) 6.2
2) 7.3
3) 8.6
4) 8.8

145 David has two jobs. He earns \$8 per hour babysitting his neighbor's children and he earns \$11 per hour working at the coffee shop. Write an inequality to represent the number of hours, x, babysitting and the number of hours, y, working at the coffee shop that David will need to work to earn a minimum of \$200. David worked 15 hours at the coffee shop. Use the inequality to find the number of full hours he must babysit to reach his goal of \$200.

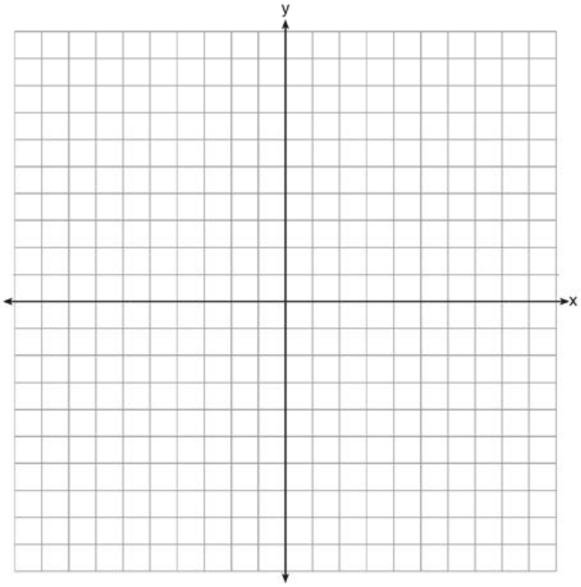
A.REI.D.12: GRAPHING LINEAR INEQUALITIES

146 Which inequality is represented in the graph below?

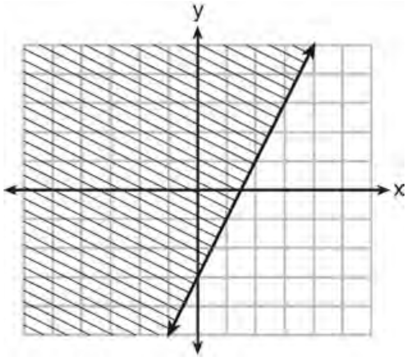


1) $y \geq -3x + 4$
2) $y \leq -3x + 4$
3) $y \geq -4x - 3$
4) $y \leq -4x - 3$

147 On the set of axes below, graph the inequality $2x + y > 1$.

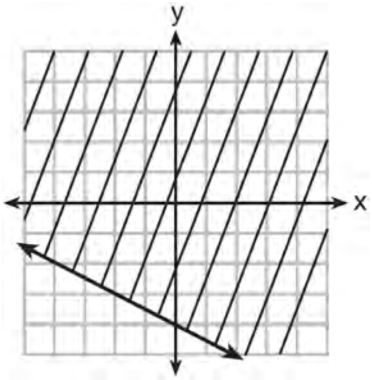


148 Which inequality is represented by the graph below?

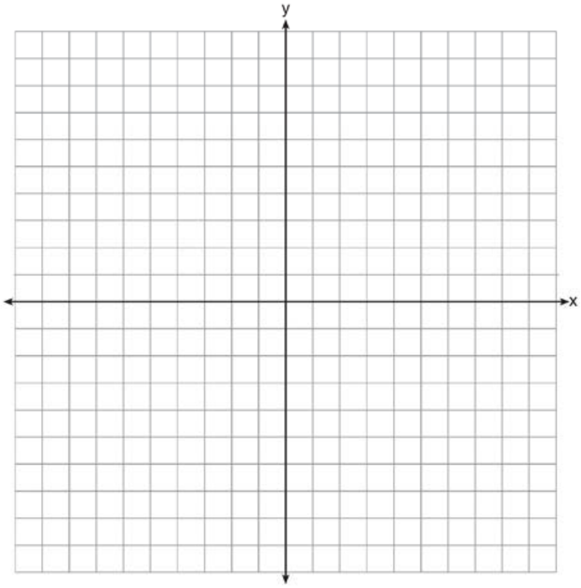


1) $y \le 2x - 3$
2) $y \ge 2x - 3$
3) $y \le -3x + 2$
4) $y \ge -3x + 2$

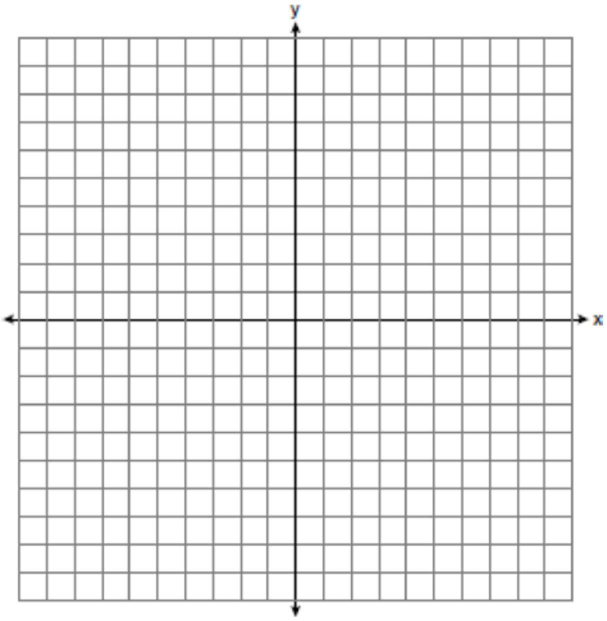
149 Shawn incorrectly graphed the inequality $-x - 2y \ge 8$ as shown below.



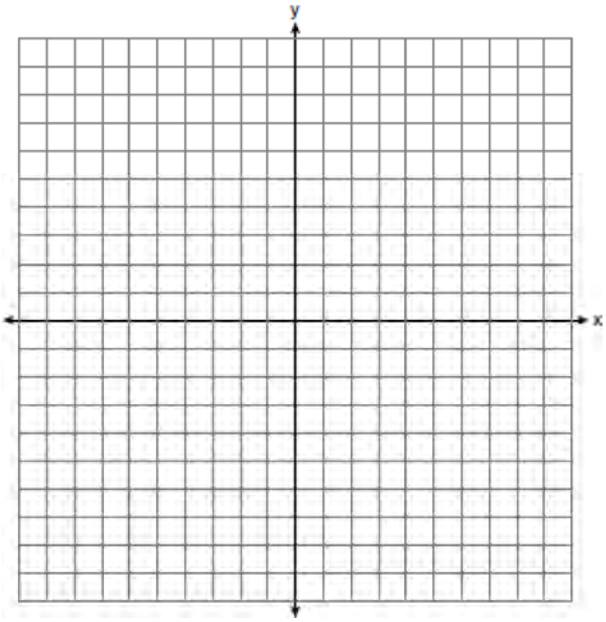
Explain Shawn's mistake. Graph the inequality correctly on the set of axes below.



150 Graph the inequality $y > 2x - 5$ on the set of axes below. State the coordinates of a point in its solution.



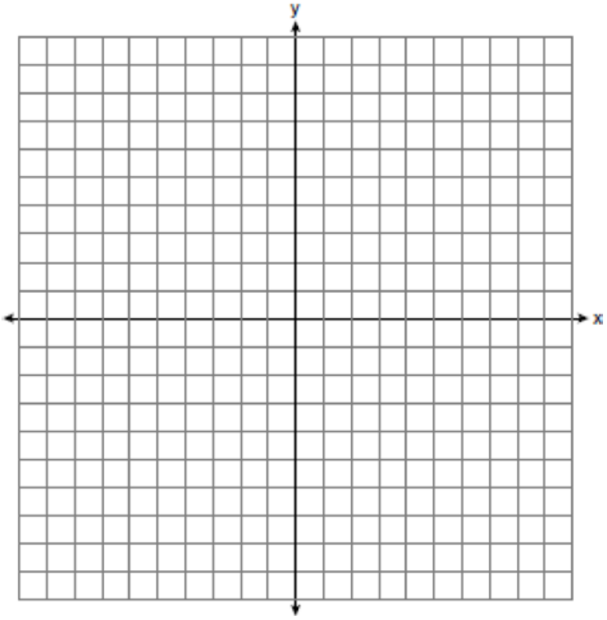
151 Graph the inequality $y + 4 < -2(x - 4)$ on the set of axes below.



ABSOLUTE VALUE

F.IF.C.7, F.BF.B.3: GRAPHING ABSOLUTE VALUE FUNCTIONS

152 On the set of axes below, graph the function $y = |x + 1|$.

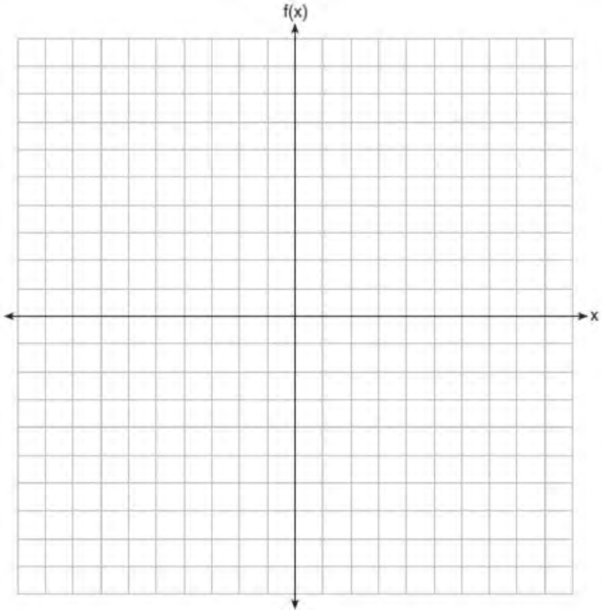


State the range of the function. State the domain over which the function is increasing.

153 What is the *minimum* value of the function $y = |x + 3| - 2$?

1) –2
2) 2
3) 3
4) –3

154 On the set of axes below, graph $f(x) = |x - 3| + 2$.

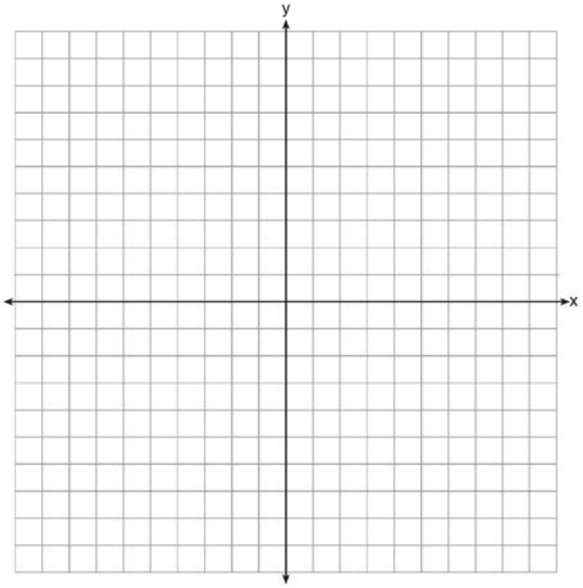


155 Describe the effect that each transformation below has on the function $f(x) = |x|$, where $a > 0$.

$g(x) = |x - a|$

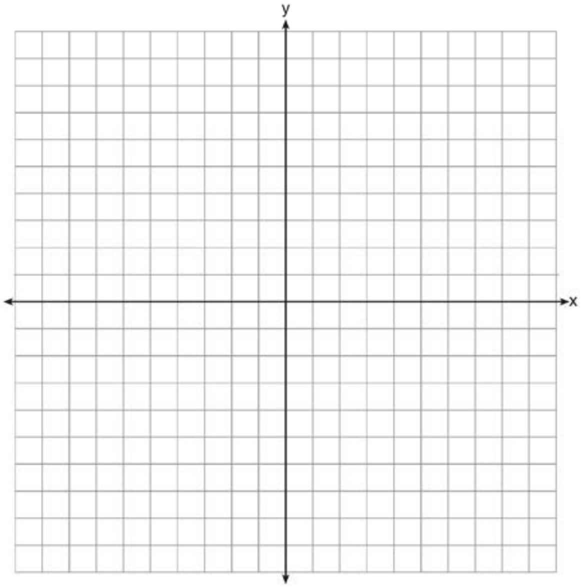
$h(x) = |x| - a$

156 On the axes below, graph $f(x) = |3x|$.



If $g(x) = f(x) - 2$, how is the graph of $f(x)$ translated to form the graph of $g(x)$? If $h(x) = f(x - 4)$, how is the graph of $f(x)$ translated to form the graph of $h(x)$?

157 Graph the function $y = |x - 3|$ on the set of axes below.



Explain how the graph of $y = |x - 3|$ has changed from the related graph $y = |x|$.

QUADRATICS

A.SSE.B.3, A.REI.B.4: SOLVING QUADRATICS

158 Solve $8m^2 + 20m = 12$ for m by factoring.

159 Keith determines the zeros of the function $f(x)$ to be –6 and 5. What could be Keith's function?
1) $f(x) = (x + 5)(x + 6)$
2) $f(x) = (x + 5)(x - 6)$
3) $f(x) = (x - 5)(x + 6)$
4) $f(x) = (x - 5)(x - 6)$

160 In the equation $x^2 + 10x + 24 = (x + a)(x + b)$, b is an integer. Find algebraically *all* possible values of b.

161 Which equation has the same solutions as $2x^2 + x - 3 = 0$

1) $(2x - 1)(x + 3) = 0$
2) $(2x + 1)(x - 3) = 0$
3) $(2x - 3)(x + 1) = 0$
4) $(2x + 3)(x - 1) = 0$

162 The zeros of the function $f(x) = 3x^2 - 3x - 6$ are

1) –1 and –2
2) 1 and –2
3) 1 and 2
4) –1 and 2

163 The zeros of the function $f(x) = 2x^2 - 4x - 6$ are

1) 3 and –1
2) 3 and 1
3) –3 and 1
4) –3 and –1

164 Janice is asked to solve $0 = 64x^2 + 16x - 3$. She begins the problem by writing the following steps:

Line 1 $0 = 64x^2 + 16x - 3$
Line 2 $0 = B^2 + 2B - 3$
Line 3 $0 = (B + 3)(B - 1)$

Use Janice's procedure to solve the equation for x. Explain the method Janice used to solve the quadratic equation.

165 What is the solution set of the equation $(x - 2)(x - a) = 0$?

1) -2 and a
2) -2 and $-a$
3) 2 and a
4) 2 and $-a$

166 The function $r(x)$ is defined by the expression $x^2 + 3x - 18$. Use factoring to determine the zeros of $r(x)$. Explain what the zeros represent on the graph of $r(x)$.

167 If the quadratic formula is used to find the roots of the equation $x^2 - 6x - 19 = 0$, the correct roots are

1) $3 \pm 2\sqrt{7}$
2) $-3 \pm 2\sqrt{7}$
3) $3 \pm 4\sqrt{14}$
4) $-3 \pm 4\sqrt{14}$

168 Which equation has the same solution as $x^2 - 6x - 12 = 0$?

1) $(x + 3)^2 = 21$
2) $(x - 3)^2 = 21$
3) $(x + 3)^2 = 3$
4) $(x - 3)^2 = 3$

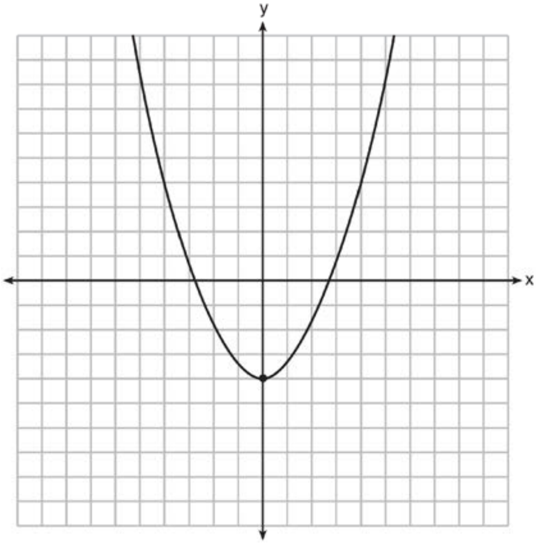
169 What are the roots of the equation $x^2 + 4x - 16 = 0$?

1) $2 \pm 2\sqrt{5}$
2) $-2 \pm 2\sqrt{5}$
3) $2 \pm 4\sqrt{5}$
4) $-2 \pm 4\sqrt{5}$

170 Write an equation that defines $m(x)$ as a trinomial where $m(x) = (3x - 1)(3 - x) + 4x^2 + 19$. Solve for x when $m(x) = 0$.

171 If $4x^2 - 100 = 0$, the roots of the equation are
1) –25 and 25
2) –25, only
3) –5 and 5
4) –5, only

172 Ryker is given the graph of the function $y = \frac{1}{2}x^2 - 4$. He wants to find the zeros of the function, but is unable to read them exactly from the graph.



Find the zeros in simplest radical form.

173 A student was given the equation $x^2 + 6x - 13 = 0$ to solve by completing the square. The first step that was written is shown below.

$$x^2 + 6x = 13$$

The next step in the student's process was $x^2 + 6x + c = 13 + c$. State the value of c that creates a perfect square trinomial. Explain how the value of c is determined.

174 Which equation has the same solutions as $x^2 + 6x - 7 = 0$?
1) $(x + 3)^2 = 2$
2) $(x - 3)^2 = 2$
3) $(x - 3)^2 = 16$
4) $(x + 3)^2 = 16$

175 Solve the equation $4x^2 - 12x = 7$ algebraically for x.

176 When directed to solve a quadratic equation by completing the square, Sam arrived at the equation $\left(x - \frac{5}{2}\right)^2 = \frac{13}{4}$. Which equation could have been the original equation given to Sam?
1) $x^2 + 5x + 7 = 0$
2) $x^2 + 5x + 3 = 0$
3) $x^2 - 5x + 7 = 0$
4) $x^2 - 5x + 3 = 0$

177 A student is asked to solve the equation $4(3x-1)^2 - 17 = 83$. The student's solution to the problem starts as $4(3x-1)^2 = 100$

$$(3x-1)^2 = 25$$

A correct next step in the solution of the problem is
1) $3x-1 = \pm 5$
2) $3x-1 = \pm 25$
3) $9x^2 - 1 = 25$
4) $9x^2 - 6x + 1 = 5$

178 What are the solutions to the equation $x^2 - 8x = 24$?
1) $x = 4 \pm 2\sqrt{10}$
2) $x = -4 \pm 2\sqrt{10}$
3) $x = 4 \pm 2\sqrt{2}$
4) $x = -4 \pm 2\sqrt{2}$

179 The solution of the equation $(x+3)^2 = 7$ is
1) $3 \pm \sqrt{7}$
2) $7 \pm \sqrt{3}$
3) $-3 \pm \sqrt{7}$
4) $-7 \pm \sqrt{3}$

180 When solving the equation $x^2 - 8x - 7 = 0$ by completing the square, which equation is a step in the process?
1) $(x-4)^2 = 9$
2) $(x-4)^2 = 23$
3) $(x-8)^2 = 9$
4) $(x-8)^2 = 23$

181 Solve the equation for y: $(y-3)^2 = 4y - 12$

182 Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.
a) State two different methods Fred could use to solve the equation $f(x) = 0$.
b) Using one of the methods stated in part *a*, solve $f(x) = 0$ for x, to the *nearest tenth*.

183 What is the solution of the equation $2(x+2)^2 - 4 = 28$?
1) 6, only
2) 2, only
3) 2 and –6
4) 6 and –2

184 Amy solved the equation $2x^2 + 5x - 42 = 0$. She stated that the solutions to the equation were $\frac{7}{2}$ and -6. Do you agree with Amy's solutions? Explain why or why not.

185 The height, H, in feet, of an object dropped from the top of a building after t seconds is given by $H(t) = -16t^2 + 144$. How many feet did the object fall between one and two seconds after it was dropped? Determine, algebraically, how many seconds it will take for the object to reach the ground.

186 What are the solutions to the equation $3x^2 + 10x = 8$?

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

187 Find the zeros of $f(x) = (x-3)^2 - 49$, algebraically.

188 Which value of x is a solution to the equation $13 - 36x^2 = -12$?

1) $\frac{36}{25}$
2) $\frac{25}{36}$
3) $-\frac{6}{5}$
4) $-\frac{5}{6}$

189 The method of completing the square was used to solve the equation $2x^2 - 12x + 6 = 0$. Which equation is a correct step when using this method?

1) $(x-3)^2 = 6$
2) $(x-3)^2 = -6$
3) $(x-3)^2 = 3$
4) $(x-3)^2 = -3$

190 What are the solutions to the equation $x^2 - 8x = 10$?

1) $4 \pm \sqrt{10}$
2) $4 \pm \sqrt{26}$
3) $-4 \pm \sqrt{10}$
4) $-4 \pm \sqrt{26}$

191 Solve the equation $x^2 - 6x = 15$ by completing the square.

192 What are the solutions to the equation $3(x-4)^2 = 27$?

1) 1 and 7
2) -1 and -7
3) $4 \pm \sqrt{24}$
4) $-4 \pm \sqrt{24}$

A.REI.B.4: USING THE DISCRIMINANT

193 How many real solutions does the equation $x^2 - 2x + 5 = 0$ have? Justify your answer.

A.CED.A.1: MODELING QUADRATICS

194 Sam and Jeremy have ages that are consecutive odd integers. The product of their ages is 783. Which equation could be used to find Jeremy's age, j, if he is the younger man?

1) $j^2 + 2 = 783$
2) $j^2 - 2 = 783$
3) $j^2 + 2j = 783$
4) $j^2 - 2j = 783$

195 Abigail's and Gina's ages are consecutive integers. Abigail is younger than Gina and Gina's age is represented by x. If the difference of the square of Gina's age and eight times Abigail's age is 17, which equation could be used to find Gina's age?

1) $(x+1)^2 - 8x = 17$
2) $(x-1)^2 - 8x = 17$
3) $x^2 - 8(x+1) = 17$
4) $x^2 - 8(x-1) = 17$

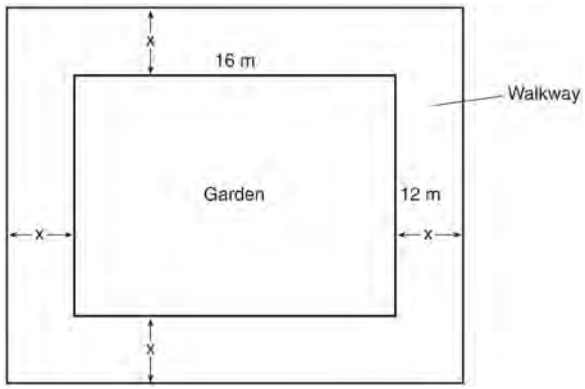
A.CED.A.1: GEOMETRIC APPLICATIONS OF QUADRATICS

196 The length of the shortest side of a right triangle is 8 inches. The lengths of the other two sides are represented by consecutive odd integers. Which equation could be used to find the lengths of the other sides of the triangle?

1) $8^2 + (x+1) = x^2$
2) $x^2 + 8^2 = (x+1)^2$
3) $8^2 + (x+2) = x^2$
4) $x^2 + 8^2 = (x+2)^2$

197 New Clarendon Park is undergoing renovations to its gardens. One garden that was originally a square is being adjusted so that one side is doubled in length, while the other side is decreased by three meters. The new rectangular garden will have an area that is 25% more than the original square garden. Write an equation that could be used to determine the length of a side of the original square garden. Explain how your equation models the situation. Determine the area, in square meters, of the new rectangular garden.

198 A rectangular garden measuring 12 meters by 16 meters is to have a walkway installed around it with a width of x meters, as shown in the diagram below. Together, the walkway and the garden have an area of 396 square meters.



Write an equation that can be used to find x, the width of the walkway. Describe how your equation models the situation. Determine and state the width of the walkway, in meters.

199 A school is building a rectangular soccer field that has an area of 6000 square yards. The soccer field must be 40 yards longer than its width. Determine algebraically the dimensions of the soccer field, in yards.

200 A landscaper is creating a rectangular flower bed such that the width is half of the length. The area of the flower bed is 34 square feet. Write and solve an equation to determine the width of the flower bed, to the *nearest tenth of a foot*.

201 A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up a maximum area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width. Write an equation or inequality that could be used to determine the maximum width of the pieces of wood for the frame Simon could create. Explain how your equation or inequality models the situation. Solve the equation or inequality to determine the maximum width of the pieces of wood used for the frame to the *nearest tenth of an inch*.

202 Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths, x. Which equation could be used to determine x?

1) $(10+x)(12+x)=120$
2) $(10+x)(12+x)=180$
3) $(15+x)(18+x)=180$
4) $(15)(18)=120+x^2$

203 A contractor has 48 meters of fencing that he is going to use as the perimeter of a rectangular garden. The length of one side of the garden is represented by x, and the area of the garden is 108 square meters. Determine, algebraically, the dimensions of the garden in meters.

F.IF.C.8: VERTEX FORM OF A QUADRATIC

204 a) Given the function $f(x)=-x^2+8x+9$, state whether the vertex represents a maximum or minimum point for the function. Explain your answer.
b) Rewrite *f(x)* in vertex form by completing the square.

205 If Lylah completes the square for $f(x)=x^2-12x+7$ in order to find the minimum, she must write $f(x)$ in the general form $f(x)=(x-a)^2+b$. What is the value of a for $f(x)$?

1) 6
2) –6
3) 12
4) –12

206 In the function $f(x)=(x-2)^2+4$, the minimum value occurs when x is

1) –2
2) 2
3) –4
4) 4

207 Which equation is equivalent to $y-34=x(x-12)$?

1) $y=(x-17)(x+2)$
2) $y=(x-17)(x-2)$
3) $y=(x-6)^2+2$
4) $y=(x-6)^2-2$

208 Which equation and ordered pair represent the correct vertex form and vertex for $j(x) = x^2 - 12x + 7$?
1) $j(x) = (x - 6)^2 + 43,\ (6, 43)$
2) $j(x) = (x - 6)^2 + 43,\ (-6, 43)$
3) $j(x) = (x - 6)^2 - 29,\ (6, -29)$
4) $j(x) = (x - 6)^2 - 29,\ (-6, -29)$

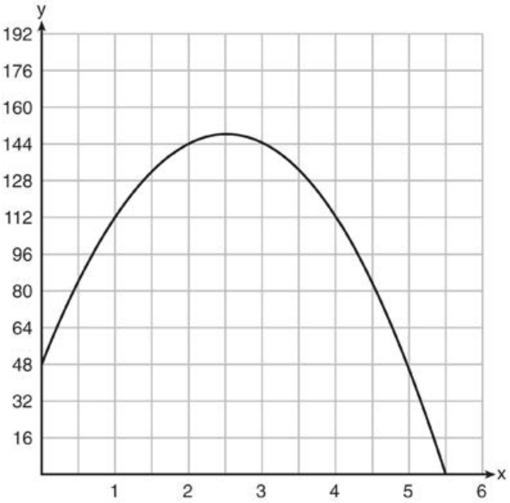
209 The function $f(x) = 3x^2 + 12x + 11$ can be written in vertex form as
1) $f(x) = (3x + 6)^2 - 25$
2) $f(x) = 3(x + 6)^2 - 25$
3) $f(x) = 3(x + 2)^2 - 1$
4) $f(x) = 3(x + 2)^2 + 7$

F.IF.B.4, F.IF.C.7: GRAPHING QUADRATIC FUNCTIONS

210 Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer. State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

211 A toy rocket is launched from the ground straight upward. The height of the rocket above the ground, in feet, is given by the equation $h(t) = -16t^2 + 64t$, where t is the time in seconds. Determine the domain for this function in the given context. Explain your reasoning.

212 A ball is thrown into the air from the edge of a 48-foot-high cliff so that it eventually lands on the ground. The graph below shows the height, y, of the ball from the ground after x seconds.



For which interval is the ball's height always *decreasing*?
1) $0 \le x \le 2.5$
2) $0 < x < 5.5$
3) $2.5 < x < 5.5$
4) $x \ge 2$

213 Morgan throws a ball up into the air. The height of the ball above the ground, in feet, is modeled by the function $h(t) = -16t^2 + 24t$, where t represents the time, in seconds, since the ball was thrown. What is the appropriate domain for this situation?
1) $0 \le t \le 1.5$
2) $0 \le t \le 9$
3) $0 \le h(t) \le 1.5$
4) $0 \le h(t) \le 9$

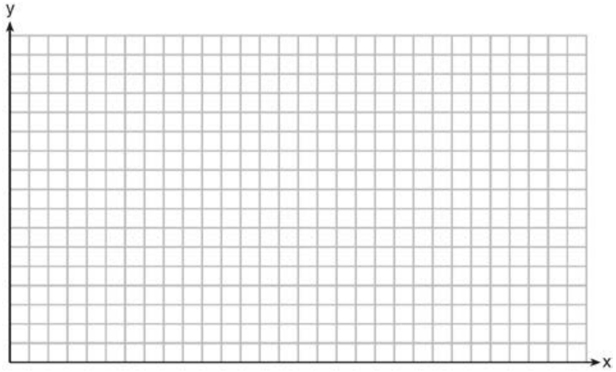
214 The height of a rocket, at selected times, is shown in the table below.

Time (sec)	0	1	2	3	4	5	6	7
Height (ft)	180	260	308	324	308	260	180	68

Based on these data, which statement is *not* a valid conclusion?

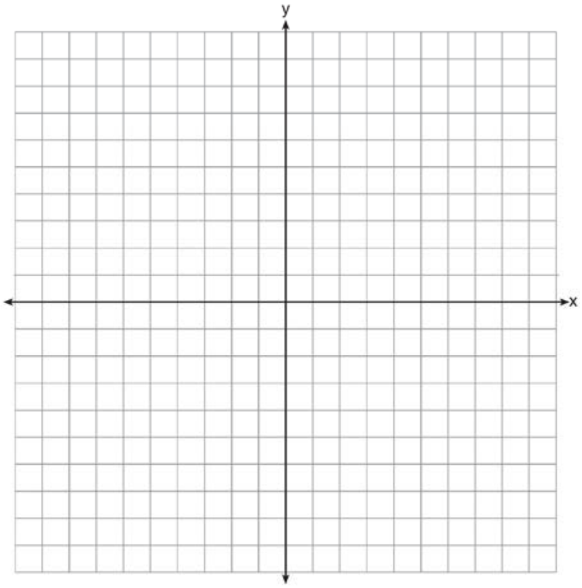
1) The rocket was launched from a height of 180 feet.
2) The maximum height of the rocket occurred 3 seconds after launch.
3) The rocket was in the air approximately 6 seconds before hitting the ground.
4) The rocket was above 300 feet for approximately 2 seconds.

215 A football player attempts to kick a football over a goal post. The path of the football can be modeled by the function $h(x) = -\frac{1}{225}x^2 + \frac{2}{3}x$, where x is the horizontal distance from the kick, and $h(x)$ is the height of the football above the ground, when both are measured in feet. On the set of axes below, graph the function $y = h(x)$ over the interval $0 \le x \le 150$.



Determine the vertex of $y = h(x)$. Interpret the meaning of this vertex in the context of the problem. The goal post is 10 feet high and 45 yards away from the kick. Will the ball be high enough to pass over the goal post? Justify your answer.

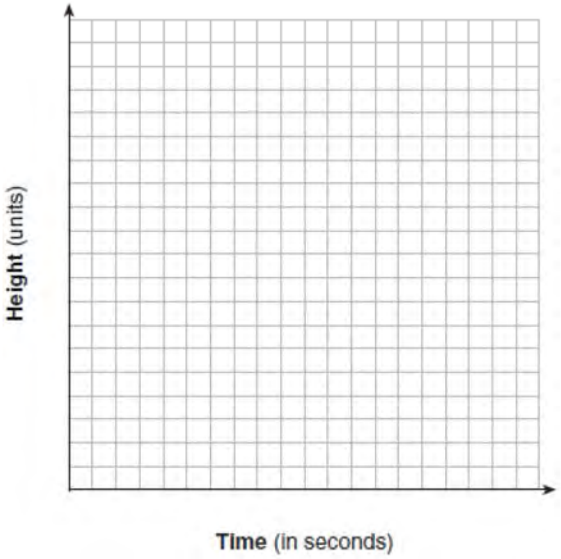
216 On the set of axes below, draw the graph of $y = x^2 - 4x - 1$.



State the equation of the axis of symmetry.

217 If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

218 Alex launched a ball into the air. The height of the ball can be represented by the equation $h = -8t^2 + 40t + 5$, where h is the height, in units, and t is the time, in seconds, after the ball was launched. Graph the equation from $t = 0$ to $t = 5$ seconds.



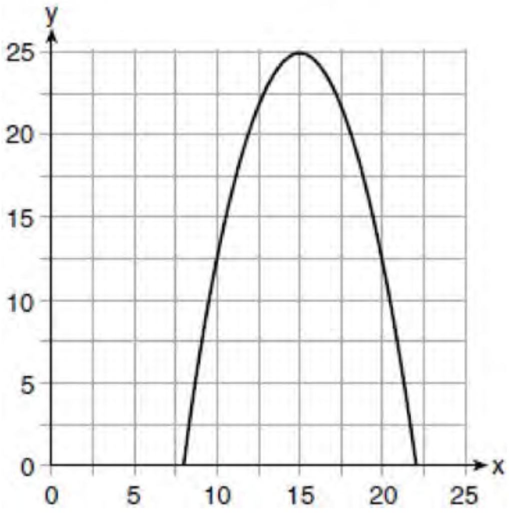
State the coordinates of the vertex and explain its meaning in the context of the problem.

219 An Air Force pilot is flying at a cruising altitude of 9000 feet and is forced to eject from her aircraft. The function $h(t) = -16t^2 + 128t + 9000$ models the height, in feet, of the pilot above the ground, where t is the time, in seconds, after she is ejected from the aircraft. Determine and state the vertex of $h(t)$. Explain what the second coordinate of the vertex represents in the context of the problem. After the pilot was ejected, what is the maximum number of feet she was above the aircraft's cruising altitude? Justify your answer.

220 The expression $-4.9t^2 + 50t + 2$ represents the height, in meters, of a toy rocket t seconds after launch. The initial height of the rocket, in meters, is

1) 0
2) 2
3) 4.9
4) 50

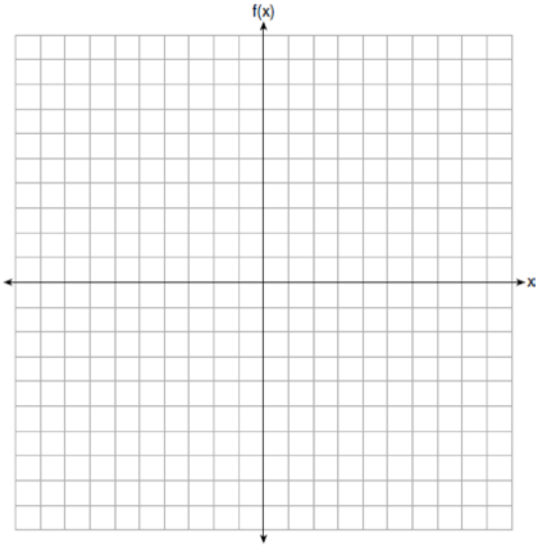
221 The graph of a quadratic function is shown below.



An equation that represents the function could be

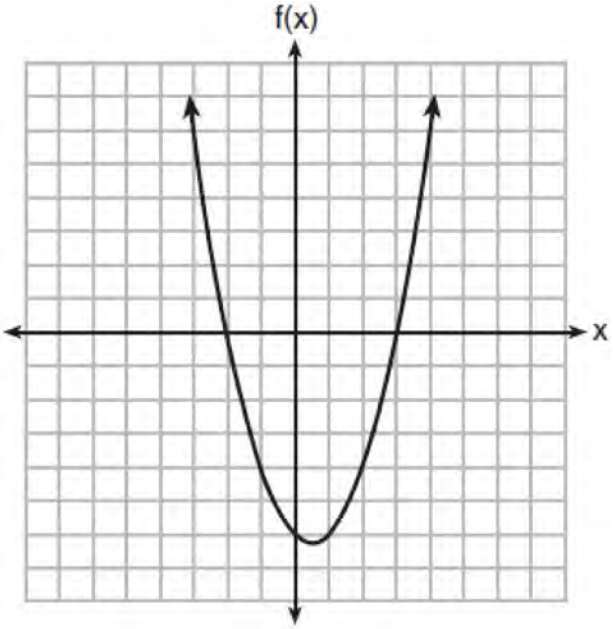
1) $q(x) = \frac{1}{2}(x + 15)^2 - 25$
2) $q(x) = -\frac{1}{2}(x + 15)^2 - 25$
3) $q(x) = \frac{1}{2}(x - 15)^2 + 25$
4) $q(x) = -\frac{1}{2}(x - 15)^2 + 25$

222 Graph the function $f(x) = -x^2 - 6x$ on the set of axes below.



State the coordinates of the vertex of the graph.

223 The graph of the function $f(x) = ax^2 + bx + c$ is given below.



Could the factors of $f(x)$ be $(x+2)$ and $(x-3)$? Based on the graph, explain why or why *not*.

SYSTEMS

A.REI.C.5-6: SOLVING LINEAR SYSTEMS

224 Albert says that the two systems of equations shown below have the same solutions.

First System	**Second System**
$8x + 9y = 48$	$8x + 9y = 48$
$12x + 5y = 21$	$-8.5y = -51$

Determine and state whether you agree with Albert. Justify your answer.

225 Which system of equations has the same solution as the system below?

$$2x+2y=16$$
$$3x-y=4$$

1) $2x+2y=16$
$6x-2y=4$
2) $2x+2y=16$
$6x-2y=8$
3) $x+y=16$
$3x-y=4$
4) $6x+6y=48$
$6x+2y=8$

226 Which pair of equations could *not* be used to solve the following equations for x and y?

$$4x+2y=22$$
$$-2x+2y=-8$$

1) $4x+2y=22$
$2x-2y=8$
2) $4x+2y=22$
$-4x+4y=-16$
3) $12x+6y=66$
$6x-6y=24$
4) $8x+4y=44$
$-8x+8y=-8$

227 A system of equations is given below.

$$x+2y=5$$
$$2x+y=4$$

Which system of equations does *not* have the same solution?

1) $3x+6y=15$
$2x+y=4$
2) $4x+8y=20$
$2x+y=4$
3) $x+2y=5$
$6x+3y=12$
4) $x+2y=5$
$4x+2y=12$

228 A system of equations is shown below.

Equation A: $5x+9y=12$
Equation B: $4x-3y=8$

Which method eliminates one of the variables?

1) Multiply equation A by $-\frac{1}{3}$ and add the result to equation B.
2) Multiply equation B by 3 and add the result to equation A.
3) Multiply equation A by 2 and equation B by –6 and add the results together.
4) Multiply equation B by 5 and equation A by 4 and add the results together.

229 Which system of equations does *not* have the same solution as the system below?

$$4x + 3y = 10$$
$$-6x - 5y = -16$$

1) $-12x - 9y = -30$
   $12x + 10y = 32$
2) $20x + 15y = 50$
   $-18x - 15y = -48$
3) $24x + 18y = 60$
   $-24x - 20y = -64$
4) $40x + 30y = 100$
   $36x + 30y = -96$

230 Guy and Jim work at a furniture store. Guy is paid \$185 per week plus 3% of his total sales in dollars, x, which can be represented by $g(x) = 185 + 0.03x$. Jim is paid \$275 per week plus 2.5% of his total sales in dollars, x, which can be represented by $f(x) = 275 + 0.025x$. Determine the value of x, in dollars, that will make their weekly pay the same.

231 In attempting to solve the system of equations $y = 3x - 2$ and $6x - 2y = 4$, John graphed the two equations on his graphing calculator. Because he saw only one line, John wrote that the answer to the system is the empty set. Is he correct? Explain your answer.

232 What is the solution to the system of equations below?

$$y = 2x + 8$$
$$3(-2x + y) = 12$$

1) no solution
2) infinite solutions
3) $(-1,6)$
4) $\left(\frac{1}{2},9\right)$

233 The line represented by the equation $4y + 2x = 33.6$ shares a solution point with the line represented by the table below.

x	**y**
–5	3.2
–2	3.8
2	4.6
4	5
11	6.4

The solution for this system is

1) $(-14.0,-1.4)$
2) $(-6.8,5.0)$
3) $(1.9,4.6)$
4) $(6.0,5.4)$

A.CED.A.3: MODELING LINEAR SYSTEMS

234 An animal shelter spends \$2.35 per day to care for each cat and \$5.50 per day to care for each dog. Pat noticed that the shelter spent \$89.50 caring for cats and dogs on Wednesday. Write an equation to represent the possible numbers of cats and dogs that could have been at the shelter on Wednesday. Pat said that there might have been 8 cats and 14 dogs at the shelter on Wednesday. Are Pat's numbers possible? Use your equation to justify your answer. Later, Pat found a record showing that there were a total of 22 cats and dogs at the shelter on Wednesday. How many cats were at the shelter on Wednesday?

235 During the 2010 season, football player McGee's earnings, *m*, were 0.005 million dollars more than those of his teammate Fitzpatrick's earnings, *f*. The two players earned a total of 3.95 million dollars. Which system of equations could be used to determine the amount each player earned, in millions of dollars?

1) $m+f=3.95$
   $m+0.005=f$
2) $m-3.95=f$
   $f+0.005=m$
3) $f-3.95=m$
   $m+0.005=f$
4) $m+f=3.95$
   $f+0.005=m$

236 Jacob and Zachary go to the movie theater and purchase refreshments for their friends. Jacob spends a total of \$18.25 on two bags of popcorn and three drinks. Zachary spends a total of \$27.50 for four bags of popcorn and two drinks. Write a system of equations that can be used to find the price of one bag of popcorn and the price of one drink. Using these equations, determine and state the price of a bag of popcorn and the price of a drink, to the *nearest cent.*

237 Mo's farm stand sold a total of 165 pounds of apples and peaches. She sold apples for \$1.75 per pound and peaches for \$2.50 per pound. If she made \$337.50, how many pounds of peaches did she sell?

1) 11
2) 18
3) 65
4) 100

238 At Bea's Pet Shop, the number of dogs, *d*, is initially five less than twice the number of cats, *c*. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$. Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop. Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning. Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

239 Last week, a candle store received \$355.60 for selling 20 candles. Small candles sell for \$10.98 and large candles sell for \$27.98. How many large candles did the store sell?

1) 6
2) 8
3) 10
4) 12

240 The Celluloid Cinema sold 150 tickets to a movie. Some of these were child tickets and the rest were adult tickets. A child ticket cost \$7.75 and an adult ticket cost \$10.25. If the cinema sold \$1470 worth of tickets, which system of equations could be used to determine how many adult tickets, *a*, and how many child tickets, *c*, were sold?

1) $a + c = 150$
   $10.25a + 7.75c = 1470$
2) $a + c = 1470$
   $10.25a + 7.75c = 150$
3) $a + c = 150$
   $7.75a + 10.25c = 1470$
4) $a + c = 1470$
   $7.75a + 10.25c = 150$

241 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent \$19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent \$15.76. Write a system of equations to represent the costs of a juice box, *j*, and a bottle of water, *w*. Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible. Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

242 Alicia purchased *H* half-gallons of ice cream for \$3.50 each and *P* packages of ice cream cones for \$2.50 each. She purchased 14 items and spent \$43. Which system of equations could be used to determine how many of each item Alicia purchased?

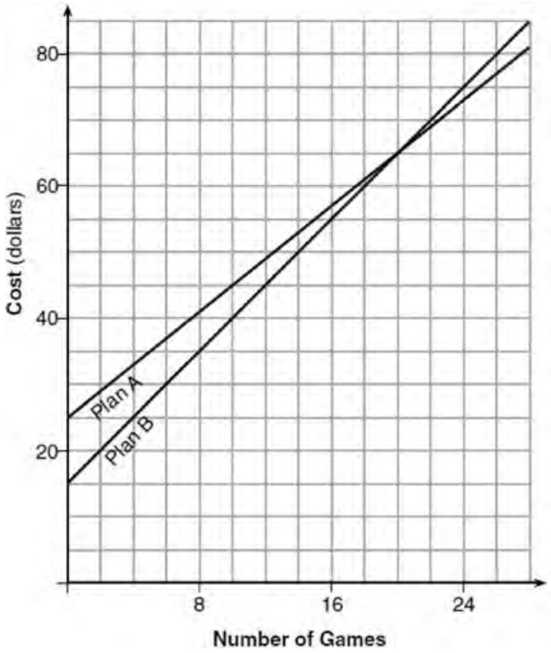
1) $3.50H + 2.50P = 43$
   $H + P = 14$
2) $3.50P + 2.50H = 43$
   $P + H = 14$
3) $3.50H + 2.50P = 14$
   $H + P = 43$
4) $3.50P + 2.50H = 14$
   $P + H = 43$

243 Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled \$15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled \$45.90. Write and solve a system of equations to determine the price of one plain pizza. [Only an algebraic solution can receive full credit.]

244 Ian is borrowing \$1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of \$60 per month. Ken is borrowing \$600 from his parents to purchase a snowboard. He plans to pay his parents back at the rate of \$20 per month. Write an equation that can be used to determine after how many months the boys will owe the same amount. Determine algebraically and state in how many months the two boys will owe the same amount. State the amount they will owe at this time. Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount. Determine and state if Ian is correct. Explain your reasoning.

Algebra I Regents Exam Questions by Common Core State Standard: Topic

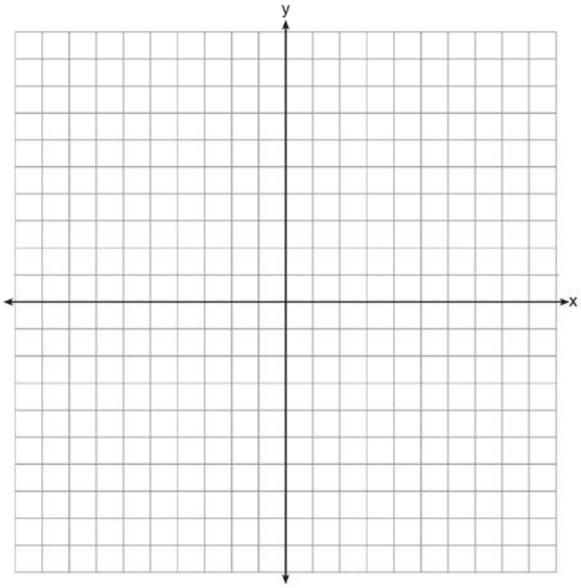
245 The graph below models the cost of renting video games with a membership in Plan *A* and Plan *B*.



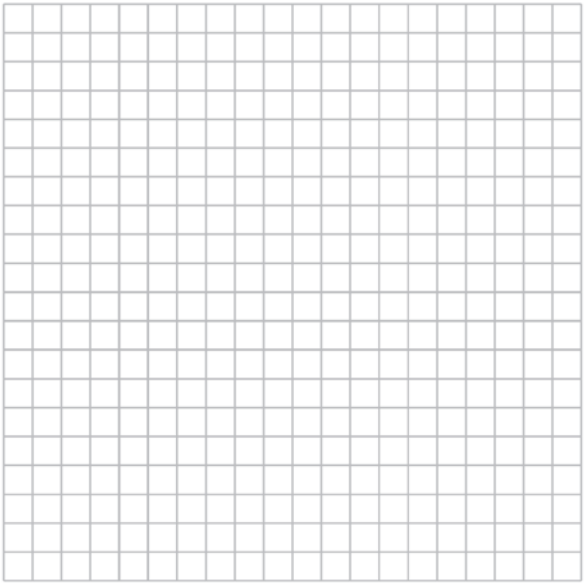
Explain why Plan *B* is the better choice for Dylan if he only has $50 to spend on video games, including a membership fee. Bobby wants to spend $65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

A.REI.C.6: GRAPHING LINEAR SYSTEMS

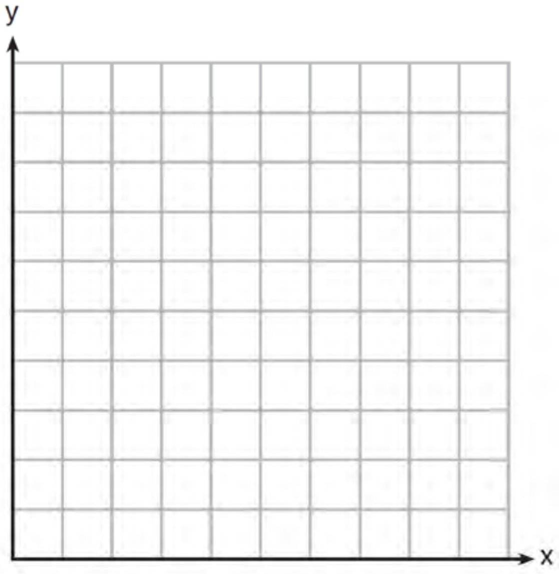
246 Next weekend Marnie wants to attend either carnival *A* or carnival *B*. Carnival *A* charges $6 for admission and an additional $1.50 per ride. Carnival *B* charges $2.50 for admission and an additional $2 per ride.
a) In function notation, write $A(x)$ to represent the total cost of attending carnival *A* and going on *x* rides. In function notation, write $B(x)$ to represent the total cost of attending carnival *B* and going on *x* rides.
b) Determine the number of rides Marnie can go on such that the total cost of attending each carnival is the same. [Use of the set of axes below is optional.]
c) Marnie wants to go on five rides. Determine which carnival would have the lower total cost. Justify your answer.



247 A local business was looking to hire a landscaper to work on their property. They narrowed their choices to two companies. Flourish Landscaping Company charges a flat rate of \$120 per hour. Green Thumb Landscapers charges \$70 per hour plus a \$1600 equipment fee. Write a system of equations representing how much each company charges. Determine and state the number of hours that must be worked for the cost of each company to be the same. [The use of the grid below is optional.] If it is estimated to take at least 35 hours to complete the job, which company will be less expensive? Justify your answer.

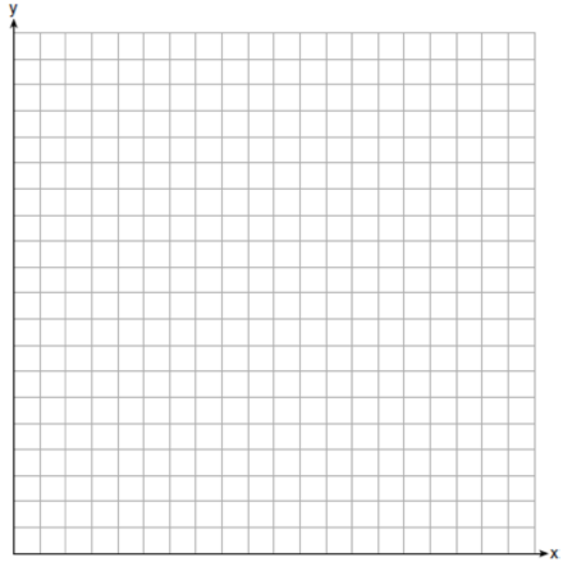


248 Franco and Caryl went to a bakery to buy desserts. Franco bought 3 packages of cupcakes and 2 packages of brownies for \$19. Caryl bought 2 packages of cupcakes and 4 packages of brownies for \$24. Let *x* equal the price of one package of cupcakes and *y* equal the price of one package of brownies. Write a system of equations that describes the given situation. On the set of axes below, graph the system of equations.



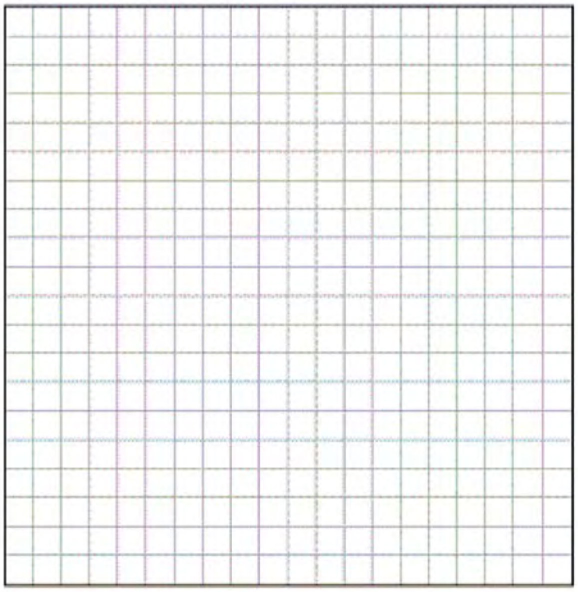
Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution.

249 Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year. Write a system of equations to model this situation, where *x* represents the number of years since 2010. Graph this system of equations on the set of axes below.



Explain in detail what each coordinate of the point of intersection of these equations means in the context of this problem.

250 Zeke and six of his friends are going to a baseball game. Their combined money totals $28.50. At the game, hot dogs cost $1.25 each, hamburgers cost $2.50 each, and sodas cost $0.50 each. Each person buys one soda. They spend all $28.50 on food and soda. Write an equation that can determine the number of hot dogs, *x*, and hamburgers, *y*, Zeke and his friends can buy. Graph your equation on the grid below.



Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all $28.50. Explain your answer.

251 Rowan has \$50 in a savings jar and is putting in \$5 every week. Jonah has \$10 in his own jar and is putting in \$15 every week. Each of them plots his progress on a graph with time on the horizontal axis and amount in the jar on the vertical axis. Which statement about their graphs is true?

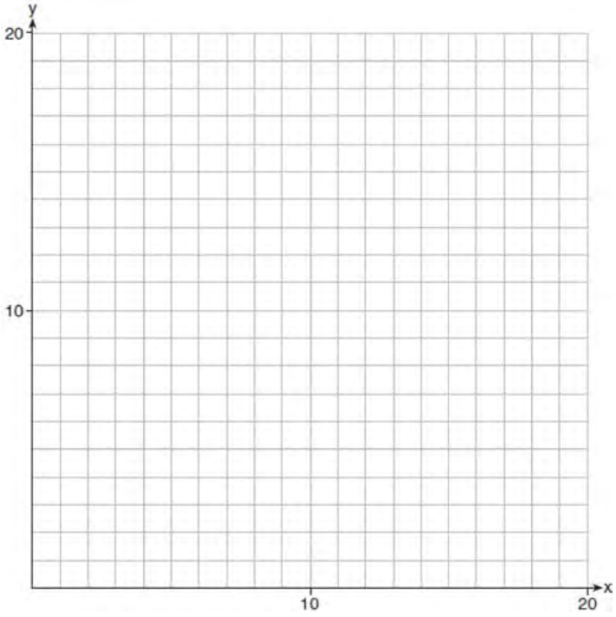
1) Rowan's graph has a steeper slope than Jonah's.
2) Rowan's graph always lies above Jonah's.
3) Jonah's graph has a steeper slope than Rowan's.
4) Jonah's graph always lies above Rowan's.

A.CED.A.3: MODELING SYSTEMS OF LINEAR INEQUALITIES

252 A high school drama club is putting on their annual theater production. There is a maximum of 800 tickets for the show. The costs of the tickets are \$6 before the day of the show and \$9 on the day of the show. To meet the expenses of the show, the club must sell at least \$5,000 worth of tickets.
a) Write a system of inequalities that represent this situation.
b) The club sells 440 tickets before the day of the show. Is it possible to sell enough additional tickets on the day of the show to at least meet the expenses of the show? Justify your answer.

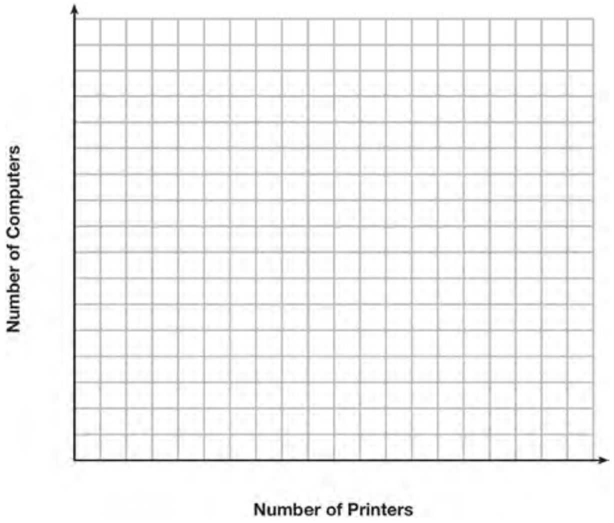
253 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost \$12 at the door and \$8.50 if purchased in advance. The drama club has a goal of selling at least \$1000 worth of tickets to Saturday's show. Write a system of inequalities that can be used to model this scenario. If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

254 Edith babysits for x hours a week after school at a job that pays \$4 an hour. She has accepted a job that pays \$8 an hour as a library assistant working y hours a week. She will work both jobs. She is able to work *no more than* 15 hours a week, due to school commitments. Edith wants to earn *at least* \$80 a week, working a combination of both jobs. Write a system of inequalities that can be used to represent the situation. Graph these inequalities on the set of axes below.



Determine and state one combination of hours that will allow Edith to earn *at least* \$80 per week while working *no more than* 15 hours.

255 An on-line electronics store must sell at least \$2500 worth of printers and computers per day. Each printer costs \$50 and each computer costs \$500. The store can ship a maximum of 15 items per day. On the set of axes below, graph a system of inequalities that models these constraints.



Determine a combination of printers and computers that would allow the electronics store to meet all of the constraints. Explain how you obtained your answer.

256 The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for \$2 each and bottles of water sell for \$1.50 each. The club needs to raise at least \$500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles. Write a system of inequalities that can be used to represent this situation. The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

257 Jordan works for a landscape company during his summer vacation. He is paid \$12 per hour for mowing lawns and \$14 per hour for planting gardens. He can work a maximum of 40 hours per week, and would like to earn at least \$250 this week. If *m* represents the number of hours mowing lawns and *g* represents the number of hours planting gardens, which system of inequalities could be used to represent the given conditions?

1) $m+g\le 40$
$12m+14g\ge 250$

2) $m+g\ge 40$
$12m+14g\le 250$

3) $m+g\le 40$
$12m+14g\le 250$

4) $m+g\ge 40$
$12m+14g\ge 250$

A.REI.D.12: GRAPHING SYSTEMS OF LINEAR INEQUALITIES

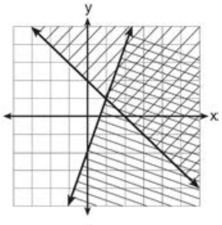
258 Which ordered pair is *not* in the solution set of $y>-\frac{1}{2}x+5$ and $y\le 3x-2$?

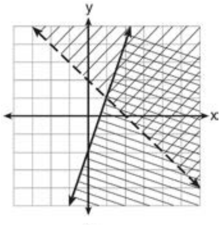
1) $(5,3)$
2) $(4,3)$
3) $(3,4)$
4) $(4,4)$

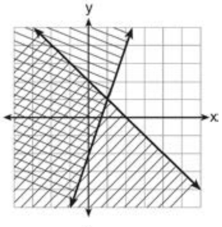
259 Given: $y + x > 2$

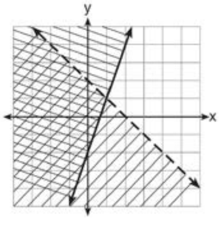
$y \le 3x - 2$

Which graph shows the solution of the given set of inequalities?

1) 

2) 

3) 

4) 

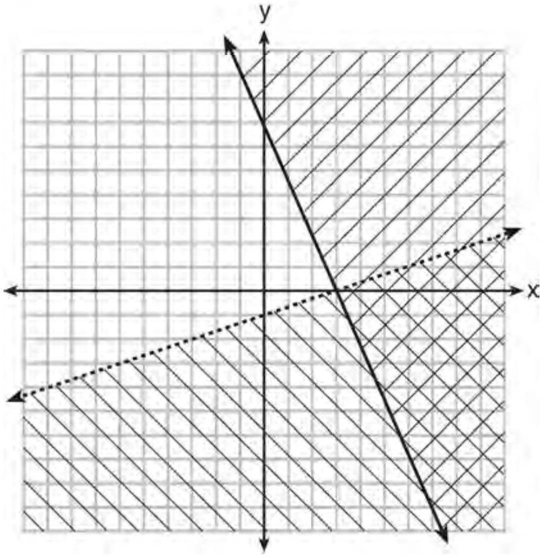
260 Which point is a solution to the system below?

$$2y < -12x + 4$$

$$y < -6x + 4$$

1) $\left(1, \frac{1}{2}\right)$
2) $(0,6)$
3) $\left(-\frac{1}{2}, 5\right)$
4) $(-3,2)$

261 What is one point that lies in the solution set of the system of inequalities graphed below?

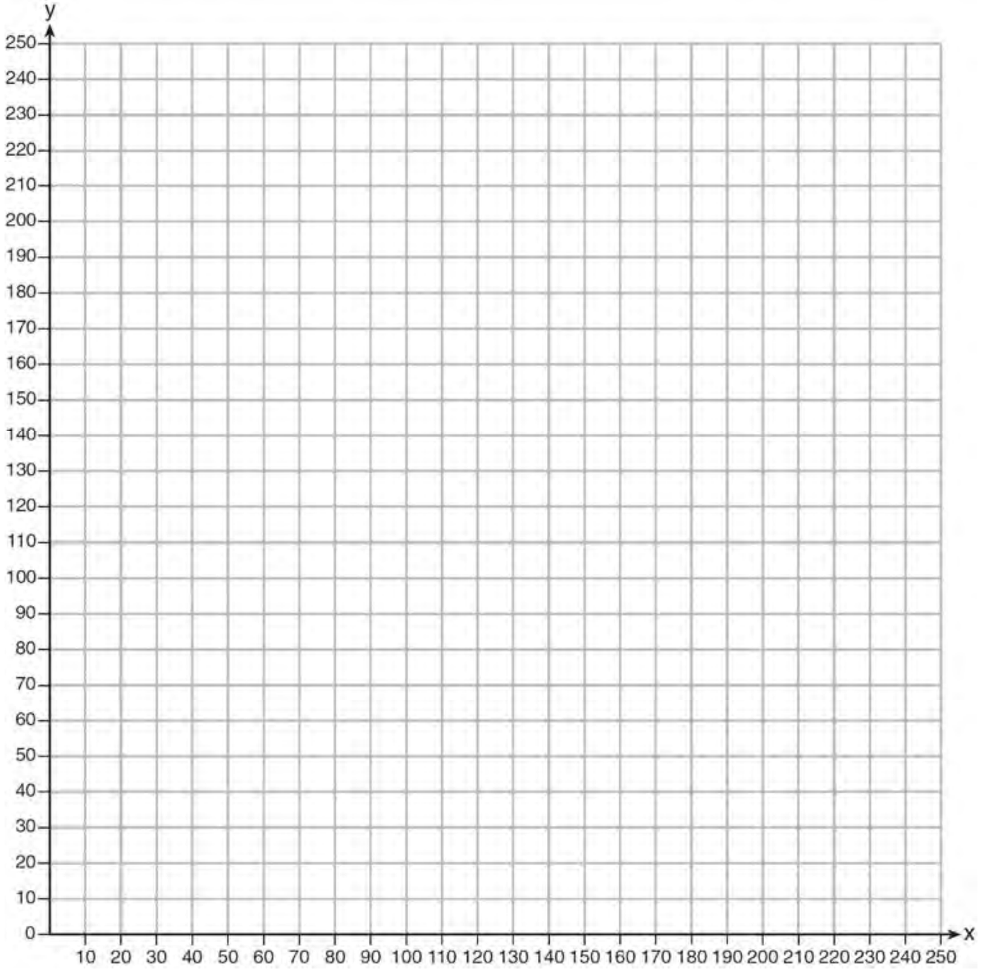


1) $(7,0)$
2) $(3,0)$
3) $(0,7)$
4) $(-3,5)$

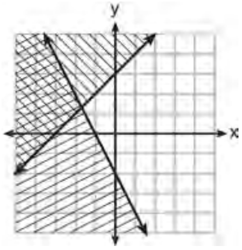
262 First consider the system of equations $y = -\frac{1}{2}x + 1$ and $y = x - 5$. Then consider the system of inequalities $y > -\frac{1}{2}x + 1$ and $y < x - 5$. When comparing the number of solutions in each of these systems, which statement is true?

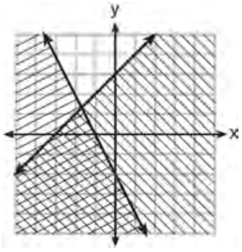
1) Both systems have an infinite number of solutions.
2) The system of equations has more solutions.
3) The system of inequalities has more solutions.
4) Both systems have only one solution.

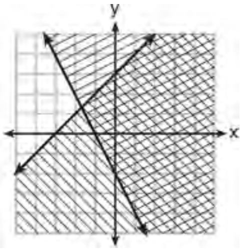
263 The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater. Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal. Graph the solution to this system of inequalities on the set of axes below. Label the solution with an S. Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

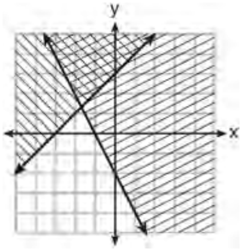


264 Which graph represents the solution of $y \le x + 3$ and $y \ge -2x - 2$?

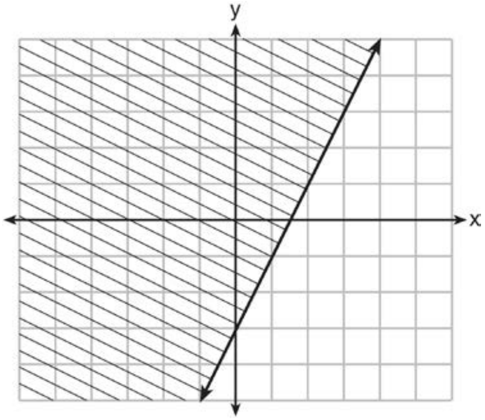
1) 

2) 

3) 

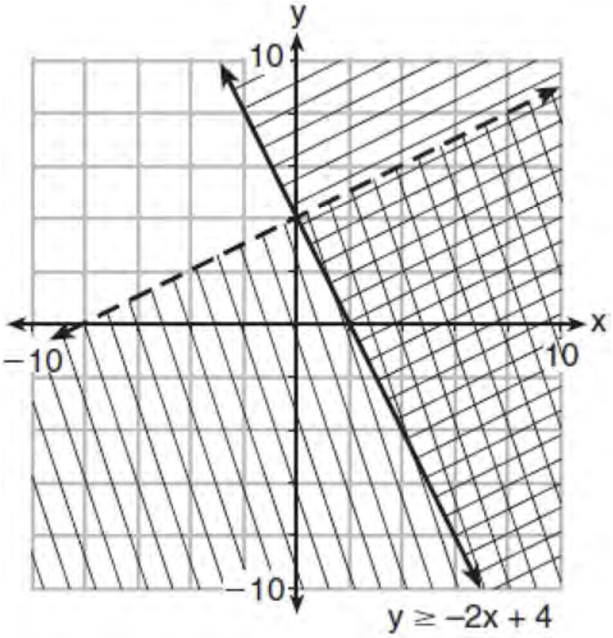
4) 

265 The graph of an inequality is shown below.

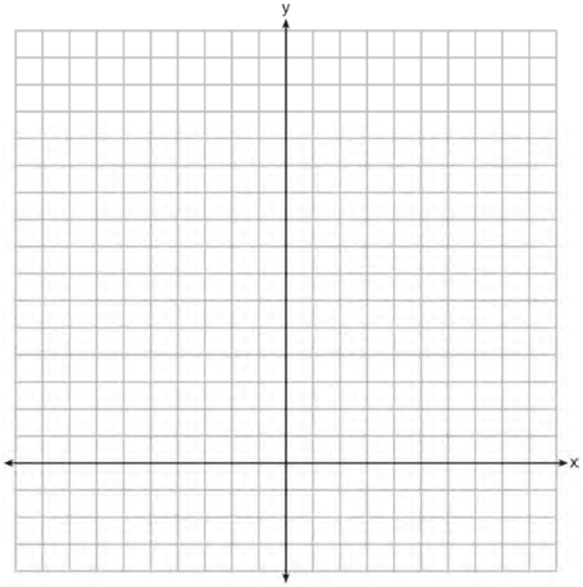


a) Write the inequality represented by the graph.
b) On the same set of axes, graph the inequality $x + 2y < 4$.
c) The two inequalities graphed on the set of axes form a system. Oscar thinks that the point $(2, 1)$ is in the solution set for this system of inequalities. Determine and state whether you agree with Oscar. Explain your reasoning.

266 Determine if the point (0,4) is a solution to the system of inequalities graphed below. Justify your answer.



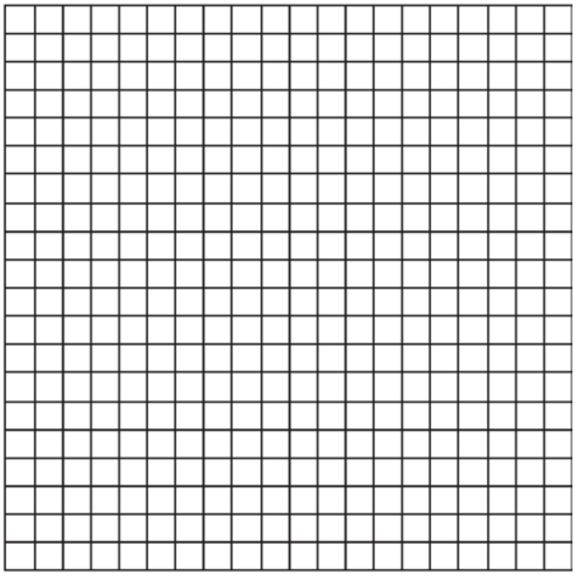
267 The sum of two numbers, *x* and *y*, is more than 8. When you double *x* and add it to *y*, the sum is less than 14. Graph the inequalities that represent this scenario on the set of axes below.



Kai says that the point (6,2) is a solution to this system. Determine if he is correct and explain your reasoning.

268 Solve the following system of inequalities graphically on the grid below and label the solution *S*.

$$3x + 4y > 20$$
$$x < 3y - 18$$



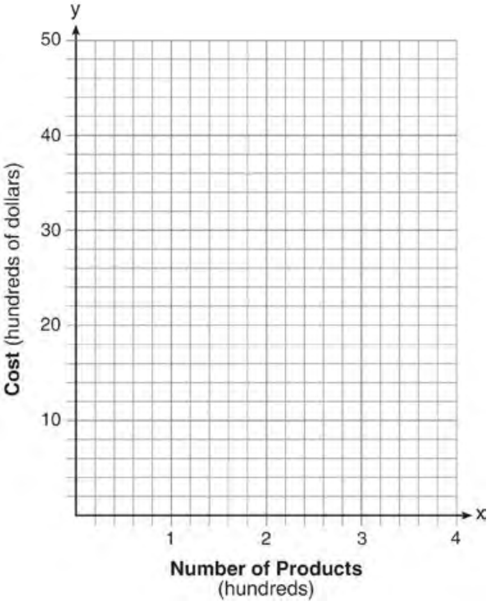
Is the point $(3,7)$ in the solution set? Explain your answer.

A.REI.C.7, A.REI.D.11: QUADRATIC-LINEAR SYSTEMS

269 The graphs of $y = x^2 - 3$ and $y = 3x - 4$ intersect at approximately

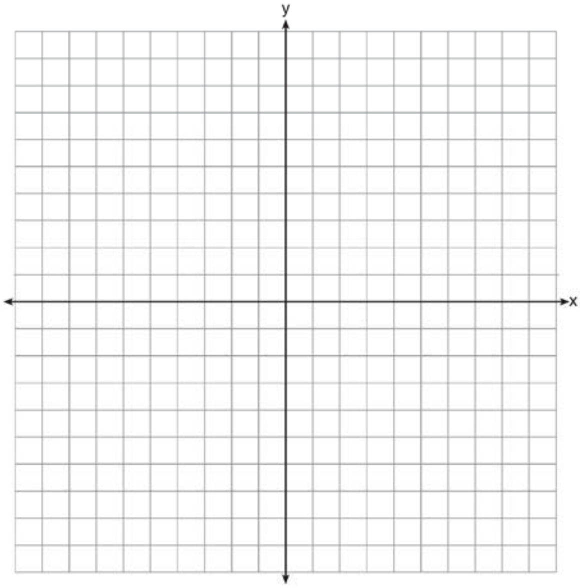
1) $(0.38,-2.85)$, only
2) $(2.62,3.85)$, only
3) $(0.38,-2.85)$ and $(2.62,3.85)$
4) $(0.38,-2.85)$ and $(3.85,2.62)$

270 A company is considering building a manufacturing plant. They determine the weekly production cost at site *A* to be $A(x) = 3x^2$ while the production cost at site *B* is $B(x) = 8x + 3$, where x represents the number of products, *in hundreds*, and $A(x)$ and $B(x)$ are the production costs, *in hundreds of dollars*. Graph the production cost functions on the set of axes below and label them site *A* and site *B*.



State the positive value(s) of x for which the production costs at the two sites are equal. Explain how you determined your answer. If the company plans on manufacturing 200 products per week, which site should they use? Justify your answer.

271 Let $f(x) = -2x^2$ and $g(x) = 2x - 4$. On the set of axes below, draw the graphs of $y = f(x)$ and $y = g(x)$.



Using this graph, determine and state *all* values of x for which $f(x) = g(x)$.

272 John and Sarah are each saving money for a car. The total amount of money John will save is given by the function $f(x) = 60 + 5x$. The total amount of money Sarah will save is given by the function $g(x) = x^2 + 46$. After how many weeks, x, will they have the same amount of money saved? Explain how you arrived at your answer.

273 If $f(x) = x^2 - 2x - 8$ and $g(x) = \frac{1}{4}x - 1$, for which value of x is $f(x) = g(x)$?

1) -1.75 and -1.438
2) -1.75 and 4
3) -1.438 and 0
4) 4 and 0

274 If $f(x) = x^2$ and $g(x) = x$, determine the value(s) of x that satisfy the equation $f(x) = g(x)$.

275 Given: $g(x) = 2x^2 + 3x + 10$

$k(x) = 2x + 16$

Solve the equation $g(x) = 2k(x)$ algebraically for x, to the *nearest tenth*. Explain why you chose the method you used to solve this quadratic equation.

A.REI.D.11: OTHER SYSTEMS

276 Two functions, $y = |x - 3|$ and $3x + 3y = 27$, are graphed on the same set of axes. Which statement is true about the solution to the system of equations?

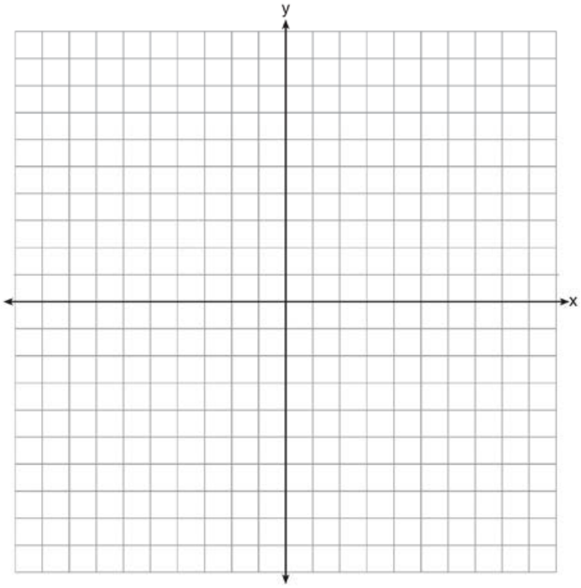
1) $(3,0)$ is the solution to the system because it satisfies the equation $y = |x - 3|$.
2) $(9,0)$ is the solution to the system because it satisfies the equation $3x + 3y = 27$.
3) $(6,3)$ is the solution to the system because it satisfies both equations.
4) $(3,0)$, $(9,0)$, and $(6,3)$ are the solutions to the system of equations because they all satisfy at least one of the equations.

277 On the set of axes below, graph

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

and

$$f(x) = \begin{cases} 2x + 1, & x \le -1 \\ 2 - x^2, & x > -1 \end{cases}$$



How many values of x satisfy the equation $f(x) = g(x)$? Explain your answer, using evidence from your graphs.

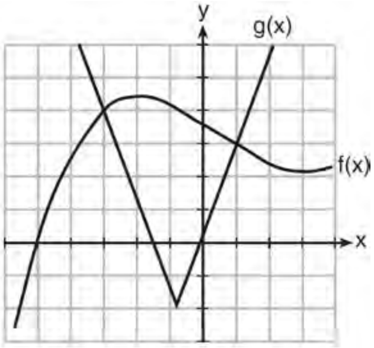
278 Given the functions $h(x) = \frac{1}{2}x + 3$ and $j(x) = |x|$, which value of x makes $h(x) = j(x)$?

1) -2
2) 2
3) 3
4) -6

279 The graphs of the functions $f(x) = |x - 3| + 1$ and $g(x) = 2x + 1$ are drawn. Which statement about these functions is true?

1) The solution to $f(x) = g(x)$ is 3.
2) The solution to $f(x) = g(x)$ is 1.
3) The graphs intersect when $y = 1$.
4) The graphs intersect when $x = 3$.

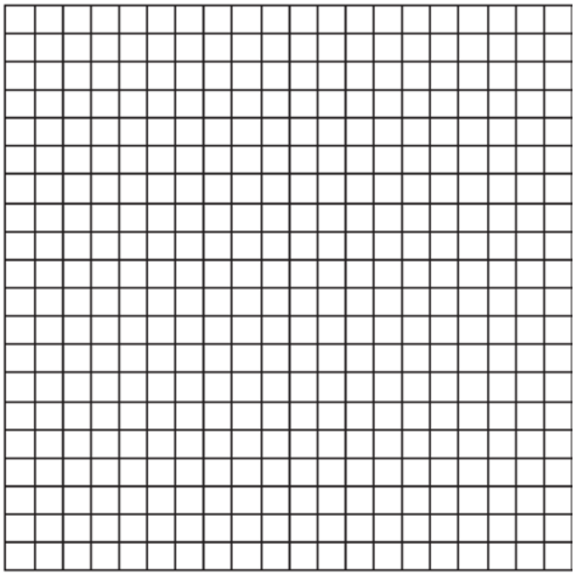
280 The graph below shows two functions, $f(x)$ and $g(x)$. State all the values of x for which $f(x) = g(x)$.



281 Which value of x results in equal outputs for $j(x) = 3x - 2$ and $b(x) = |x + 2|$?

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

282 Graph $f(x) = |x|$ and $g(x) = -x^2 + 6$ on the grid below. Does $f(-2) = g(-2)$? Use your graph to explain why or why not.



POWERS

A.SSE.B.3, A.CED.A.1, F.BF.A.1, F.LE.A.2, F.LE.B.5: MODELING EXPONENTIAL FUNCTIONS

283 Miriam and Jessica are growing bacteria in a laboratory. Miriam uses the growth function $f(t) = n^{2t}$ while Jessica uses the function $g(t) = n^{4t}$, where n represents the initial number of bacteria and t is the time, in hours. If Miriam starts with 16 bacteria, how many bacteria should Jessica start with to achieve the same growth over time?

1) 32
2) 16
3) 8
4) 4

284 Jacob and Jessica are studying the spread of dandelions. Jacob discovers that the growth over t weeks can be defined by the function $f(t) = (8) \cdot 2^t$. Jessica finds that the growth function over t weeks is $g(t) = 2^{t+3}$. Calculate the number of dandelions that Jacob and Jessica will each have after 5 weeks. Based on the growth from both functions, explain the relationship between $f(t)$ and $g(t)$.

285 The growth of a certain organism can be modeled by $C(t) = 10(1.029)^{24t}$, where $C(t)$ is the total number of cells after t hours. Which function is approximately equivalent to $C(t)$?

1) $C(t) = 240(.083)^{24t}$
2) $C(t) = 10(.083)^t$
3) $C(t) = 10(1.986)^t$
4) $C(t) = 240(1.986)^{\frac{t}{24}}$

286 A computer application generates a sequence of musical notes using the function $f(n) = 6(16)^n$, where n is the number of the note in the sequence and $f(n)$ is the note frequency in hertz. Which function will generate the same note sequence as $f(n)$?

1) $g(n) = 12(2)^{4n}$
2) $h(n) = 6(2)^{4n}$
3) $p(n) = 12(4)^{2n}$
4) $k(n) = 6(8)^{2n}$

287 Mario's $15,000 car depreciates in value at a rate of 19% per year. The value, V, after t years can be modeled by the function $V = 15,000(0.81)^t$. Which function is equivalent to the original function?

1) $V = 15,000(0.9)^{9t}$
2) $V = 15,000(0.9)^{2t}$
3) $V = 15,000(0.9)^{\frac{t}{9}}$
4) $V = 15,000(0.9)^{\frac{t}{2}}$

288 Nora inherited a savings account that was started by her grandmother 25 years ago. This scenario is modeled by the function $A(t) = 5000(1.013)^{t+25}$, where $A(t)$ represents the value of the account, in dollars, t years after the inheritance. Which function below is equivalent to $A(t)$?

1) $A(t) = 5000[(1.013^t)]^{25}$
2) $A(t) = 5000[(1.013)^t + (1.013)^{25}]$
3) $A(t) = (5000)^t(1.013)^{25}$
4) $A(t) = 5000(1.013)^t(1.013)^{25}$

289 The Ebola virus has an infection rate of 11% per day as compared to the SARS virus, which has a rate of 4% per day. If there were one case of Ebola and 30 cases of SARS initially reported to authorities and cases are reported each day, which statement is true?

1) At day 10 and day 53 there are more Ebola cases.
2) At day 10 and day 53 there are more SARS cases.
3) At day 10 there are more SARS cases, but at day 53 there are more Ebola cases.
4) At day 10 there are more Ebola cases, but at day 53 there are more SARS cases.

290 Dylan invested $600 in a savings account at a 1.6% annual interest rate. He made no deposits or withdrawals on the account for 2 years. The interest was compounded annually. Find, to the *nearest cent*, the balance in the account after 2 years.

291 Rhonda deposited $3000 in an account in the Merrick National Bank, earning 4.2% interest, compounded annually. She made no deposits or withdrawals. Write an equation that can be used to find B, her account balance after t years.

292 Krystal was given $3000 when she turned 2 years old. Her parents invested it at a 2% interest rate compounded annually. No deposits or withdrawals were made. Which expression can be used to determine how much money Krystal had in the account when she turned 18?

1) $3000(1 + 0.02)^{16}$
2) $3000(1 - 0.02)^{16}$
3) $3000(1 + 0.02)^{18}$
4) $3000(1 - 0.02)^{18}$

293 The country of Benin in West Africa has a population of 9.05 million people. The population is growing at a rate of 3.1% each year. Which function can be used to find the population 7 years from now?

1) $f(t) = (9.05 \times 10^6)(1 - 0.31)^7$
2) $f(t) = (9.05 \times 10^6)(1 + 0.31)^7$
3) $f(t) = (9.05 \times 10^6)(1 + 0.031)^7$
4) $f(t) = (9.05 \times 10^6)(1 - 0.031)^7$

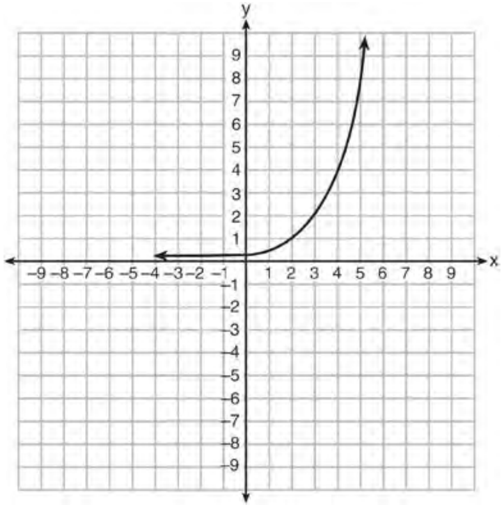
294 A student invests \$500 for 3 years in a savings account that earns 4% interest per year. No further deposits or withdrawals are made during this time. Which statement does not yield the correct balance in the account at the end of 3 years?

1) $500(1.04)^3$
2) $500(1-.04)^3$
3) $500(1+.04)(1+.04)(1+.04)$
4) $500+500(.04)+520(.04)+540.8(.04)$

295 Anne invested \$1000 in an account with a 1.3% annual interest rate. She made no deposits or withdrawals on the account for 2 years. If interest was compounded annually, which equation represents the balance in the account after the 2 years?

1) $A=1000(1-0.013)^2$
2) $A=1000(1+0.013)^2$
3) $A=1000(1-1.3)^2$
4) $A=1000(1+1.3)^2$

296 Write an exponential equation for the graph shown below.



Explain how you determined the equation.

297 The table below shows the temperature, $T(m)$, of a cup of hot chocolate that is allowed to chill over several minutes, m.

Time, m (minutes)	0	2	4	6	8
Temperature, T(m) (ºF)	150	108	78	56	41

Which expression best fits the data for $T(m)$?

1) $150(0.85)^m$
2) $150(1.15)^m$
3) $150(0.85)^{m-1}$
4) $150(1.15)^{m-1}$

298 Jill invests \$400 in a savings bond. The value of the bond, $V(x)$, in hundreds of dollars after x years is illustrated in the table below.

x	V(x)
0	4
1	5.4
2	7.29
3	9.84

Which equation and statement illustrate the approximate value of the bond in hundreds of dollars over time in years?

1) $V(x) = 4(0.65)^x$ and it grows.
2) $V(x) = 4(0.65)^x$ and it decays.
3) $V(x) = 4(1.35)^x$ and it grows.
4) $V(x) = 4(1.35)^x$ and it decays.

299 The breakdown of a sample of a chemical compound is represented by the function $p(t) = 300(0.5)^t$, where $p(t)$ represents the number of milligrams of the substance and t represents the time, in years. In the function $p(t)$, explain what 0.5 and 300 represent.

300 Some banks charge a fee on savings accounts that are left inactive for an extended period of time. The equation $y = 5000(0.98)^x$ represents the value, y, of one account that was left inactive for a period of x years. What is the y-intercept of this equation and what does it represent?

1) 0.98, the percent of money in the account initially
2) 0.98, the percent of money in the account after x years
3) 5000, the amount of money in the account initially
4) 5000, the amount of money in the account after x years

301 The function $V(t) = 1350(1.017)^t$ represents the value $V(t)$, in dollars, of a comic book t years after its purchase. The yearly rate of appreciation of the comic book is

1) 17%
2) 1.7%
3) 1.017%
4) 0.017%

302 The number of carbon atoms in a fossil is given by the function $y = 5100(0.95)^x$, where x represents the number of years since being discovered. What is the percent of change each year? Explain how you arrived at your answer.

303 The equation $A = 1300(1.02)^7$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?

1) 0.02% decay
2) 0.02% growth
3) 2% decay
4) 2% growth

304 Milton has his money invested in a stock portfolio. The value, $v(x)$, of his portfolio can be modeled with the function $v(x) = 30,000(0.78)^x$, where x is the number of years since he made his investment. Which statement describes the rate of change of the value of his portfolio?

1) It decreases 78% per year.
2) It decreases 22% per year.
3) It increases 78% per year.
4) It increases 22% per year.

305 The 2014 winner of the Boston Marathon runs as many as 120 miles per week. During the last few weeks of his training for an event, his mileage can be modeled by $M(w) = 120(.90)^{w-1}$, where w represents the number of weeks since training began. Which statement is true about the model $M(w)$?

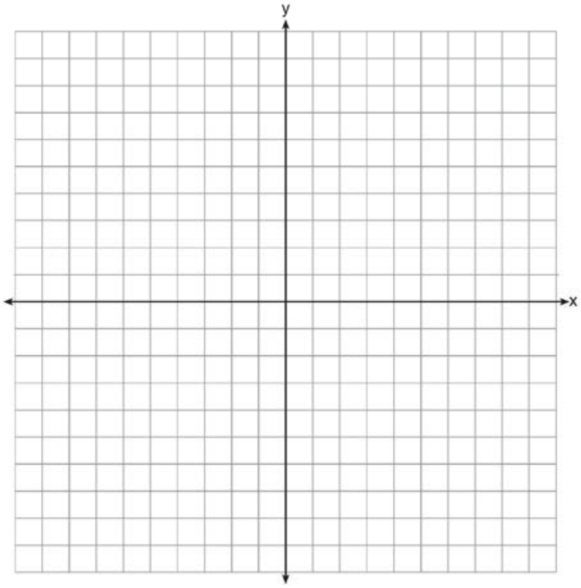
1) The number of miles he runs will increase by 90% each week.
2) The number of miles he runs will be 10% of the previous week.
3) $M(w)$ represents the total mileage run in a given week.
4) w represents the number of weeks left until his marathon.

306 The value, $v(t)$, of a car depreciates according to the function $v(t) = P(.85)^t$, where P is the purchase price of the car and t is the time, in years, since the car was purchased. State the percent that the value of the car *decreases* by each year. Justify your answer.

POLYNOMIALS

A.REI.D.10: IDENTIFYING SOLUTIONS

307 On the set of axes below, draw the graph of the equation $y = -\frac{3}{4}x + 3$.



Is the point $(3,2)$ a solution to the equation? Explain your answer based on the graph drawn.

308 Which point is *not* on the graph represented by $y = x^2 + 3x - 6$?

1) $(-6,12)$
2) $(-4,-2)$
3) $(2,4)$
4) $(3,-6)$

309 The solution of an equation with two variables, x and y, is

1) the set of all x values that make $y = 0$
2) the set of all y values that make $x = 0$
3) the set of all ordered pairs, (x,y), that make the equation true
4) the set of all ordered pairs, (x,y), where the graph of the equation crosses the y-axis

310 Which ordered pair would *not* be a solution to $y = x^3 - x$?

1) $(-4,-60)$
2) $(-3,-24)$
3) $(-2,-6)$
4) $(-1,-2)$

A.APR.A.1: OPERATIONS WITH POLYNOMIALS

311 If $A = 3x^2 + 5x - 6$ and $B = -2x^2 - 6x + 7$, then $A - B$ equals

1) $-5x^2 - 11x + 13$
2) $5x^2 + 11x - 13$
3) $-5x^2 - x + 1$
4) $5x^2 - x + 1$

312 Express the product of $2x^2 + 7x - 10$ and $x + 5$ in standard form.

313 Fred is given a rectangular piece of paper. If the length of Fred's piece of paper is represented by $2x - 6$ and the width is represented by $3x - 5$, then the paper has a total area represented by

1) $5x - 11$
2) $6x^2 - 28x + 30$
3) $10x - 22$
4) $6x^2 - 6x - 11$

314 Subtract $5x^2 + 2x - 11$ from $3x^2 + 8x - 7$. Express the result as a trinomial.

315 If the difference $(3x^2 - 2x + 5) - (x^2 + 3x - 2)$ is multiplied by $\frac{1}{2}x^2$, what is the result, written in standard form?

316 Which trinomial is equivalent to $3(x-2)^2 - 2(x-1)$?

1) $3x^2 - 2x - 10$
2) $3x^2 - 2x - 14$
3) $3x^2 - 14x + 10$
4) $3x^2 - 14x + 14$

317 When $(2x-3)^2$ is subtracted from $5x^2$, the result is
1) $x^2-12x-9$
2) $x^2-12x+9$
3) $x^2+12x-9$
4) $x^2+12x+9$

318 The expression $3(x^2-1)-(x^2-7x+10)$ is equivalent to
1) $2x^2-7x+7$
2) $2x^2+7x-13$
3) $2x^2-7x+9$
4) $2x^2+7x-11$

319 What is the product of $2x+3$ and $4x^2-5x+6$?
1) $8x^3-2x^2+3x+18$
2) $8x^3-2x^2-3x+18$
3) $8x^3+2x^2-3x+18$
4) $8x^3+2x^2+3x+18$

320 Which expression is equivalent to $2(3g-4)-(8g+3)$?
1) $-2g-1$
2) $-2g-5$
3) $-2g-7$
4) $-2g-11$

321 Express in simplest form: $(3x^2+4x-8)-(-2x^2+4x+2)$

322 Write the expression $5x+4x^2(2x+7)-6x^2-9x$ as a polynomial in standard form.

323 Which polynomial is twice the sum of $4x^2-x+1$ and $-6x^2+x-4$?
1) $-2x^2-3$
2) $-4x^2-3$
3) $-4x^2-6$
4) $-2x^2+x-5$

A.SSE.A.2: FACTORING POLYNOMIALS

324 Which expression is equivalent to x^4-12x^2+36?
1) $(x^2-6)(x^2-6)$
2) $(x^2+6)(x^2+6)$
3) $(6-x^2)(6+x^2)$
4) $(x^2+6)(x^2-6)$

325 Four expressions are shown below.

I	$2(2x^2-2x-60)$
II	$4(x^2-x-30)$
III	$4(x+6)(x-5)$
IV	$4x(x-1)-120$

The expression $4x^2-4x-120$ is equivalent to
1) I and II, only
2) II and IV, only
3) I, II, and IV
4) II, III, and IV

326 When factored completely, $x^3 - 13x^2 - 30x$ is
1) $x(x+3)(x-10)$
2) $x(x-3)(x-10)$
3) $x(x+2)(x-15)$
4) $x(x-2)(x+15)$

327 Factor the expression $x^4 + 6x^2 - 7$ completely.

A.SSE.A.2: FACTORING THE DIFFERENCE OF PERFECT SQUARES

328 When factored completely, the expression $p^4 - 81$ is equivalent to
1) $(p^2+9)(p^2-9)$
2) $(p^2-9)(p^2-9)$
3) $(p^2+9)(p+3)(p-3)$
4) $(p+3)(p-3)(p+3)(p-3)$

329 If the area of a rectangle is expressed as $x^4 - 9y^2$, then the product of the length and the width of the rectangle could be expressed as
1) $(x-3y)(x+3y)$
2) $(x^2-3y)(x^2+3y)$
3) $(x^2-3y)(x^2-3y)$
4) $(x^4+y)(x-9y)$

330 The expression $x^4 - 16$ is equivalent to
1) $(x^2+8)(x^2-8)$
2) $(x^2-8)(x^2-8)$
3) $(x^2+4)(x^2-4)$
4) $(x^2-4)(x^2-4)$

331 Which expression is equivalent to $36x^2 - 100$?
1) $4(3x-5)(3x-5)$
2) $4(3x+5)(3x-5)$
3) $2(9x-25)(9x-25)$
4) $2(9x+25)(9x-25)$

332 Which expression is equivalent to $16x^2 - 36$?
1) $4(2x-3)(2x-3)$
2) $4(2x+3)(2x-3)$
3) $(4x-6)(4x-6)$
4) $(4x+6)(4x+6)$

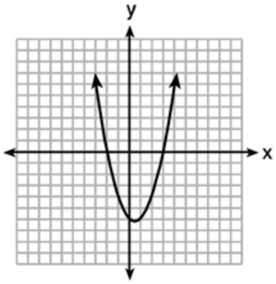
333 Which expression is equivalent to $16x^4 - 64$?
1) $(4x^2-8)^2$
2) $(8x^2-32)^2$
3) $(4x^2+8)(4x^2-8)$
4) $(8x^2+32)(8x^2-32)$

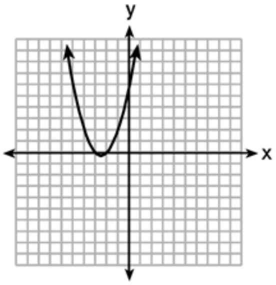
334 The expression $49x^2 - 36$ is equivalent to
1) $(7x-6)^2$
2) $(24.5x-18)^2$
3) $(7x-6)(7x+6)$
4) $(24.5x-18)(24.5x+18)$

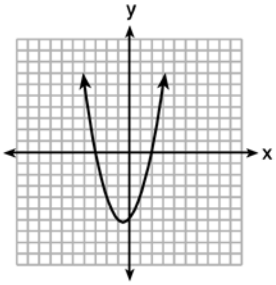
335 Which expression is equivalent to $y^4 - 100$?
1) $(y^2-10)^2$
2) $(y^2-50)^2$
3) $(y^2+10)(y^2-10)$
4) $(y^2+50)(y^2-50)$

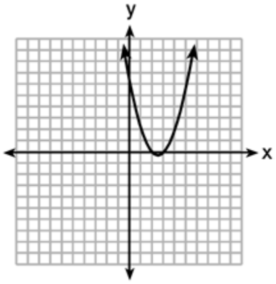
A.APR.B.3: ZEROS OF POLYNOMIALS

336 The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and –3?

1) 

2) 

3) 

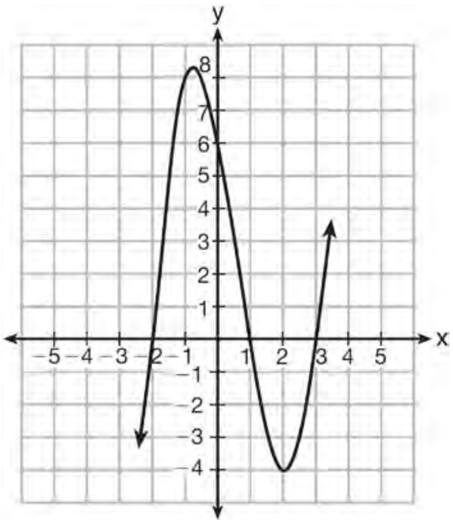
4) 

337 Which equation(s) represent the graph below?

I $y = (x + 2)(x^2 - 4x - 12)$

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

III $y = (x - 1)(x^2 - 5x - 6)$



1) I, only
2) II, only
3) I and II
4) II and III

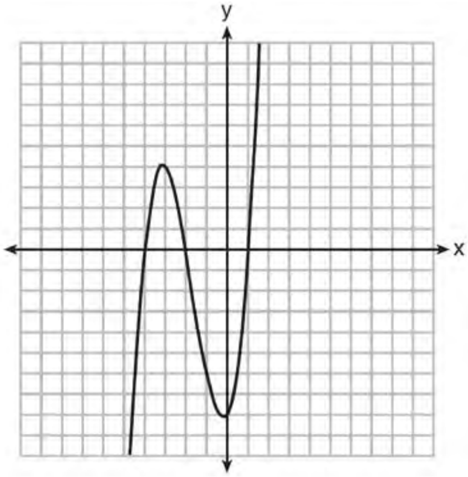
338 For which function defined by a polynomial are the zeros of the polynomial –4 and –6?

1) $y = x^2 - 10x - 24$
2) $y = x^2 + 10x + 24$
3) $y = x^2 + 10x - 24$
4) $y = x^2 - 10x + 24$

339 The zeros of the function $f(x) = (x + 2)^2 - 25$ are

1) –2 and 5
2) –3 and 7
3) –5 and 2
4) –7 and 3

340 The graph of $f(x)$ is shown below.

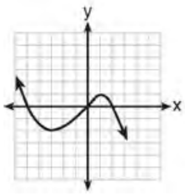


Which function could represent the graph of $f(x)$?

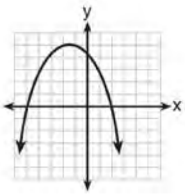
1) $f(x) = (x+2)(x^2+3x-4)$
2) $f(x) = (x-2)(x^2+3x-4)$
3) $f(x) = (x+2)(x^2+3x+4)$
4) $f(x) = (x-2)(x^2+3x+4)$

341 A polynomial function contains the factors x, $x-2$, and $x+5$. Which graph(s) below could represent the graph of this function?

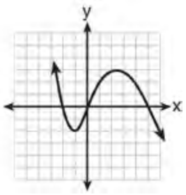
I



II



III



1) I, only
2) II, only
3) I and III
4) I, II, and III

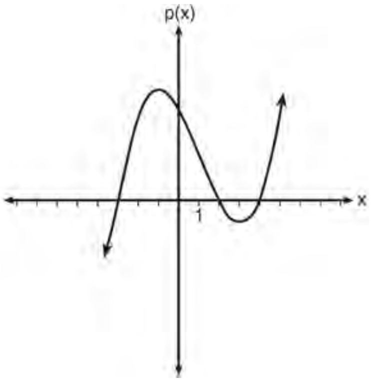
342 What are the zeros of the function $f(x) = x^2 - 13x - 30$?

1) −10 and 3
2) 10 and −3
3) −15 and 2
4) 15 and −2

343 The zeros of the function $f(x) = x^2 - 5x - 6$ are

1) −1 and 6
2) 1 and −6
3) 2 and −3
4) −2 and 3

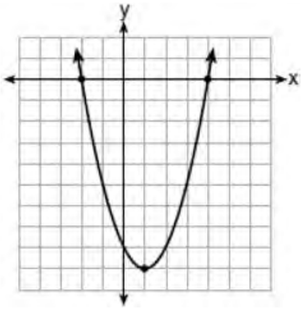
344 Based on the graph below, which expression is a possible factorization of $p(x)$?



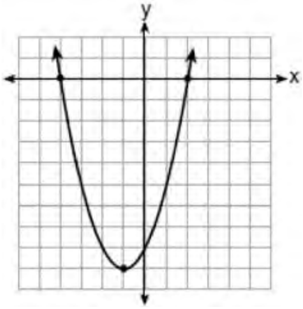
1) $(x+3)(x-2)(x-4)$
2) $(x-3)(x+2)(x+4)$
3) $(x+3)(x-5)(x-2)(x-4)$
4) $(x-3)(x+5)(x+2)(x+4)$

345 Which function has zeros of -4 and 2?

1) $f(x) = x^2 + 7x - 8$

2) 

3) $g(x) = x^2 - 7x - 8$

4) 

346 Which polynomial function has zeros at -3, 0, and 4?

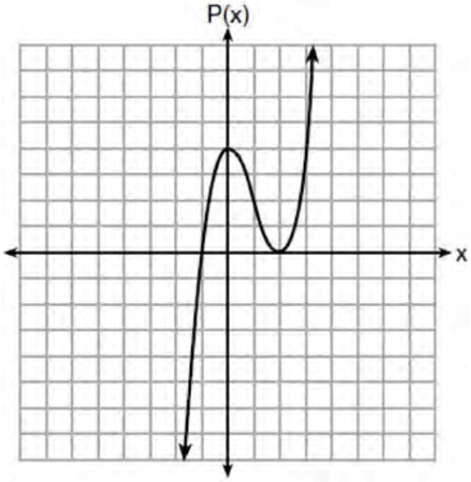
1) $f(x) = (x+3)(x^2+4)$
2) $f(x) = (x^2-3)(x-4)$
3) $f(x) = x(x+3)(x-4)$
4) $f(x) = x(x-3)(x+4)$

347 The zeros of the function $f(x) = 2x^3 + 12x - 10x^2$ are

1) $\{2,3\}$
2) $\{-1,6\}$
3) $\{0,2,3\}$
4) $\{0,-1,6\}$

348 Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

349 Wenona sketched the polynomial $P(x)$ as shown on the axes below.

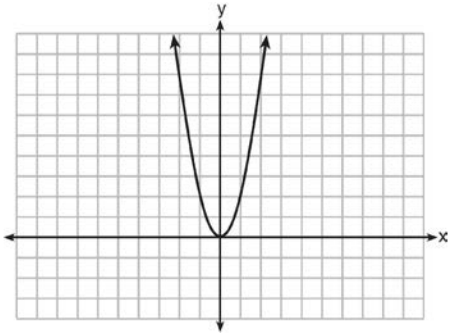


Which equation could represent $P(x)$?

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

F.BF.B.3: GRAPHING POLYNOMIAL FUNCTIONS

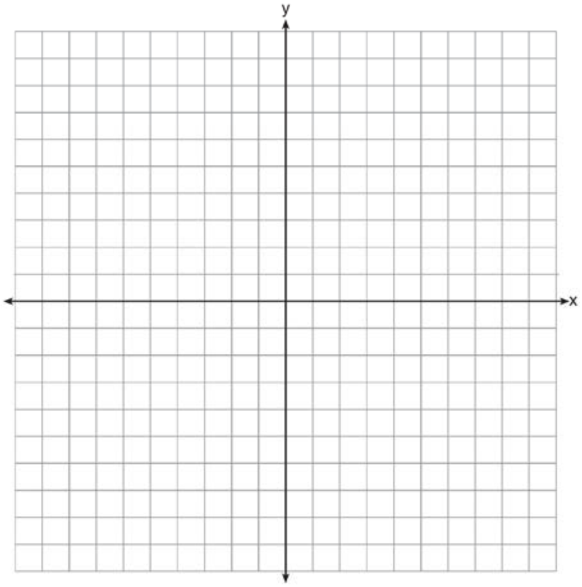
350 The graph of the equation $y = ax^2$ is shown below.



If a is multiplied by $-\frac{1}{2}$, the graph of the new equation is
1) wider and opens downward
2) wider and opens upward
3) narrower and opens downward
4) narrower and opens upward

351 How does the graph of $f(x) = 3(x-2)^2 + 1$ compare to the graph of $g(x) = x^2$?
1) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
2) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.
3) The graph of $f(x)$ is narrower than the graph of $g(x)$, and its vertex is moved to the left 2 units and up 1 unit.
4) The graph of $f(x)$ is wider than the graph of $g(x)$, and its vertex is moved to the right 2 units and up 1 unit.

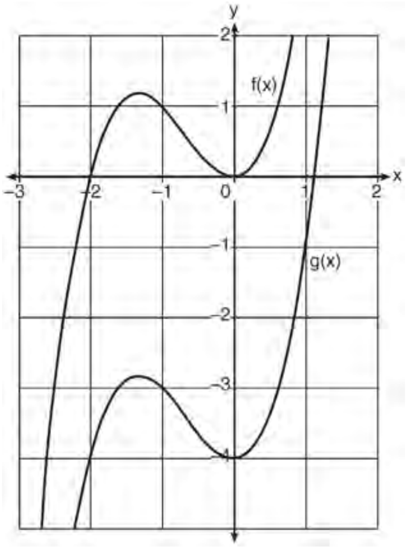
352 The vertex of the parabola represented by $f(x) = x^2 - 4x + 3$ has coordinates $(2,-1)$. Find the coordinates of the vertex of the parabola defined by $g(x) = f(x-2)$. Explain how you arrived at your answer. [The use of the set of axes below is optional.]



353 Given the graph of the line represented by the equation $f(x) = -2x + b$, if b is increased by 4 units, the graph of the new line would be shifted 4 units
1) right
2) up
3) left
4) down

354 When the function $f(x) = x^2$ is multiplied by the value a, where $a > 1$, the graph of the new function, $g(x) = ax^2$
1) opens upward and is wider
2) opens upward and is narrower
3) opens downward and is wider
4) opens downward and is narrower

355 In the diagram below, $f(x) = x^3 + 2x^2$ is graphed. Also graphed is $g(x)$, the result of a translation of $f(x)$.



Determine an equation of $g(x)$. Explain your reasoning.

356 In the functions $f(x) = kx^2$ and $g(x) = |kx|$, k is a positive integer. If k is replaced by $\frac{1}{2}$, which statement about these new functions is true?

1) The graphs of both $f(x)$ and $g(x)$ become wider.
2) The graph of $f(x)$ becomes narrower and the graph of $g(x)$ shifts left.
3) The graphs of both $f(x)$ and $g(x)$ shift vertically.
4) The graph of $f(x)$ shifts left and the graph of $g(x)$ becomes wider.

357 If the original function $f(x) = 2x^2 - 1$ is shifted to the left 3 units to make the function $g(x)$, which expression would represent $g(x)$?

1) $2(x-3)^2 - 1$
2) $2(x+3)^2 - 1$
3) $2x^2 + 2$
4) $2x^2 - 4$

RADICALS

N.RN.B.3: OPERATIONS WITH RADICALS

358 Given: $L = \sqrt{2}$

$M = 3\sqrt{3}$

$N = \sqrt{16}$

$P = \sqrt{9}$

Which expression results in a rational number?

1) $L + M$
2) $M + N$
3) $N + P$
4) $P + L$

359 Which statement is *not* always true?

1) The product of two irrational numbers is irrational.
2) The product of two rational numbers is rational.
3) The sum of two rational numbers is rational.
4) The sum of a rational number and an irrational number is irrational.

360 Ms. Fox asked her class "Is the sum of 4.2 and $\sqrt{2}$ rational or irrational?" Patrick answered that the sum would be irrational. State whether Patrick is correct or incorrect. Justify your reasoning.

361 Which statement is *not* always true?
1) The sum of two rational numbers is rational.
2) The product of two irrational numbers is rational.
3) The sum of a rational number and an irrational number is irrational.
4) The product of a nonzero rational number and an irrational number is irrational.

362 For which value of P and W is $P+W$ a rational number?
1) $P=\frac{1}{\sqrt{3}}$ and $W=\frac{1}{\sqrt{6}}$
2) $P=\frac{1}{\sqrt{4}}$ and $W=\frac{1}{\sqrt{9}}$
3) $P=\frac{1}{\sqrt{6}}$ and $W=\frac{1}{\sqrt{10}}$
4) $P=\frac{1}{\sqrt{25}}$ and $W=\frac{1}{\sqrt{2}}$

363 Given the following expressions:

I. $-\frac{5}{8}+\frac{3}{5}$ III. $\left(\sqrt{5}\right)\cdot\left(\sqrt{5}\right)$
II. $\frac{1}{2}+\sqrt{2}$ IV. $3\cdot\left(\sqrt{49}\right)$

Which expression(s) result in an irrational number?
1) II, only
2) III, only
3) I, III, IV
4) II, III, IV

364 Determine if the product of $3\sqrt{2}$ and $8\sqrt{18}$ is rational or irrational. Explain your answer.

365 Is the sum of $3\sqrt{2}$ and $4\sqrt{2}$ rational or irrational? Explain your answer.

366 Jakob is working on his math homework. He decides that the sum of the expression $\frac{1}{3}+\frac{6\sqrt{5}}{7}$ must be rational because it is a fraction. Is Jakob correct? Explain your reasoning.

367 State whether $7-\sqrt{2}$ is rational or irrational. Explain your answer.

368 A teacher wrote the following set of numbers on the board:

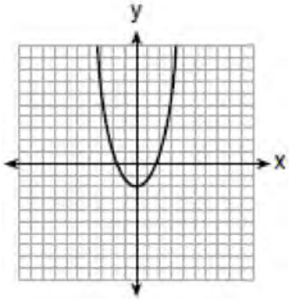
$$a=\sqrt{20}\quad b=2.5\quad c=\sqrt{225}$$

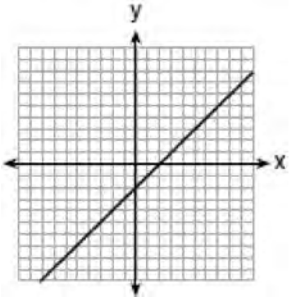
Explain why $a+b$ is irrational, but $b+c$ is rational.

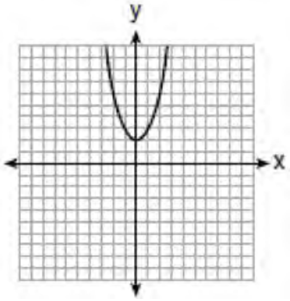
369 The product of $\sqrt{576}$ and $\sqrt{684}$ is
1) irrational because both factors are irrational
2) rational because both factors are rational
3) irrational because one factor is irrational
4) rational because one factor is rational

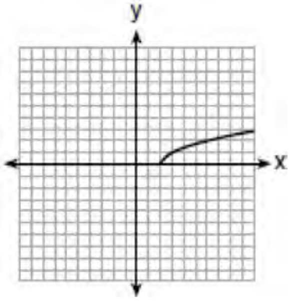
F.IF.C.7: GRAPHING ROOT FUNCTIONS

370 Which graph represents $y = \sqrt{x-2}$?

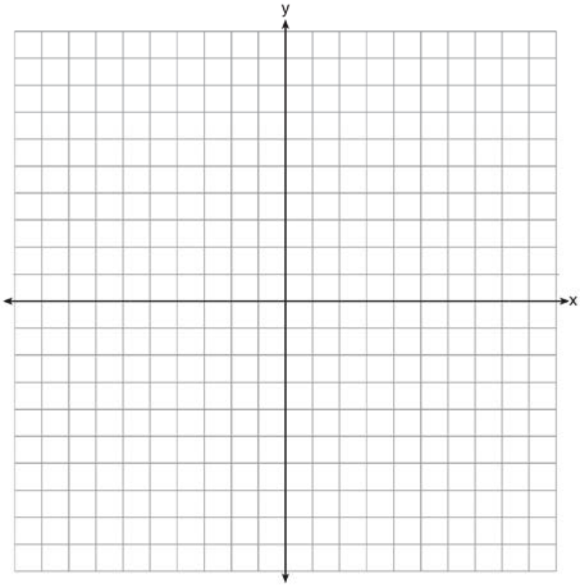
1) 

2) 

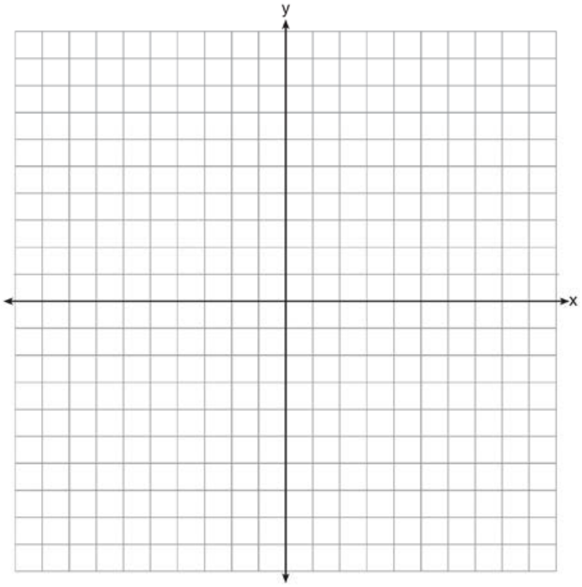
3) 

4) 

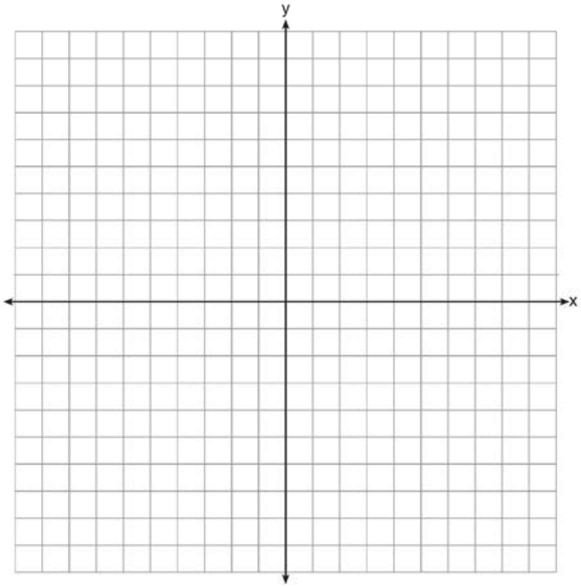
371 On the set of axes below, graph the function represented by $y = \sqrt[3]{x-2}$ for the domain $-6 \le x \le 10$.



372 Draw the graph of $y = \sqrt{x} - 1$ on the set of axes below.



373 Graph the function $y = -\sqrt{x+3}$ on the set of axes below.



FUNCTIONS

F.IF.A.1: DEFINING FUNCTIONS

374 Which table represents a function?

1)

x	2	4	2	4
f(x)	3	5	7	9

2)

x	0	−1	0	1
f(x)	0	1	−1	0

3)

x	3	5	7	9
f(x)	2	4	2	4

4)

x	0	1	−1	0
f(x)	0	−1	0	1

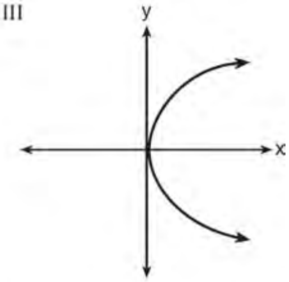
375 The function f has a domain of $\{1,3,5,7\}$ and a range of $\{2,4,6\}$. Could f be represented by $\{(1,2),(3,4),(5,6),(7,2)\}$? Justify your answer.

376 Which representations are functions?

I

x	y
2	6
3	−12
4	7
5	5
2	−6

III

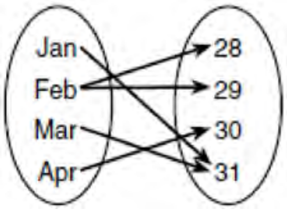


II $\{(1,1),(2,1),(3,2),(4,3),(5,5),(6,8),(7,13)\}$

IV $y = 2x + 1$

1) I and II
2) II and IV
3) III, only
4) IV, only

377 A mapping is shown in the diagram below.



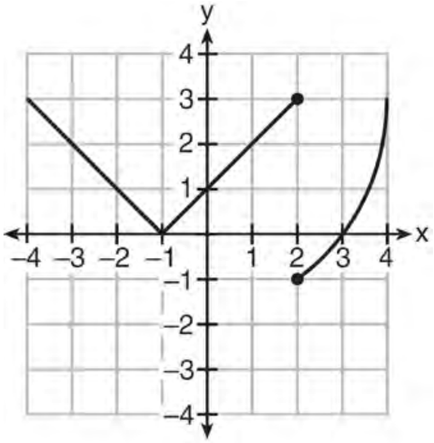
This mapping is
1) a function, because Feb has two outputs, 28 and 29
2) a function, because two inputs, Jan and Mar, result in the output 31
3) not a function, because Feb has two outputs, 28 and 29
4) not a function, because two inputs, Jan and Mar, result in the output 31

378 A function is shown in the table below.

x	f(x)
–4	2
–1	–4
0	–2
3	16

If included in the table, which ordered pair, $(-4,1)$ or $(1,-4)$, would result in a relation that is no longer a function? Explain your answer.

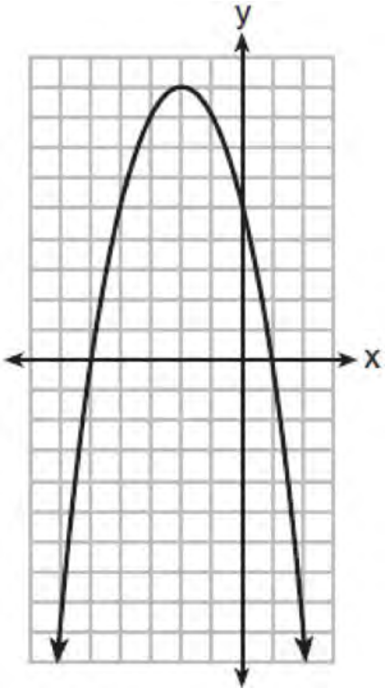
379 Marcel claims that the graph below represents a function.



State whether Marcel is correct. Justify your answer.

380 Nora says that the graph of a circle is a function because she can trace the whole graph without picking up her pencil. Mia says that a circle graph is *not* a function because multiple values of *x* map to the same *y*-value. Determine if either one is correct, and justify your answer completely.

381 A relation is graphed on the set of axes below.

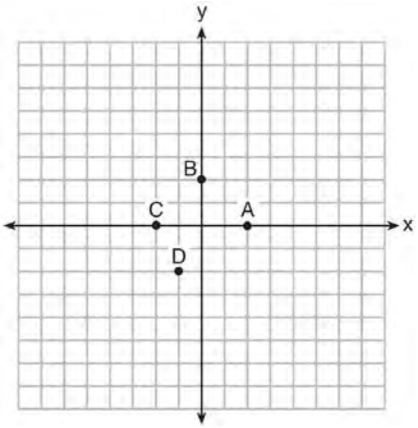


Based on this graph, the relation is
1) a function because it passes the horizontal line test
2) a function because it passes the vertical line test
3) not a function because it fails the horizontal line test
4) not a function because it fails the vertical line test

F.IF.A.2: FUNCTIONAL NOTATION, EVALUATING FUNCTIONS

382 Given that $f(x) = 2x + 1$, find $g(x)$ if $g(x) = 2[f(x)]^2 - 1$.

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



Which point could be used to find $f(2)$?
1) *A*
2) *B*
3) *C*
4) *D*

384 The value in dollars, $v(x)$, of a certain car after x years is represented by the equation $v(x) = 25,000(0.86)^x$. To the *nearest dollar*, how much more is the car worth after 2 years than after 3 years?
1) 2589
2) 6510
3) 15,901
4) 18,490

385 If $f(n) = (n - 1)^2 + 3n$, which statement is true?
1) $f(3) = -2$
2) $f(-2) = 3$
3) $f(-2) = -15$
4) $f(-15) = -2$

386 The equation to determine the weekly earnings of an employee at The Hamburger Shack is given by $w(x)$, where x is the number of hours worked.

$$w(x)=\begin{cases}10x, & 0\le x\le 40\\ 15(x-40)+400, & x>40\end{cases}$$

Determine the difference in salary, *in dollars*, for an employee who works 52 hours versus one who works 38 hours. Determine the number of hours an employee must work in order to earn \$445. Explain how you arrived at this answer.

387 If $f(x)=\dfrac{\sqrt{2x+3}}{6x-5}$, then $f\left(\dfrac{1}{2}\right)=$

1) 1
2) -2
3) -1
4) $-\dfrac{13}{3}$

388 Lynn, Jude, and Anne were given the function $f(x)=-2x^2+32$, and they were asked to find $f(3)$. Lynn's answer was 14, Jude's answer was 4, and Anne's answer was ±4. Who is correct?

1) Lynn, only
2) Jude, only
3) Anne, only
4) Both Lynn and Jude

389 If $f(x)=\dfrac{1}{2}x^2-\left(\dfrac{1}{4}x+3\right)$, what is the value of $f(8)$?

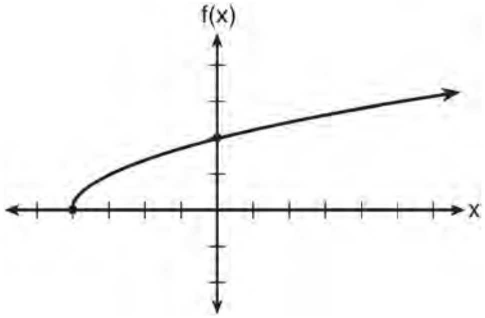
1) 11
2) 17
3) 27
4) 33

390 For a recently released movie, the function $y=119.67(0.61)^x$ models the revenue earned, y, in millions of dollars each week, x, for several weeks after its release. Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

1) 37.27
2) 27.16
3) 17.06
4) 10.11

F.IF.A.2, F.IF.B.5: DOMAIN AND RANGE

391 The graph of the function $f(x)=\sqrt{x+4}$ is shown below.



The domain of the function is

1) $\{x\,|\,x>0\}$
2) $\{x\,|\,x\ge 0\}$
3) $\{x\,|\,x>-4\}$
4) $\{x\,|\,x\ge -4\}$

392 If $f(x)=\dfrac{1}{3}x+9$, which statement is always true?

1) $f(x)<0$
2) $f(x)>0$
3) If $x<0$, then $f(x)<0$.
4) If $x>0$, then $f(x)>0$.

393 Let f be a function such that $f(x) = 2x - 4$ is defined on the domain $2 \le x \le 6$. The range of this function is
1) $0 \le y \le 8$
2) $0 \le y < \infty$
3) $2 \le y \le 6$
4) $-\infty < y < \infty$

394 The range of the function defined as $y = 5^x$ is
1) $y < 0$
2) $y > 0$
3) $y \le 0$
4) $y \ge 0$

395 The range of the function $f(x) = x^2 + 2x - 8$ is all real numbers
1) less than or equal to -9
2) greater than or equal to -9
3) less than or equal to -1
4) greater than or equal to -1

396 What is the domain of the relation shown below?
$\{(4,2),(1,1),(0,0),(1,-1),(4,-2)\}$
1) $\{0,1,4\}$
2) $\{-2,-1,0,1,2\}$
3) $\{-2,-1,0,1,2,4\}$
4) $\{-2,-1,0,0,1,1,1,2,4,4\}$

397 If the domain of the function $f(x) = 2x^2 - 8$ is $\{-2,3,5\}$, then the range is
1) $\{-16,4,92\}$
2) $\{-16,10,42\}$
3) $\{0,10,42\}$
4) $\{0,4,92\}$

398 Officials in a town use a function, C, to analyze traffic patterns. $C(n)$ represents the rate of traffic through an intersection where n is the number of observed vehicles in a specified time interval. What would be the most appropriate domain for the function?
1) $\{\ldots -2,-1,0,1,2,3,\ldots\}$
2) $\{-2,-1,0,1,2,3\}$
3) $\{0,\frac{1}{2},1,1\frac{1}{2},2,2\frac{1}{2}\}$
4) $\{0,1,2,3,\ldots\}$

399 The function $h(t) = -16t^2 + 144$ represents the height, $h(t)$, in feet, of an object from the ground at t seconds after it is dropped. A realistic domain for this function is
1) $-3 \le t \le 3$
2) $0 \le t \le 3$
3) $0 \le h(t) \le 144$
4) all real numbers

400 Which domain would be the most appropriate set to use for a function that predicts the number of household online-devices in terms of the number of people in the household?
1) integers
2) whole numbers
3) irrational numbers
4) rational numbers

401 A store sells self-serve frozen yogurt sundaes. The function $C(w)$ represents the cost, in dollars, of a sundae weighing w ounces. An appropriate domain for the function would be

1) integers
2) rational numbers
3) nonnegative integers
4) nonnegative rational numbers

402 A construction company uses the function $f(p)$, where p is the number of people working on a project, to model the amount of money it spends to complete a project. A reasonable domain for this function would be

1) positive integers
2) positive real numbers
3) both positive and negative integers
4) both positive and negative real numbers

403 An online company lets you download songs for \$0.99 each after you have paid a \$5 membership fee. Which domain would be most appropriate to calculate the cost to download songs?

1) rational numbers greater than zero
2) whole numbers greater than or equal to one
3) integers less than or equal to zero
4) whole numbers less than or equal to one

404 The daily cost of production in a factory is calculated using $c(x) = 200 + 16x$, where x is the number of complete products manufactured. Which set of numbers best defines the domain of $c(x)$?

1) integers
2) positive real numbers
3) positive rational numbers
4) whole numbers

F.BF.A.1: OPERATIONS WITH FUNCTIONS

405 A company produces x units of a product per month, where $C(x)$ represents the total cost and $R(x)$ represents the total revenue for the month. The functions are modeled by $C(x) = 300x + 250$ and $R(x) = -0.5x^2 + 800x - 100$. The profit is the difference between revenue and cost where $P(x) = R(x) - C(x)$. What is the total profit, $P(x)$, for the month?

1) $P(x) = -0.5x^2 + 500x - 150$
2) $P(x) = -0.5x^2 + 500x - 350$
3) $P(x) = -0.5x^2 - 500x + 350$
4) $P(x) = -0.5x^2 + 500x + 350$

F.LE.A.1-3: FAMILIES OF FUNCTIONS

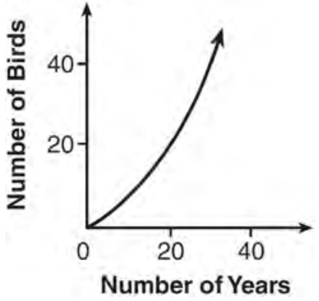
406 Which situation could be modeled by using a linear function?

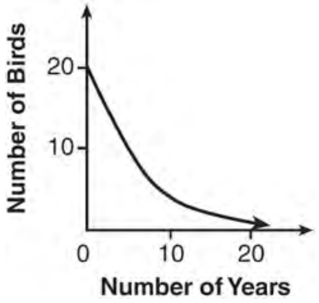
1) a bank account balance that grows at a rate of 5% per year, compounded annually
2) a population of bacteria that doubles every 4.5 hours
3) the cost of cell phone service that charges a base amount plus 20 cents per minute
4) the concentration of medicine in a person’s body that decays by a factor of one-third every hour

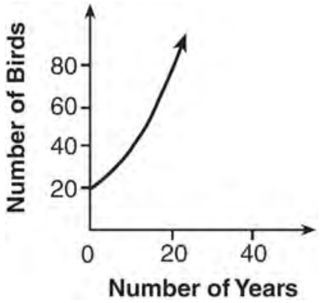
407 Sara was asked to solve this word problem: "The product of two consecutive integers is 156. What are the integers?" What type of equation should she create to solve this problem?

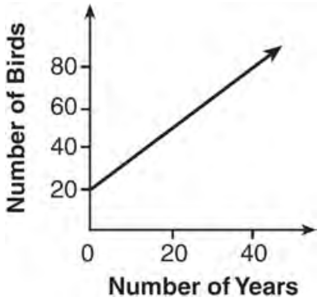
1) linear
2) quadratic
3) exponential
4) absolute value

408 A population that initially has 20 birds approximately doubles every 10 years. Which graph represents this population growth?

1) 

2) 

3) 

4) 

409 Which table of values represents a linear relationship?

1)

x	f(x)
−1	−3
0	−2
1	1
2	6
3	13

2)

x	f(x)
−1	$\frac{1}{2}$
0	1
1	2
2	4
3	8

3)

x	f(x)
−1	−3
0	−1
1	1
2	3
3	5

4)

x	f(x)
−1	−1
0	0
1	1
2	8
3	27

410 The table below shows the average yearly balance in a savings account where interest is compounded annually. No money is deposited or withdrawn after the initial amount is deposited.

Year	Balance, in Dollars
0	380.00
10	562.49
20	832.63
30	1232.49
40	1824.39
50	2700.54

Which type of function best models the given data?

1) linear function with a negative rate of change
2) linear function with a positive rate of change
3) exponential decay function
4) exponential growth function

411 Rachel and Marc were given the information shown below about the bacteria growing in a Petri dish in their biology class.

Number of Hours, x	1	2	3	4	5	6	7	8	9	10
Number of Bacteria, B(x)	220	280	350	440	550	690	860	1070	1340	1680

Rachel wants to model this information with a linear function. Marc wants to use an exponential function. Which model is the better choice? Explain why you chose this model.

412 The function, $t(x)$, is shown in the table below.

x	t(x)
–3	10
–1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential. Explain your answer.

413 The tables below show the values of four different functions for given values of *x*.

x	f(x)	x	g(x)	x	h(x)	x	k(x)
1	12	1	–1	1	9	1	–2
2	19	2	1	2	12	2	4
3	26	3	5	3	17	3	14
4	33	4	13	4	24	4	28

Which table represents a linear function?

1) $f(x)$
2) $g(x)$
3) $h(x)$
4) $k(x)$

414 Grisham is considering the three situations below.

I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.

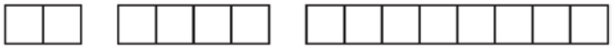
II. The value of a car depreciates at a rate of 15% per year after it is purchased.

III. The amount of bacteria in a culture triples every two days during an experiment.

Which of the statements describes a situation with an equal difference over an equal interval?

1) I, only
2) II, only
3) I and III
4) II and III

415 Consider the pattern of squares shown below:



Which type of model, linear or exponential, should be used to determine how many squares are in the *n*th pattern? Explain your answer.

416 Which scenario represents exponential growth?

1) A water tank is filled at a rate of 2 gallons/minute.
2) A vine grows 6 inches every week.
3) A species of fly doubles its population every month during the summer.
4) A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour.

417 One characteristic of all linear functions is that they change by

1) equal factors over equal intervals
2) unequal factors over equal intervals
3) equal differences over equal intervals
4) unequal differences over equal intervals

418 The highest possible grade for a book report is 100. The teacher deducts 10 points for each day the report is late. Which kind of function describes this situation?

1) linear
2) quadratic
3) exponential growth
4) exponential decay

419 Ian is saving up to buy a new baseball glove. Every month he puts $10 into a jar. Which type of function best models the total amount of money in the jar after a given number of months?
1) linear
2) exponential
3) quadratic
4) square root

420 If a population of 100 cells triples every hour, which function represents $p(t)$, the population after t hours?
1) $p(t) = 3(100)^t$
2) $p(t) = 100(3)^t$
3) $p(t) = 3t + 100$
4) $p(t) = 100t + 3$

421 The table below represents the function F.

x	3	4	6	7	8
***F*(*x*)**	9	17	65	129	257

The equation that represents this function is
1) $F(x) = 3^x$
2) $F(x) = 3x$
3) $F(x) = 2^x + 1$
4) $F(x) = 2x + 3$

422 A laboratory technician studied the population growth of a colony of bacteria. He recorded the number of bacteria every other day, as shown in the partial table below.

t (time, in days)	0	2	4
f(t) (bacteria)	25	15,625	9,765,625

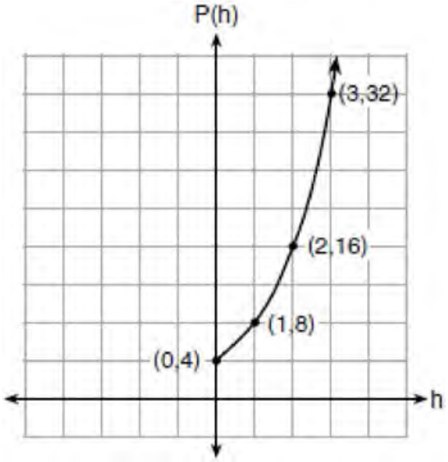
Which function would accurately model the technician's data?
1) $f(t) = 25^t$
2) $f(t) = 25^{t+1}$
3) $f(t) = 25t$
4) $f(t) = 25(t + 1)$

423 Which function is shown in the table below?

x	f(x)
–2	$\frac{1}{9}$
–1	$\frac{1}{3}$
0	1
1	3
2	9
3	27

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

424 Vinny collects population data, $P(h)$, about a specific strain of bacteria over time in hours, h, as shown in the graph below.



Which equation represents the graph of $P(h)$?

1) $P(h) = 4(2)^h$
2) $P(h) = \frac{46}{5}h + \frac{6}{5}$
3) $P(h) = 3h^2 + 0.2h + 4.2$
4) $P(h) = \frac{2}{3}h^3 - h^2 + 3h + 4$

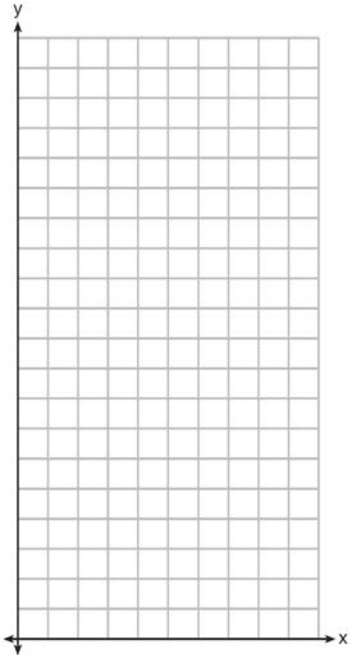
425 If $f(x) = 3^x$ and $g(x) = 2x + 5$, at which value of x is $f(x) < g(x)$?

1) –1
2) 2
3) –3
4) 4

426 Alicia has invented a new app for smart phones that two companies are interested in purchasing for a 2-year contract. Company *A* is offering her \$10,000 for the first month and will increase the amount each month by \$5000. Company *B* is offering \$500 for the first month and will double their payment each month from the previous month. Monthly payments are made at the end of each month. For which monthly payment will company *B*’s payment first exceed company *A*’s payment?

1) 6
2) 7
3) 8
4) 9

427 Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



State which function, $f(x)$ or $g(x)$, has a greater value when $x = 20$. Justify your reasoning.

428 What is the largest integer, x, for which the value of $f(x) = 5x^4 + 30x^2 + 9$ will be greater than the value of $g(x) = 3^x$?

1) 7
2) 8
3) 9
4) 10

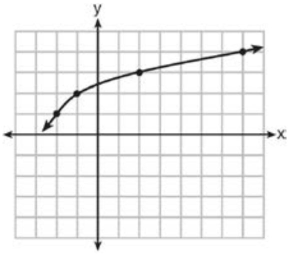
429 As x increases beyond 25, which function will have the largest value?

1) $f(x) = 1.5^x$
2) $g(x) = 1.5x + 3$
3) $h(x) = 1.5x^2$
4) $k(x) = 1.5x^3 + 1.5x^2$

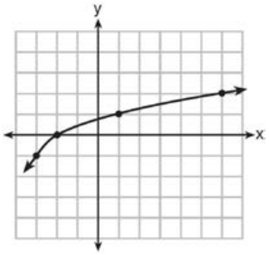
430 Michael has \$10 in his savings account. Option 1 will add \$100 to his account each week. Option 2 will double the amount in his account at the end of each week. Write a function in terms of x to model each option of saving. Michael wants to have at least \$700 in his account at the end of 7 weeks to buy a mountain bike. Determine which option(s) will enable him to reach his goal. Justify your answer.

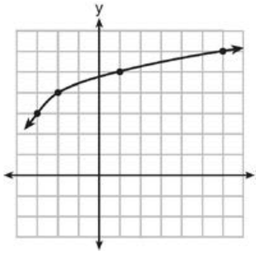
F.BF.B.3: TRANSFORMATIONS WITH FUNCTIONS

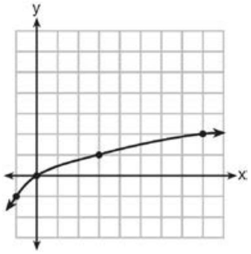
431 The graph of $y = f(x)$ is shown below.

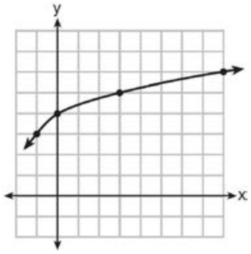


What is the graph of $y = f(x + 1) - 2$?

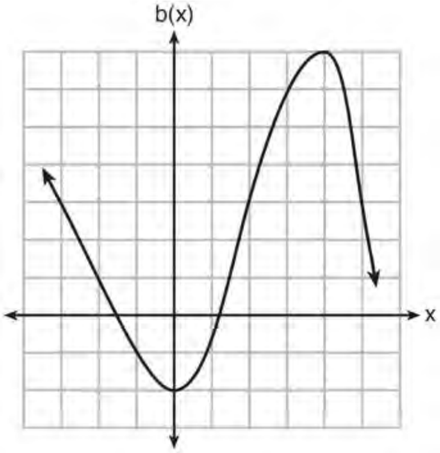
1) 

2) 

3) 

4) 

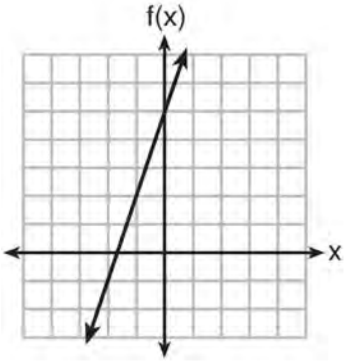
432 Richard is asked to transform the graph of $b(x)$ below.



The graph of $b(x)$ is transformed using the equation $h(x) = b(x - 2) - 3$. Describe how the graph of $b(x)$ changed to form the graph of $h(x)$.

F.IF.C.9: COMPARING FUNCTIONS

433 Which function has the greatest y-intercept?

1) $f(x) = 3x$
2) $2x + 3y = 12$
3) the line that has a slope of 2 and passes through $(1,-4)$
4) 

434 Given the following quadratic functions:

$$g(x) = -x^2 - x + 6$$

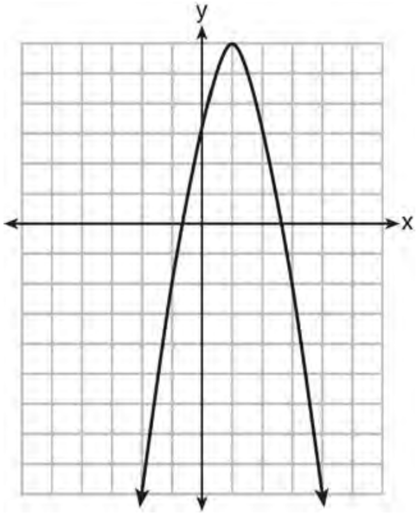
and

x	–3	–2	–1	0	1	2	3	4	5
n(x)	–7	0	5	8	9	8	5	0	–7

Which statement about these functions is true?

1) Over the interval $-1 \le x \le 1$, the average rate of change for $n(x)$ is less than that for $g(x)$.
2) The y-intercept of $g(x)$ is greater than the y-intercept for $n(x)$.
3) The function $g(x)$ has a greater maximum value than $n(x)$.
4) The sum of the roots of $n(x) = 0$ is greater than the sum of the roots of $g(x) = 0$.

435 Let f be the function represented by the graph below.



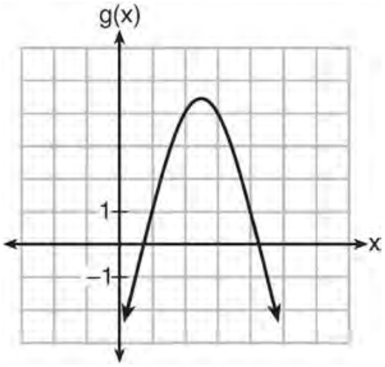
Let g be a function such that $g(x) = -\frac{1}{2}x^2 + 4x + 3$. Determine which function has the larger maximum value. Justify your answer.

436 Which quadratic function has the largest maximum?

1) $h(x) = (3 - x)(2 + x)$
2)

x	f(x)
−1	−3
0	5
1	9
2	9
3	5
4	−3

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

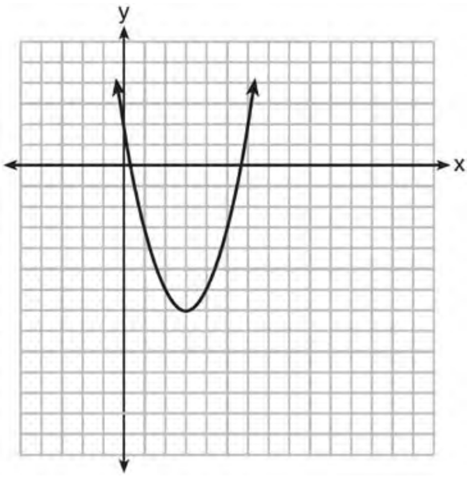


437 Which statement is true about the quadratic functions $g(x)$, shown in the table below, and $f(x) = (x-3)^2 + 2$?

x	g(x)
0	4
1	–1
2	–4
3	–5
4	–4
5	–1
6	4

1) They have the same vertex.
2) They have the same zeros.
3) They have the same axis of symmetry.
4) They intersect at two points.

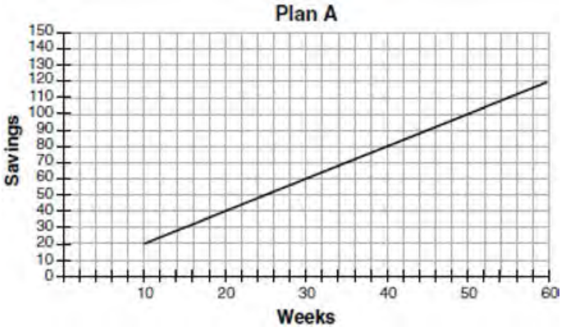
438 The graph representing a function is shown below.



Which function has a minimum that is *less* than the one shown in the graph?

1) $y = x^2 - 6x + 7$
2) $y = |x+3| - 6$
3) $y = x^2 - 2x - 10$
4) $y = |x-8| + 2$

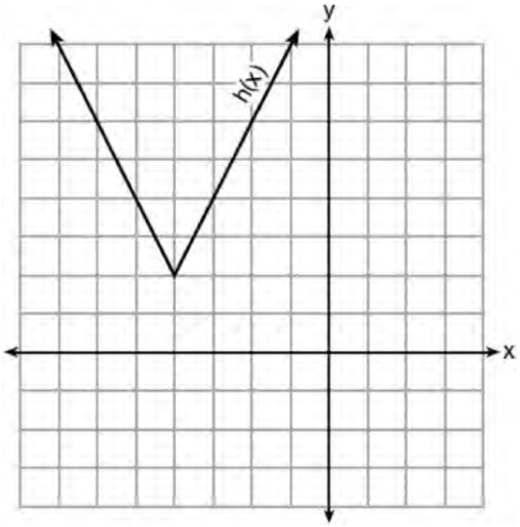
439 Nancy works for a company that offers two types of savings plans. Plan *A* is represented on the graph below.



Plan *B* is represented by the function $f(x) = 0.01 + 0.05x^2$, where x is the number of weeks. Nancy wants to have the highest savings possible after a year. Nancy picks Plan *B*. Her decision is

1) correct, because Plan *B* is an exponential function and will increase at a faster rate
2) correct, because Plan *B* is a quadratic function and will increase at a faster rate
3) incorrect, because Plan *A* will have a higher value after 1 year
4) incorrect, because Plan *B* is a quadratic function and will increase at a slower rate

440 The function $h(x)$, which is graphed below, and the function $g(x) = 2|x + 4| - 3$ are given.



Which statements about these functions are true?

I. $g(x)$ has a lower minimum value than $h(x)$.
II. For all values of x, $h(x) < g(x)$.
III. For any value of x, $g(x) \neq h(x)$.

1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

441 Which quadratic function has the largest maximum over the set of real numbers?

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

2)

x	k(x)
–1	–1
0	3
1	5
2	5
3	3
4	–1

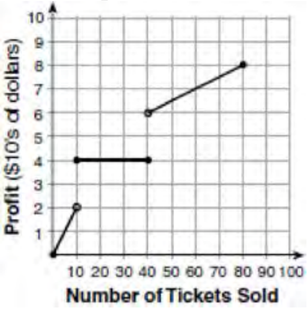
3) $g(x) = -(x - 5)^2 + 5$

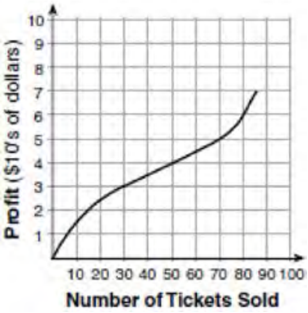
4)

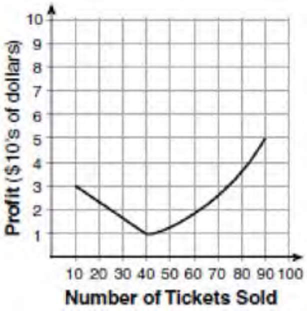
x	h(x)
–2	–9
–1	–3
0	1
1	3
2	3
3	1

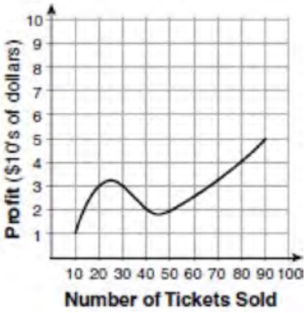
F.IF.B.4: RELATING GRAPHS TO EVENTS

442 To keep track of his profits, the owner of a carnival booth decided to model his ticket sales on a graph. He found that his profits only declined when he sold between 10 and 40 tickets. Which graph could represent his profits?

1) 

2) 

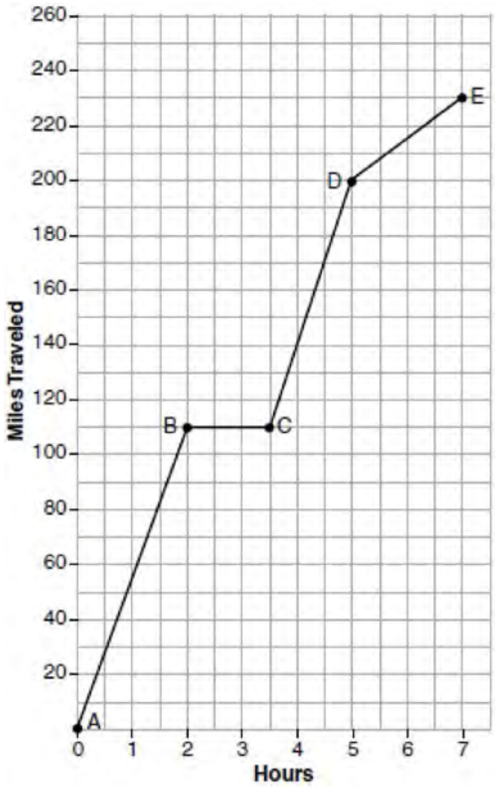
3) 

4) 

443 During a snowstorm, a meteorologist tracks the amount of accumulating snow. For the first three hours of the storm, the snow fell at a constant rate of one inch per hour. The storm then stopped for two hours and then started again at a constant rate of one-half inch per hour for the next four hours.
a) On the grid below, draw and label a graph that models the accumulation of snow over time using the data the meteorologist collected.

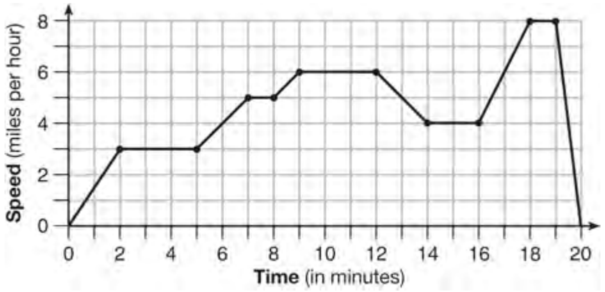
b) If the snowstorm started at 6 p.m., how much snow had accumulated by midnight?

444 The graph below models Craig's trip to visit his friend in another state. In the course of his travels, he encountered both highway and city driving.



Based on the graph, during which interval did Craig most likely drive in the city? Explain your reasoning. Explain what might have happened in the interval between *B* and *C*. Determine Craig's average speed, to the *nearest tenth of a mile per hour*, for his entire trip.

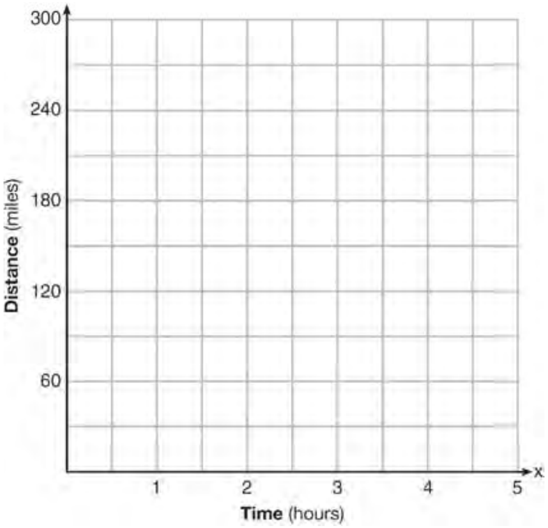
445 The graph below represents a jogger's speed during her 20-minute jog around her neighborhood.



Which statement best describes what the jogger was doing during the 9 – 12 minute interval of her jog?

1) She was standing still.
2) She was increasing her speed.
3) She was decreasing her speed.
4) She was jogging at a constant rate.

446 A driver leaves home for a business trip and drives at a constant speed of 60 miles per hour for 2 hours. Her car gets a flat tire, and she spends 30 minutes changing the tire. She resumes driving and drives at 30 miles per hour for the remaining one hour until she reaches her destination. On the set of axes below, draw a graph that models the driver's distance from home.

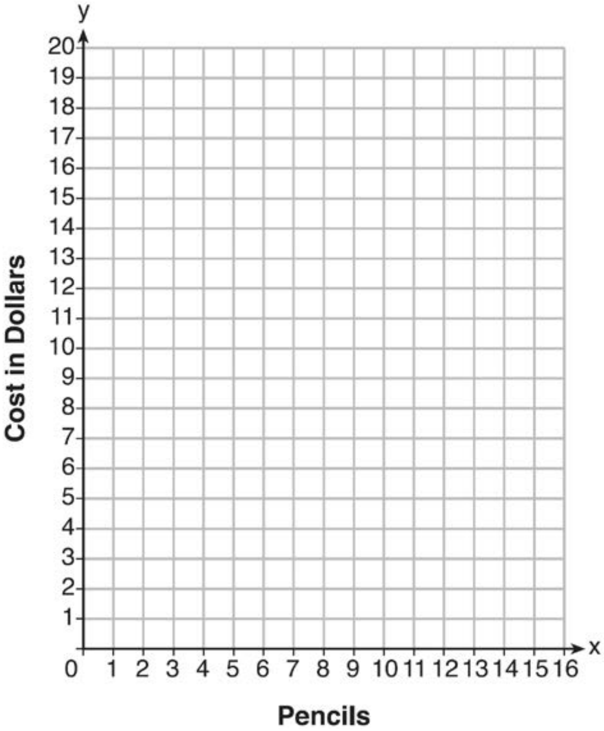

300
240
180
120
60
Distance (miles)
1
2
3
4
5
x
Time (hours)

F.IF.C.7: GRAPHING PIECEWISE-DEFINED FUNCTIONS

447 At an office supply store, if a customer purchases fewer than 10 pencils, the cost of each pencil is \$1.75. If a customer purchases 10 or more pencils, the cost of each pencil is \$1.25. Let c be a function for which $c(x)$ is the cost of purchasing x pencils, where x is a whole number.

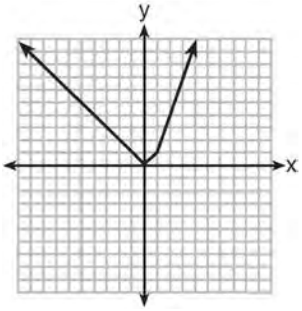
$$c(x) = \begin{cases} 1.75x, \text{ if } 0 \le x \le 9 \\ 1.25x, \text{ if } x \ge 10 \end{cases}$$

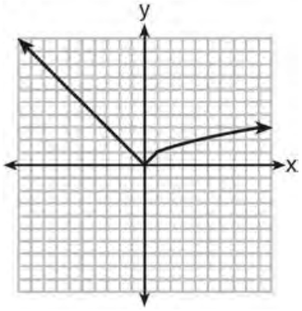
Create a graph of c on the axes below.

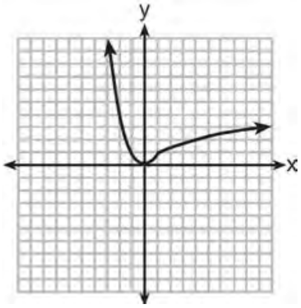

y
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Cost in Dollars
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
x
Pencils

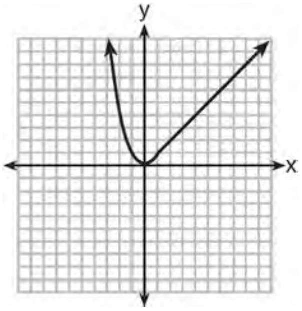
A customer brings 8 pencils to the cashier. The cashier suggests that the total cost to purchase 10 pencils would be less expensive. State whether the cashier is correct or incorrect. Justify your answer.

448 Which graph represents $f(x) = \begin{cases} |x| & x < 1 \\ \sqrt{x} & x \ge 1 \end{cases}$?

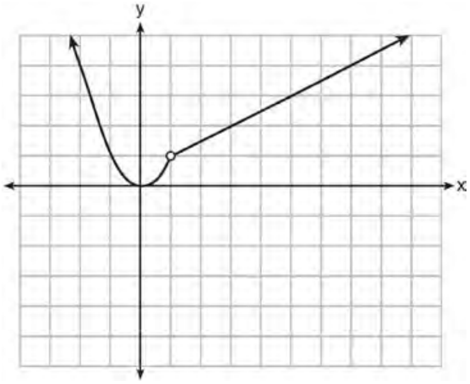
1) 

2) 

3) 

4) 

449 A function is graphed on the set of axes below.



Which function is related to the graph?

1) $f(x) = \begin{cases} x^2, x < 1 \\ x - 2, x > 1 \end{cases}$

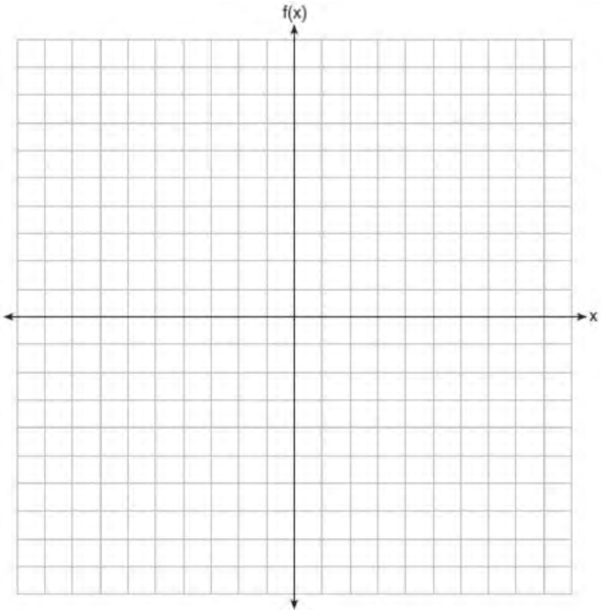
2) $f(x) = \begin{cases} x^2, x < 1 \\ \frac{1}{2}x + \frac{1}{2}, x > 1 \end{cases}$

3) $f(x) = \begin{cases} x^2, x < 1 \\ 2x - 7, x > 1 \end{cases}$

4) $f(x) = \begin{cases} x^2, x < 1 \\ \frac{3}{2}x - \frac{9}{2}, x > 1 \end{cases}$

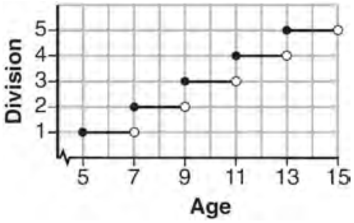
450 Graph the following function on the set of axes below.

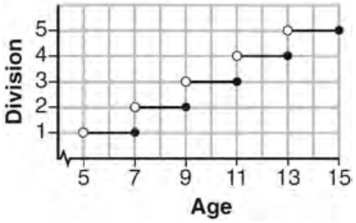
$$f(x) = \begin{cases} |x|, & -3 \le x < 1 \\ 4, & 1 \le x \le 8 \end{cases}$$

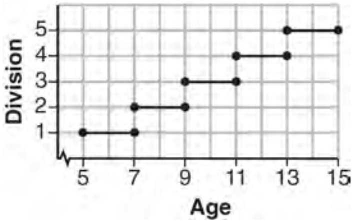


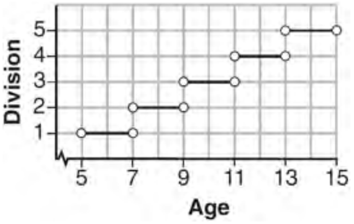
F.IF.C.7: GRAPHING STEP FUNCTIONS

451 Morgan can start wrestling at age 5 in Division 1. He remains in that division until his next odd birthday when he is required to move up to the next division level. Which graph correctly represents this information?

1) 

2) 

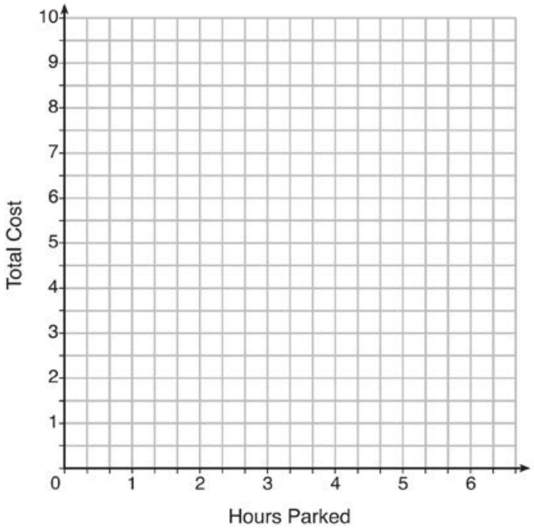
3) 

4) 

452 The table below lists the total cost for parking for a period of time on a street in Albany, N.Y. The total cost is for any length of time up to and including the hours parked. For example, parking for up to and including 1 hour would cost \$1.25; parking for 3.5 hours would cost \$5.75.

Hours Parked	**Total Cost**
1	1.25
2	2.50
3	4.00
4	5.75
5	7.75
6	10.00

Graph the step function that represents the cost for the number of hours parked.



Explain how the cost per hour to park changes over the six-hour period.

SEQUENCES AND SERIES

F.IF.A.3, F.LE.A.2: SEQUENCES

453 If $f(1) = 3$ and $f(n) = -2f(n-1) + 1$, then $f(5) =$
1) -5
2) 11
3) 21
4) 43

454 If a sequence is defined recursively by $f(0) = 2$ and $f(n+1) = -2f(n) + 3$ for $n \geq 0$, then $f(2)$ is equal to
1) 1
2) -11
3) 5
4) 17

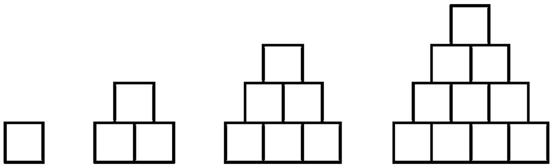
455 In a sequence, the first term is 4 and the common difference is 3. The fifth term of this sequence is
1) -11
2) -8
3) 16
4) 19

456 Given the function $f(n)$ defined by the following:

$$f(1) = 2$$
$$f(n) = -5f(n-1) + 2$$

Which set could represent the range of the function?
1) $\{2, 4, 6, 8, \dots\}$
2) $\{2, -8, 42, -208, \dots\}$
3) $\{-8, -42, -208, 1042, \dots\}$
4) $\{-10, 50, -250, 1250, \dots\}$

457 A sequence of blocks is shown in the diagram below.



This sequence can be defined by the recursive function $a_1 = 1$ and $a_n = a_{n-1} + n$. Assuming the pattern continues, how many blocks will there be when $n = 7$?
1) 13
2) 21
3) 28
4) 36

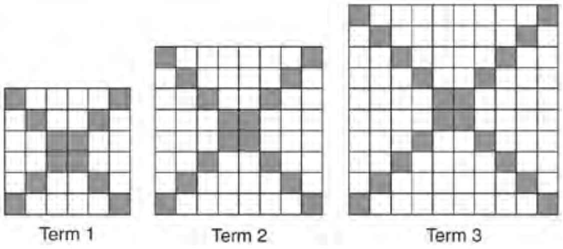
458 Determine and state whether the sequence $1, 3, 9, 27, \dots$ displays exponential behavior. Explain how you arrived at your decision.

459 A sunflower is 3 inches tall at week 0 and grows 2 inches each week. Which function(s) shown below can be used to determine the height, $f(n)$, of the sunflower in n weeks?

I. $f(n) = 2n + 3$
II. $f(n) = 2n + 3(n-1)$
III. $f(n) = f(n-1) + 2$ where $f(0) = 3$

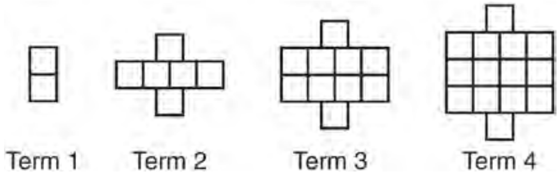
1) I and II
2) II, only
3) III, only
4) I and III

460 The diagrams below represent the first three terms of a sequence.



Assuming the pattern continues, which formula determines a_n, the number of shaded squares in the nth term?
1) $a_n = 4n + 12$
2) $a_n = 4n + 8$
3) $a_n = 4n + 4$
4) $a_n = 4n + 2$

461 A pattern of blocks is shown below.



If the pattern of blocks continues, which formula(s) could be used to determine the number of blocks in the *n*th term?

I	II	III
$a_n = n + 4$	$a_1 = 2$ $a_n = a_{n-1} + 4$	$a_n = 4n - 2$

1) I and II
2) I and III
3) II and III
4) III, only

462 The third term in an arithmetic sequence is 10 and the fifth term is 26. If the first term is a_1, which is an equation for the *n*th term of this sequence?

1) $a_n = 8n + 10$
2) $a_n = 8n - 14$
3) $a_n = 16n + 10$
4) $a_n = 16n - 38$

463 Which recursively defined function has a first term equal to 10 and a common difference of 4?

1) $f(1) = 10$
   $f(x) = f(x - 1) + 4$
2) $f(1) = 4$
   $f(x) = f(x - 1) + 10$
3) $f(1) = 10$
   $f(x) = 4f(x - 1)$
4) $f(1) = 4$
   $f(x) = 10f(x - 1)$

464 Which recursively defined function represents the sequence $3, 7, 15, 31, \ldots$?

1) $f(1) = 3,\ f(n + 1) = 2^{f(n)} + 3$
2) $f(1) = 3,\ f(n + 1) = 2^{f(n)} - 1$
3) $f(1) = 3,\ f(n + 1) = 2f(n) + 1$
4) $f(1) = 3,\ f(n + 1) = 3f(n) - 2$

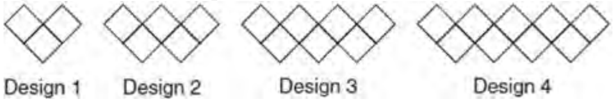
465 Which function defines the sequence $-6, -10, -14, -18, \ldots$, where $f(6) = -26$?

1) $f(x) = -4x - 2$
2) $f(x) = 4x - 2$
3) $f(x) = -x + 32$
4) $f(x) = x - 26$

466 In 2014, the cost to mail a letter was 49¢ for up to one ounce. Every additional ounce cost 21¢. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

1) $a_1 = 49;\ a_n = a_{n-1} + 21$
2) $a_1 = 0;\ a_n = 49a_{n-1} + 21$
3) $a_1 = 21;\ a_n = a_{n-1} + 49$
4) $a_1 = 0;\ a_n = 21a_{n-1} + 49$

467 If the pattern below continues, which equation(s) is a recursive formula that represents the number of squares in this sequence?



1) $y = 2x + 1$
2) $y = 2x + 3$
3) $a_1 = 3$

$a_n = a_{n-1} + 2$

4) $a_1 = 1$

$a_n = a_{n-1} + 2$

Algebra I Regents Exam Questions by Common Core State Standard: Topic
Answer Section

1 ANS: 1 PTS: 2 REF: 061401ai NAT: A.REI.A.1
TOP: Identifying Properties
2 ANS: 4 PTS: 2 REF: 081701ai NAT: A.REI.A.1
TOP: Identifying Properties
3 ANS: 4 PTS: 2 REF: 011801ai NAT: A.REI.A.1
TOP: Identifying Properties
4 ANS: 3

	Mean	Q1	Median	Q3	IQR
Semester 1	86.8	80.5	88	92.5	12
Semester 2	87	80	88	92	12

PTS: 2 REF: 061419ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion
5 ANS: 4 PTS: 2 REF: 011514ai NAT: S.ID.A.2
TOP: Central Tendency and Dispersion
6 ANS: 4 PTS: 2 REF: 011720ai NAT: S.ID.A.2
TOP: Central Tendency and Dispersion
7 ANS: 1

$A\colon \bar{x} = 6;\ \sigma_x = 3.16\quad B\colon \bar{x} = 6.875;\ \sigma_x = 3.06$

PTS: 2 REF: 081519ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion
8 ANS: 3

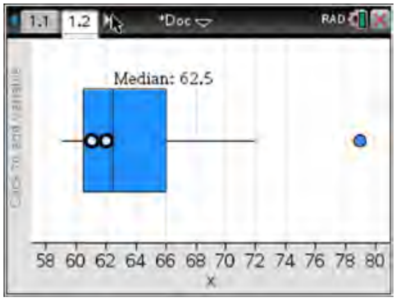
		Company 1	Company 2
1	median salary	33,500	36,250
2	mean salary	33,750	44,125
3	salary range	8,000	36,000
4	mean age	28.25	28.25

PTS: 2 REF: 081404ai NAT: S.ID.A.2 TOP: Central Tendency and Dispersion
9 ANS: 3
Median remains at 1.4.

PTS: 2 REF: 061520ai NAT: S.ID.A.3 TOP: Central Tendency and Dispersion

10 ANS: 4

(1) The box plot indicates the data is not evenly spread. (2) The median is 62.5. (3) The data is skewed because the mean does not equal the median. (4) an outlier is greater than $Q3 + 1.5 \cdot IRQ = 66 + 1.5(66 - 60.5) = 74.25$.



PTS: 2 REF: 061715ai NAT: S.ID.A.3 TOP: Central Tendency and Dispersion

11 ANS: 1

(1) the mode is a bit high (2) $Q_1 = 41$, $Q_3 = 68$, 1.5 times the IQR of 27 is 40.5, $Q_1 - 1.5IQR = 41 - 40.5 = 0.5$, $Q_3 + 1.5IQR = 68 + 40.5 = 108.5$, so the data have two outliers.

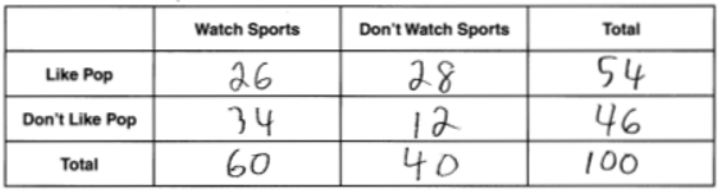
PTS: 2 REF: 011816ai NAT: S.ID.A.3 TOP: Central Tendency and Dispersion

12 ANS:

$$\frac{33 + 12}{180} = 25\%$$

PTS: 2 REF: 011526ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

13 ANS:



	Watch Sports	Don't Watch Sports	Total
Like Pop	26	28	54
Don't Like Pop	34	12	46
Total	60	40	100

PTS: 2 REF: 061729ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

14 ANS:

$$\frac{m}{351} = \frac{70}{70 + 35}$$

$$105m = 24570$$

$$m = 234$$

PTS: 2 REF: 011630ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

15 ANS: 4

$$\frac{30}{30+12+8}=0.6$$

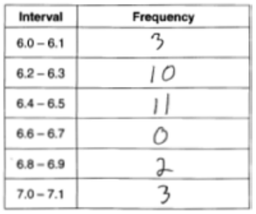
PTS: 2 REF: 061615ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

16 ANS: 2

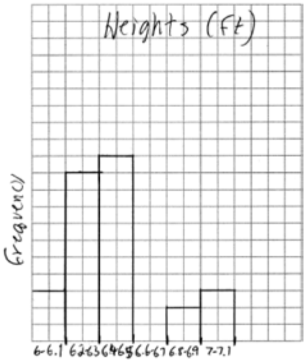
$$\frac{14}{16+20+14}=28\%$$

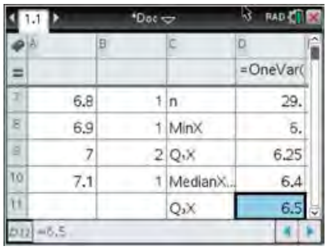
PTS: 2 REF: 011705ai NAT: S.ID.B.5 TOP: Frequency Tables
KEY: two-way

17 ANS:



Interval	Frequency
6.0 – 6.1	3
6.2 – 6.3	10
6.4 – 6.5	11
6.6 – 6.7	0
6.8 – 6.9	2
7.0 – 7.1	3





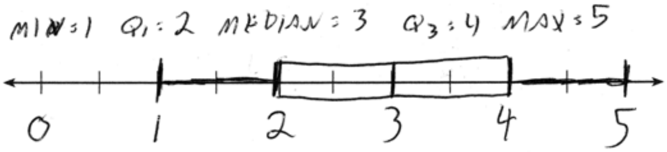
	A	B	C	D
=				=OneVar(
7	6.8	1	n	29.
8	6.9	1	MinX	6.
9	7	2	Q_1X	6.25
10	7.1	1	MedianX...	6.4
11			Q_3X	6.5

D12 =6.5

6.4-6.5

PTS: 4 REF: 081734ai NAT: S.ID.A.1 TOP: Frequency Histograms
KEY: frequency histograms

18 ANS:



PTS: 2 REF: 061432ai NAT: S.ID.A.1 TOP: Box Plots
KEY: represent

19 ANS: 4 PTS: 2 REF: 081603ai NAT: S.ID.A.1
TOP: Box Plots KEY: interpret

20 ANS: 3

median = 3, IQR = 4 − 2 = 2, $\bar{x}$ = 2.75. An outlier is outside the interval $[Q_1 - 1.5(\text{IQR}), Q_3 + 1.5(\text{IQR})]$.

$[2-1.5(2), 4+1.5(2)]$

[-1,7]

PTS: 2 REF: 061620ai NAT: S.ID.A.1 TOP: Dot Plots

21 ANS: 2 PTS: 2 REF: 081708ai NAT: S.ID.C.9
TOP: Analysis of Data

22 ANS: 2 PTS: 2 REF: 011713ai NAT: S.ID.C.9
TOP: Analysis of Data

23 ANS: 2 PTS: 2 REF: 061516ai NAT: S.ID.C.9
TOP: Analysis of Data

24 ANS:
$y = 0.05x - 0.92$

PTS: 2 REF: fall1307ai NAT: S.ID.B.6 TOP: Regression
KEY: linear

25 ANS:
$y = 836.47(2.05)^x$ The data appear to grow at an exponential rate. $y = 836.47(2.05)^2 \approx 3515$.

PTS: 4 REF: fall1313ai NAT: S.ID.B.6 TOP: Regression
KEY: choose model

26 ANS: 4 PTS: 2 REF: 081421ai NAT: S.ID.B.6
TOP: Regression KEY: linear

27 ANS:
$y = 80(1.5)^x$ $80(1.5)^{26} \approx 3{,}030{,}140$. No, because the prediction at $x = 52$ is already too large.

PTS: 4 REF: 061536ai NAT: S.ID.B.6 TOP: Regression
KEY: exponential AI

28 ANS:
$y = 0.16x + 8.27$ $r = 0.97$, which suggests a strong association.

PTS: 4 REF: 081536ai NAT: S.ID.B.6 TOP: Regression
KEY: linear with correlation coefficient

29 ANS:
$f(t) = -58t + 6182$ $r = -.94$ This indicates a strong linear relationship because r is close to -1.

PTS: 4 REF: 011635ai NAT: S.ID.B.6 TOP: Regression
KEY: linear with correlation coefficient

30 ANS:
$y = 17.159x - 2.476$. $y = 17.159(.65) - 2.476 \approx 8.7$

PTS: 4 REF: 081633ai NAT: S.ID.B.6 TOP: Regression
KEY: linear

31 ANS:
$y = -8.5x + 99.2$ The y-intercept represents the length of the rope without knots. The slope represents the decrease in the length of the rope for each knot.

PTS: 4 REF: 011834ai NAT: S.ID.B.6 TOP: Regression
KEY: linear

32 ANS: 3 PTS: 2 REF: 061411ai NAT: S.ID.C.8
TOP: Correlation Coefficient

33 ANS: 4 PTS: 2 REF: 011703ai NAT: S.ID.C.8
TOP: Correlation Coefficient

34 ANS: 1 PTS: 2 REF: 061714ai NAT: S.ID.C.8
TOP: Correlation Coefficient

35 ANS: 1 PTS: 2 REF: 081722ai NAT: S.ID.C.8
TOP: Correlation Coefficient

36 ANS:
$r \approx 0.94$. The correlation coefficient suggests that as calories increase, so does sodium.

PTS: 4 REF: 011535ai NAT: S.ID.C.8 TOP: Correlation Coefficient

37 ANS: 2 PTS: 2 REF: 061604ai NAT: S.ID.C.8
TOP: Correlation Coefficient

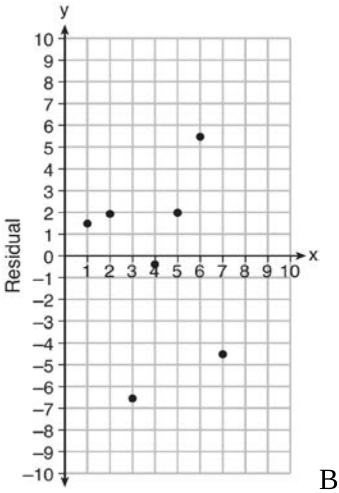
38 ANS: 2
$r = 0.92$

PTS: 2 REF: 081606ai NAT: S.ID.C.8 TOP: Correlation Coefficient

39 ANS:
$r \approx 0.92$. The correlation coefficient suggests a strong positive correlation between a student’s mathematics and physics scores.

PTS: 2 REF: 011831ai NAT: S.ID.C.8 TOP: Correlation Coefficient

40 ANS:



$y = 6.32x + 22.43$ Based on the residual plot, the equation is a good fit for the data because the residual values are scattered without a pattern and are fairly evenly distributed above and below the x-axis.

PTS: 4 REF: fall1314ai NAT: S.ID.B.6 TOP: Residuals

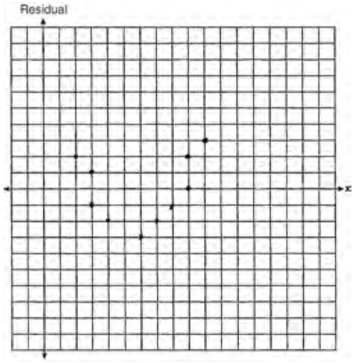
41 ANS: 3
A correlation coefficient close to –1 or 1 indicates a good fit. For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the x-axis.

PTS: 2 REF: fall1303ai NAT: S.ID.B.6 TOP: Residuals

42 ANS: 3
For a residual plot, there should be no observable pattern and a similar distribution of residuals above and below the x-axis.

PTS: 2 REF: 011624ai NAT: S.ID.B.6 TOP: Residuals

43 ANS:



The line is a poor fit because the residuals form a pattern.

PTS: 2 REF: 081431ai NAT: S.ID.B.6 TOP: Residuals

44 ANS:

Graph A is a good fit because it does not have a clear pattern, whereas Graph B does.

PTS: 2 REF: 061531ai NAT: S.ID.B.6 TOP: Residuals

45 ANS: 2 PTS: 2 REF: 061702ai NAT: A.SSE.A.1
TOP: Dependent and Independent Variables

46 ANS: 4 PTS: 2 REF: 081503ai NAT: A.SSE.A.1
TOP: Modeling Expressions

47 ANS: 4 PTS: 2 REF: 061602ia NAT: A.SSE.A.1
TOP: Modeling Expressions

48 ANS:

No, –2 is the coefficient of the term with the highest power.

PTS: 2 REF: 081628ai NAT: A.SSE.A.1 TOP: Modeling Expressions

49 ANS: 4 PTS: 2 REF: 011718ai NAT: A.SSE.A.1
TOP: Modeling Expressions

50 ANS: 2 PTS: 2 REF: 081712ai NAT: A.SSE.A.1
TOP: Modeling Expressions

51 ANS: 1

$$\frac{7}{3}\left(x+\frac{9}{28}\right)=20$$

$$\frac{7}{3}x+\frac{3}{4}=\frac{80}{4}$$

$$\frac{7}{3}x=\frac{77}{4}$$

$$x=\frac{33}{4}=8.25$$

PTS: 2 REF: 061405ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: fractional expressions

52 ANS: 1

$$\begin{aligned} \frac{x-2}{3} &= \frac{4}{6} \\ 6x-12 &= 12 \\ 6x &= 24 \\ x &= 4 \end{aligned}$$

PTS: 2 REF: 081420ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: fractional expressions

53 ANS: 1

$$\begin{aligned} 4(x-7) &= 0.3(x+2)+2.11 \\ 4x-28 &= 0.3x+0.6+2.11 \\ 3.7x-28 &= 2.71 \\ 3.7x &= 30.71 \\ x &= 8.3 \end{aligned}$$

PTS: 2 REF: 061719ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: decimals

54 ANS: 2

$$6\left(\frac{5}{6}\left(\frac{3}{8}-x\right)=16\right)$$

$$8\left(5\left(\frac{3}{8}-x\right)=96\right)$$

$$\begin{aligned} 15-40x &= 768 \\ -40x &= 753 \\ x &= -18.825 \end{aligned}$$

PTS: 2 REF: 081713ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: fractional expressions

55 ANS: 4

$$\frac{2}{3}\left(\frac{1}{4}x-2\right)=\frac{1}{5}\left(\frac{4}{3}x-1\right)$$

$$\begin{aligned} 10(3x-24) &= 3(16x-12) \\ 30x-240 &= 48x-36 \\ -204 &= 18x \\ x &= -11.\bar{3} \end{aligned}$$

PTS: 2 REF: 011822ai NAT: A.REI.B.3 TOP: Solving Linear Equations
KEY: fractional expressions

56 ANS:

$$12x + 9(2x) + 5(3x) = 15 \quad 6\left(\frac{1}{3}\right) = 2 \text{ pounds}$$
$$45x = 15$$
$$x = \frac{1}{3}$$

PTS: 2 REF: spr1305ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

57 ANS: 3 PTS: 2 REF: 081616ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

58 ANS: 2 PTS: 2 REF: 061416ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

59 ANS:

$$15x + 36 = 10x + 48$$
$$5x = 12$$
$$x = 2.4$$

PTS: 2 REF: 011531ai NAT: A.CED.A.1 TOP: Modeling Linear Equations

60 ANS: 3 PTS: 2 REF: 081614ai NAT: A.CED.A.1
TOP: Modeling Linear Equations

61 ANS:

$C = 1.29 + .99(s - 1)$ No, because $C = 1.29 + .99(52 - 1) = 51.78$

PTS: 2 REF: 011730ai NAT: A.CED.A.2 TOP: Modeling Linear Equations

62 ANS: 4 PTS: 2 REF: 061422ai NAT: A.CED.A.3
TOP: Modeling Linear Equations

63 ANS: 4 PTS: 2 REF: 081508ai NAT: A.CED.A.3
TOP: Modeling Linear Equations

64 ANS: 1

$$V = \frac{1}{3}\pi r^2 h$$
$$3V = \pi r^2 h$$
$$\frac{3V}{\pi h} = r^2$$
$$\sqrt{\frac{3V}{\pi h}} = r$$

PTS: 2 REF: 061423ai NAT: A.CED.A.4 TOP: Transforming Formulas

65 ANS:

$$A = \frac{1}{2}h(b_1 + b_2) \quad b_1 = \frac{2(60)}{6} - 12 = 20 - 12 = 8$$

$$\frac{2A}{h} = b_1 + b_2$$

$$\frac{2A}{h} - b_2 = b_1$$

PTS: 4 REF: 081434ai NAT: A.CED.A.4 TOP: Transforming Formulas

66 ANS: 1 PTS: 2 REF: 011516ai NAT: A.CED.A.4
TOP: Transforming Formulas

67 ANS: 2

$$d = \frac{1}{2}at^2$$

$$2d = at^2$$

$$\frac{2d}{a} = t^2$$

$$\sqrt{\frac{2d}{a}} = t$$

PTS: 2 REF: 061519ai NAT: A.CED.A.4 TOP: Transforming Formulas

68 ANS:

$$\frac{V}{\pi h} = \frac{\pi r^2 h}{\pi h} \quad d = 2\sqrt{\frac{66}{3.3\pi}} \approx 5$$

$$\frac{V}{\pi h} = r^2$$

$$\sqrt{\frac{V}{\pi h}} = r$$

PTS: 4 REF: 081535ai NAT: A.CED.A.4 TOP: Transforming Formulas

69 ANS: 3 PTS: 2 REF: 011606ai NAT: A.CED.A.4
TOP: Transforming Formulas

70 ANS:

$$\frac{S}{180} = n - 2$$

$$\frac{S}{180} + 2 = n$$

PTS: 2 REF: 061631ai NAT: A.CED.A.4 TOP: Transforming Formulas

71 ANS:

$$\begin{aligned} 4ax + 12 - 3ax &= 25 + 3a \\ ax &= 13 + 3a \\ x &= \frac{13 + 3a}{a} \end{aligned}$$

PTS: 2 REF: 081632ai NAT: A.CED.A.4 TOP: Transforming Formulas

72 ANS: 3 PTS: 2 REF: 011704ai NAT: A.CED.A.4
TOP: Transforming Formulas

73 ANS: 3 PTS: 2 REF: 061723ai NAT: A.CED.A.4
TOP: Transforming Formulas

74 ANS:

$$V = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

PTS: 2 REF: 081727ai NAT: A.CED.A.4 TOP: Transforming Formulas

75 ANS:

$$F_g = \frac{GM_1M_2}{r^2}$$

$$r^2 = \frac{GM_1M_2}{F_g}$$

$$r = \sqrt{\frac{GM_1M_2}{F_g}}$$

PTS: 2 REF: 011830ai NAT: A.CED.A.4 TOP: Transforming Formulas

76 ANS: 2 PTS: 2 REF: 011502ai NAT: N.Q.A.1
TOP: Conversions KEY: dimensional analysis

77 ANS: 1

$$12.5\text{ sec} \times \frac{1\text{ min}}{60\text{ sec}} = 0.208\overline{3}\text{ min}$$

PTS: 2 REF: 061608ai NAT: N.Q.A.1 TOP: Conversions
KEY: dimensional analysis

78 ANS: 1

$C(68) = \frac{5}{9}(68 - 32) = 20$

PTS: 2 REF: 011710ai NAT: N.Q.A.1 TOP: Conversions
KEY: formula

79 ANS:

$12\text{ km}\left(\frac{0.62\text{ m}}{1\text{ km}}\right) = 7.44\text{ m} \quad \frac{26.2\text{ m}}{7.44\text{ mph}} \approx 3.5\text{ hours}$

PTS: 2 REF: 011726ai NAT: N.Q.A.1 TOP: Conversions
KEY: dimensional analysis

80 ANS: 4 PTS: 2 REF: 061720ai NAT: N.Q.A.1
TOP: Conversions KEY: dimensional analysis

81 ANS: 3 PTS: 2 REF: 081609ai NAT: N.Q.A.2
TOP: Using Rate

82 ANS:

$\frac{2}{40} = \frac{5.75}{x} \quad \frac{5280}{115} \approx 46$

$x = 115$

PTS: 2 REF: 081730ai NAT: N.Q.A.2 TOP: Using Rate

83 ANS:

The rate of speed is expressed in $\frac{\text{feet}}{\text{minute}}$ because speed=$\frac{\text{distance}}{\text{time}}$.

PTS: 2 REF: 011827ai NAT: N.Q.A.2 TOP: Using Rate

84 ANS:

$\frac{762 - 192}{92 - 32} = \frac{570}{60} = 9.5 \quad y = 9.5x \quad T = 192 + 9.5(120 - 32) = 1028$

PTS: 4 REF: 061635ai NAT: A.CED.A.2 TOP: Speed

85 ANS:

$610 - 55(4) = 390 \quad \frac{390}{65} = 6 \quad 4 + 6 = 10 \quad 610 - 55(2) = 500 \quad \frac{500}{65} \approx 7.7 \quad 10 - (2 + 7.7) \approx 0.3$

PTS: 4 REF: 081733ai NAT: A.CED.A.2 TOP: Speed

86 ANS: 4

Over the interval $0 \le x \le 3$, the average rate of change for $\text{h}(x) = \frac{9 - 2}{3 - 0} = \frac{7}{3}$, $\text{f}(x) = \frac{7 - 1}{3 - 0} = \frac{6}{3} = 2$, and $\text{g}(x) = \frac{3 - 0}{3 - 0} = \frac{3}{3} = 1$.

PTS: 2 REF: spr1301ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

87 ANS: 1

$$\frac{0.8(10^2) - 0.8(5^2)}{10 - 5} = \frac{80 - 20}{5} = 12$$

PTS: 2 REF: 011521ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

88 ANS: 1

The graph is steepest between hour 0 and hour 1.

PTS: 2 REF: 081601ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

89 ANS: 1

$$\frac{110 - 40}{2 - 1} > \frac{350 - 230}{8 - 6}$$

$$70 > 60$$

PTS: 2 REF: 061418ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

90 ANS: 4

$$\frac{4.7 - 2.3}{20 - 80} = \frac{2.4}{-60} = -0.04.$$

PTS: 2 REF: 081414ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

91 ANS: 3

$$\frac{36.6 - 15}{4 - 0} = \frac{21.6}{4} = 5.4$$

PTS: 2 REF: 061511ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

92 ANS: 1 PTS: 2 REF: 081515ai NAT: F.IF.B.6
TOP: Rate of Change KEY: AI

93 ANS: 4

$$(1)\ \frac{6 - 1}{1971 - 1898} = \frac{5}{73} \approx .07 \quad (2)\ \frac{14 - 6}{1985 - 1971} = \frac{8}{14} \approx .57 \quad (3)\ \frac{24 - 14}{2006 - 1985} = \frac{10}{21} \approx .48 \quad (4)\ \frac{35 - 24}{2012 - 2006} = \frac{11}{6} \approx 1.83$$

PTS: 2 REF: 011613ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

94 ANS:

During 1960-1965 the graph has the steepest slope.

PTS: 2 REF: 011628ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

95 ANS: 1 PTS: 2 REF: 061603ai NAT: F.IF.B.6
TOP: Rate of Change KEY: AI

96 ANS: 4

1) $y = 3x + 2$; 2) $\frac{-5-2}{3-2} = -7$; 3) $y = -2x + 3$; 4) $y = -3x + 5$

PTS: 2 REF: 081615ai NAT: F.IF.B.6 TOP: Rate of Change

97 ANS: 1 PTS: 2 REF: 011721ai NAT: F.IF.B.6
TOP: Rate of Change

98 ANS:

$\frac{480-140}{7-2} = 68\text{ mph}$

PTS: 2 REF: 011731ai NAT: F.IF.B.6 TOP: Rate of Change

99 ANS: 2

The slope of a line connecting $(5,19)$ and $(10,20)$ is lowest.

PTS: 2 REF: 081705ai NAT: F.IF.B.6 TOP: Rate of Change
KEY: AI

100 ANS: 2

From 1996-2012, the average rate of change was positive for three age groups.

PTS: 2 REF: 011824ai NAT: F.IF.B.6 TOP: Rate of Change

101 ANS:

The set of integers includes negative numbers, so is not an appropriate domain for time; for $(0,6)$, the hourly rate is increasing, or for $(0,14)$, the total numbers of shoes is increasing; $\frac{120-0}{6-14} = -15$, 15 fewer shoes were sold each hour between the sixth and fourteenth hours.

PTS: 4 REF: 011836ai NAT: F.IF.B.6 TOP: Rate of Change

102 ANS:

$A(n) = 175 - 2.75n$ $0 = 175 - 2.75n$ After 63 weeks, Caitlin will not have enough money to rent another movie.

$2.75n = 175$

$n = 63.6$

PTS: 4 REF: 061435ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

103 ANS: 4 PTS: 2 REF: 011523ai NAT: F.BF.A.1
TOP: Modeling Linear Functions

104 ANS:

$f(x) = 6.50x + 4(12)$

PTS: 2 REF: 061526ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

105 ANS:

$T(d) = 2d + 28$ $T(6) = 2(6) + 28 = 40$

PTS: 2 REF: 081532ai NAT: F.BF.A.1 TOP: Modeling Linear Functions

106 ANS: 4
$P(c) = (.50 + .25)c - 9.96 = .75c - 9.96$

PTS: 2 REF: 011807ai NAT: F.BF.A.1 TOP: Modeling Linear Functions
107 ANS: 4 PTS: 2 REF: 081604ai NAT: F.LE.A.2
TOP: Modeling Linear Functions
108 ANS:
$p(x) = 0.035x + 300 \quad p(8250) = 0.035(8250) + 300 = 588.75$

PTS: 4 REF: 011833ai NAT: F.BF.A.1 TOP: Modeling Linear Functions
109 ANS:
$h(n) = 1.5(n - 1) + 3$

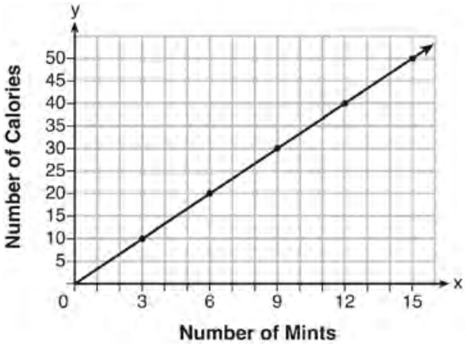
PTS: 2 REF: 081525ai NAT: F.LE.A.2 TOP: Modeling Linear Functions
110 ANS:
$f(x) = 0.75x + 4.50$. Each card costs 75¢ and start-up costs were \$4.50.

PTS: 4 REF: 011735ai NAT: F.LE.A.2 TOP: Modeling Linear Functions
111 ANS: 3 PTS: 2 REF: 061407ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
112 ANS: 2 PTS: 2 REF: 081402ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
113 ANS: 2 PTS: 2 REF: 011501ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
114 ANS: 3 PTS: 2 REF: 061501ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
115 ANS:
The slope represents the amount paid each month and the *y*-intercept represents the initial cost of membership.

PTS: 2 REF: 011629ai NAT: F.LE.B.5 TOP: Modeling Linear Functions
116 ANS: 2 PTS: 2 REF: 011709ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
117 ANS: 4 PTS: 2 REF: 081709ai NAT: F.LE.B.5
TOP: Modeling Linear Functions
118 ANS: 2 PTS: 2 REF: 061704ai NAT: S.ID.C.7
TOP: Modeling Linear Functions
119 ANS:
There is 2 inches of snow every 4 hours.

PTS: 2 REF: 061630ai NAT: S.ID.C.7 TOP: Modeling Linear Functions

120 ANS:



$$C(x) = \frac{10}{3}x \quad 180 = \frac{10}{3}x$$

$$540 = 10x$$

$$54 = x$$

PTS: 4 REF: fall1308ai NAT: A.CED.A.2 TOP: Graphing Linear Functions

121 ANS: 2 PTS: 2 REF: 081413ai NAT: A.CED.A.2
TOP: Graphing Linear Functions KEY: bimodalgraph

122 ANS: 2 PTS: 2 REF: 011602ai NAT: A.CED.A.2
TOP: Graphing Linear Functions

123 ANS: 1

$$4x - 5(0) = 40$$

$$4x = 40$$

$$x = 10$$

PTS: 2 REF: 081408ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

124 ANS: 4

$$y + 3 = 6(0)$$

$$y = -3$$

PTS: 2 REF: 011509ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

125 ANS:

The data is continuous, i.e. a fraction of a cookie may be eaten.

PTS: 2 REF: 081729ai NAT: F.IF.B.4 TOP: Graphing Linear Functions

126 ANS: 4

$$m = \frac{11-1}{3-(-2)} = \frac{10}{5} = 2 \quad y = mx + b \quad y = 2x + 5$$

$$11 = 2(3) + b \quad 9 = 2(2) + 5$$

$$5 = b$$

PTS: 2 REF: 011511ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

127 ANS:

$m = \frac{4-1}{-3-6} = \frac{3}{-9} = -\frac{1}{3}$ $y - y_1 = m(x - x_1)$

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

$4 = 1 + b$

$3 = b$

$y = -\frac{1}{3}x + 3$

PTS: 2 REF: 061629ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

128 ANS: 3

$m = \frac{3 - -7}{2 - 4} = -5$ $\begin{array}{l} 3 = (-5)(2) + b \\ b = 13 \end{array}$ $y = -5x + 13$ represents the line passing through the points $(2,3)$ and $(4,-7)$. The fourth equation may be rewritten as $y = 5x - 13$, so is a different line.

PTS: 2 REF: 081720ai NAT: A.REI.D.10 TOP: Writing Linear Equations
KEY: other forms

129 ANS: 1

$7 - \frac{2}{3}x < x - 8$

$15 < \frac{5}{3}x$

$9 < x$

PTS: 2 REF: 011507ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

130 ANS:

$b(x - 3) \ge ax + 7b$

$bx - 3b \ge ax + 7b$

$bx - ax \ge 10b$

$x(b - a) \ge 10b$

$x \le \frac{10b}{b - a}$

PTS: 2 REF: 011631ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

131 ANS: 4

$$\begin{aligned} 3x+2 &\le 5x-20 \\ 22 &\le 2x \\ 11 &\le x \end{aligned}$$

PTS: 2 REF: 061609ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

132 ANS: 1

$$\begin{aligned} 2h+8 &> 3h-6 \\ 14 &> h \\ h &< 14 \end{aligned}$$

PTS: 2 REF: 081607ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

133 ANS:

$$\begin{aligned} 1.8-0.4y &\ge 2.2-2y \\ 1.6y &\ge 0.4 \\ y &\ge 0.25 \end{aligned}$$

PTS: 2 REF: 011727ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

134 ANS: 1

$$\begin{aligned} 2+\frac{4}{9}x &\ge 4+x \\ -2 &\ge \frac{5}{9}x \\ x &\le -\frac{18}{5} \end{aligned}$$

PTS: 2 REF: 081711ai NAT: A.REI.B.3 TOP: Solving Linear Inequalities

135 ANS:

$$\begin{aligned} 2(-1)+a(-1)-7 &> -12 \quad a=2 \\ -a-9 &> -12 \\ -a &> -3 \\ a &< 3 \end{aligned}$$

PTS: 2 REF: 061427ai NAT: A.REI.B.3 TOP: Interpreting Solutions

136 ANS:

$$\begin{aligned} 6.\ 3x+9 &\le 5x-3 \\ 12 &\le 2x \\ 6 &\le x \end{aligned}$$

PTS: 2 REF: 081430ai NAT: A.REI.B.3 TOP: Interpreting Solutions

137 ANS:
$-3x+7-5x<15$ 0 is the smallest integer.

$$-8x<8$$

$$x>-1$$

PTS: 2 REF: 061530ai NAT: A.REI.B.3 TOP: Interpreting Solutions

138 ANS:
$7x-3(4x-8)\le 6x+12-9x$ 6, 7, 8 are the numbers greater than or equal to 6 in the interval.

$$7x-12x+24\le -3x+12$$

$$-5x+24\le -3x+12$$

$$12\le 2x$$

$$6\le x$$

PTS: 4 REF: 081534ai NAT: A.REI.B.3 TOP: Interpreting Solutions

139 ANS: 4

$$47-4x<7$$

$$-4x<-40$$

$$x>10$$

PTS: 2 REF: 061713ai NAT: A.REI.B.3 TOP: Interpreting Solutions

140 ANS: 2

$$-2(x-5)<10$$

$$x-5>-5$$

$$x>0$$

PTS: 2 REF: 011817ai NAT: A.REI.B.3 TOP: Interpreting Solutions

141 ANS: 3 PTS: 2 REF: 011513ai NAT: A.CED.A.1
TOP: Modeling Linear Inequalities

142 ANS: 4

$$\begin{array}{ll} \dfrac{750+2.25p}{p}>2.75 & \dfrac{750+2.25p}{p}<3.25 \\ 750+2.25p>2.75p & 750+2.25p<3.25p \\ 750>.50p & 750<p \\ 1500>p & \end{array}$$

PTS: 2 REF: 061524ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

143 ANS: 4 PTS: 2 REF: 081505ai NAT: A.CED.A.1
TOP: Modeling Linear Inequalities

144 ANS: 2

$$7 < \frac{7.2+7.6+p_L}{3} \text{ and } \frac{7.2+7.6+p_H}{3} < 7.8$$

$$6.2 < p_L \qquad p_H < 8.6$$

PTS: 2 REF: 061607ai NAT: A.CED.A.1 TOP: Modeling Linear Inequalities

145 ANS:

$$8x + 11y \geq 200 \quad 8x + 11(15) \geq 200$$

$$8x + 165 \geq 200$$

$$8x \geq 35$$

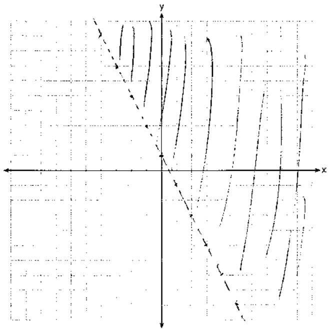
$$x \geq 4.375$$

5 hours

PTS: 4 REF: fall1309ai NAT: A.CED.A.3 TOP: Modeling Linear Inequalities

146 ANS: 1 PTS: 2 REF: 061505ai NAT: A.REI.D.12
TOP: Graphing Linear Inequalities

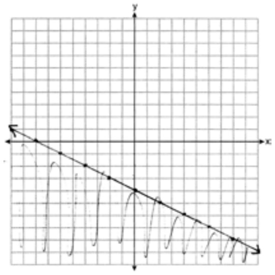
147 ANS:



PTS: 2 REF: 081526ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

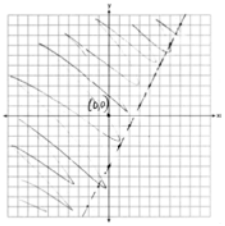
148 ANS: 2 PTS: 2 REF: 011605ai NAT: A.REI.D.12
TOP: Graphing Linear Inequalities

149 ANS:



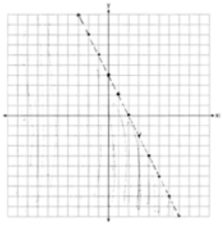
PTS: 4 REF: 081634ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

150 ANS:



PTS: 2 REF: 011729ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

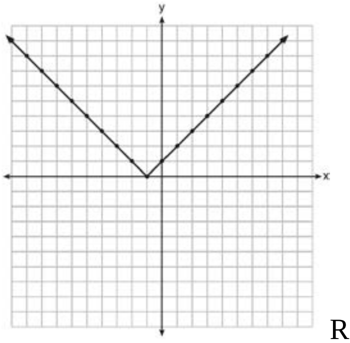
151 ANS:



$y < -2x + 4$

PTS: 2 REF: 061730ai NAT: A.REI.D.12 TOP: Graphing Linear Inequalities

152 ANS:

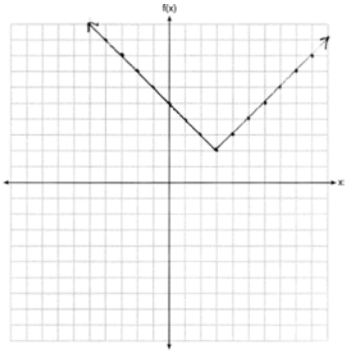


Range: $y \geq 0$. The function is increasing for $x > -1$.

PTS: 4 REF: fall1310ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

153 ANS: 1 PTS: 2 REF: 011712ai NAT: F.IF.C.7
TOP: Graphing Absolute Value Functions

154 ANS:

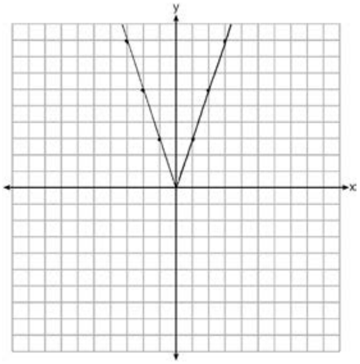


PTS: 2 REF: 011825ai NAT: F.IF.C.7 TOP: Graphing Absolute Value Functions

155 ANS:
$g(x)$ is $f(x)$ shifted right by a, $h(x)$ is $f(x)$ shifted down by a.

PTS: 2 REF: 061732ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

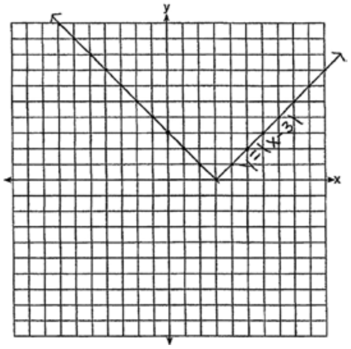
156 ANS:



2 down. 4 right.

PTS: 4 REF: 081433ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

157 ANS:



The graph has shifted three units to the right.

PTS: 2 REF: 061525ai NAT: F.BF.B.3 TOP: Graphing Absolute Value Functions

158 ANS:

$$8m^2+20m-12=0$$
$$4(2m^2+5m-3)=0$$
$$(2m-1)(m+3)=0$$
$$m=\frac{1}{2},-3$$

PTS: 2 REF: fall1305ai NAT: A.SSE.B.3 TOP: Solving Quadratics

159 ANS: 3 PTS: 2 REF: 061412ai NAT: A.SSE.B.3
TOP: Solving Quadratics

160 ANS:
$x^2+10x+24=(x+4)(x+6)=(x+6)(x+4)$. 6 and 4

PTS: 2 REF: 081425ai NAT: A.SSE.B.3 TOP: Solving Quadratics

161 ANS: 4 PTS: 2 REF: 011503ai NAT: A.SSE.B.3
TOP: Solving Quadratics

162 ANS: 4

$$\begin{aligned} 3x^2-3x-6&=0 \\ 3(x^2-x-2)&=0 \\ 3(x-2)(x+1)&=0 \\ x&=2,-1 \end{aligned}$$

PTS: 2 REF: 081513ai NAT: A.SSE.B.3 TOP: Solving Quadratics

163 ANS: 1

$$\begin{aligned} 2x^2-4x-6&=0 \\ 2(x^2-2x-3)&=0 \\ 2(x-3)(x+1)&=0 \\ x&=3,-1 \end{aligned}$$

PTS: 2 REF: 011609ai NAT: A.SSE.B.3 TOP: Solving Quadratics

164 ANS:

$$\begin{aligned} 0&=(B+3)(B-1) \\ 0&=(8x+3)(8x-1) \\ x&=-\frac{3}{8},\frac{1}{8} \end{aligned}$$

Janice substituted B for $8x$, resulting in a simpler quadratic. Once factored, Janice substituted $8x$ for B.

PTS: 4 REF: 081636ai NAT: A.SSE.B.3 TOP: Solving Quadratics

165 ANS: 3 PTS: 2 REF: 011702ai NAT: A.SSE.B.3
TOP: Solving Quadratics

166 ANS:

$$\begin{aligned} x^2+3x-18&=0 \\ (x+6)(x-3)&=0 \\ x&=-6,3 \end{aligned}$$

The zeros are the x-intercepts of $r(x)$.

PTS: 4 REF: 061733ai NAT: A.SSE.B.3 TOP: Solving Quadratics

167 ANS: 1

$$\begin{aligned} x^2 - 6x &= 19 \\ x^2 - 6x + 9 &= 19 + 9 \\ (x-3)^2 &= 28 \\ x - 3 &= \pm\sqrt{4 \cdot 7} \\ x &= 3 \pm 2\sqrt{7} \end{aligned}$$

PTS: 2 REF: fall1302ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

168 ANS: 2

$$\begin{aligned} x^2 - 6x &= 12 \\ x^2 - 6x + 9 &= 12 + 9 \\ (x-3)^2 &= 21 \end{aligned}$$

PTS: 2 REF: 061408ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

169 ANS: 2

$$\begin{aligned} x^2 + 4x &= 16 \\ x^2 + 4x + 4 &= 16 + 4 \\ (x+2)^2 &= 20 \\ x + 2 &= \pm\sqrt{4 \cdot 5} \\ &= -2 \pm 2\sqrt{5} \end{aligned}$$

PTS: 2 REF: 061410ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

170 ANS:

$$\begin{aligned} m(x) &= (3x-1)(3-x) + 4x^2 + 19 \\ m(x) &= 9x - 3x^2 - 3 + x + 4x^2 + 19 \\ m(x) &= x^2 + 10x + 16 \end{aligned}$$

$$\begin{aligned} x^2 + 10x + 16 &= 0 \\ (x+8)(x+2) &= 0 \\ x &= -8, -2 \end{aligned}$$

PTS: 4 REF: 061433ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: factoring

171 ANS: 3 PTS: 2 REF: 081403ai NAT: A.REI.B.4
TOP: Solving Quadratics KEY: taking square roots

172 ANS:

$$\frac{1}{2}x^2-4=0$$

$$x^2-8=0$$

$$x^2=8$$

$$x=\pm 2\sqrt{2}$$

PTS: 2 REF: fall1306ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

173 ANS:

Since $(x+p)^2=x^2+2px+p^2$, p is half the coefficient of x, and the constant term is equal to p^2. $\left(\frac{6}{2}\right)^2=9$

PTS: 2 REF: 081432ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

174 ANS: 4

$$x^2+6x=7$$

$$x^2+6x+9=7+9$$

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

PTS: 2 REF: 011517ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

175 ANS:

$$4x^2-12x-7=0$$

$$(4x^2-14x)+(2x-7)=0$$

$$2x(2x-7)+(2x-7)=0$$

$$(2x+1)(2x-7)=0$$

$$x=-\frac{1}{2},\frac{7}{2}$$

PTS: 2 REF: 011529ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: factoring

176 ANS: 4

$$\begin{aligned} x^2-5x&=-3 \\ x^2-5x+\frac{25}{4}&=\frac{-12}{4}+\frac{25}{4} \\ \left(x-\frac{5}{2}\right)^2&=\frac{13}{4} \end{aligned}$$

PTS: 2 REF: 061518ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

177 ANS: 1 PTS: 2 REF: 061521ai NAT: A.REI.B.4
TOP: Solving Quadratics KEY: taking square roots

178 ANS: 1

$$\begin{aligned} x^2-8x+16&=24+16 \\ (x-4)^2&=40 \\ x-4&=\pm\sqrt{40} \\ x&=4\pm 2\sqrt{10} \end{aligned}$$

PTS: 2 REF: 061523ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

179 ANS: 3 PTS: 2 REF: 081523ai NAT: A.REI.B.4
TOP: Solving Quadratics KEY: taking square roots

180 ANS: 2

$$\begin{aligned} x^2-8x&=7 \\ x^2-8x+16&=7+16 \\ (x-4)^2&=23 \end{aligned}$$

PTS: 2 REF: 011614ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

181 ANS:

$$\begin{aligned} y^2-6y+9&=4y-12 \\ y^2-10y+21&=0 \\ (y-7)(y-3)&=0 \\ y&=7,3 \end{aligned}$$

PTS: 2 REF: 011627ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: factoring

182 ANS:
Two of the following: quadratic formula, complete the square, factor by grouping or graphically.

$$x = \frac{-16 \pm \sqrt{16^2 - 4(4)(9)}}{2(4)} = \frac{-16 \pm \sqrt{112}}{8} \approx -0.7, -3.3$$

PTS: 4 REF: 011634ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: quadratic formula

183 ANS: 3

$$\begin{aligned} 2(x+2)^2 &= 32 \\ (x+2)^2 &= 16 \\ x+2 &= \pm 4 \\ x &= -6, 2 \end{aligned}$$

PTS: 2 REF: 061619ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

184 ANS:

$$\begin{aligned} 2x^2 + 5x - 42 &= 0 \\ (x+6)(2x-7) &= 0 \\ x &= -6, \frac{7}{2} \end{aligned}$$

Agree, as shown by solving the equation by factoring.

PTS: 2 REF: 061628ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: factoring

185 ANS:

$$H(1) - H(2) = -16(1)^2 + 144 - (-16(2)^2 + 144) = 128 - 80 = 48$$

$$\begin{aligned} -16t^2 &= -144 \\ t^2 &= 9 \\ t &= 3 \end{aligned}$$

PTS: 4 REF: 061633ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

186 ANS: 1

$$\begin{aligned} 3x^2 + 10x - 8 &= 0 \\ (3x-2)(x+4) &= 0 \\ x &= \frac{2}{3}, -4 \end{aligned}$$

PTS: 2 REF: 081619ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: factoring

187 ANS:

$$\begin{aligned}(x-3)^2-49&=0\\(x-3)^2&=49\\x-3&=\pm 7\\x&=-4,10\end{aligned}$$

PTS: 2 REF: 081631ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

188 ANS: 4

$$\begin{aligned}36x^2&=25\\x^2&=\frac{25}{36}\\x&=\pm\frac{5}{6}\end{aligned}$$

PTS: 2 REF: 011715ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

189 ANS: 1

$$\begin{aligned}2(x^2-6x+3)&=0\\x^2-6x&=-3\\x^2-6x+9&=-3+9\\(x-3)^2&=6\end{aligned}$$

PTS: 2 REF: 011722ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

190 ANS: 2

$$\begin{aligned}x^2-8x+16&=10+16\\(x-4)^2&=26\\x-4&=\pm\sqrt{26}\\x&=4\pm\sqrt{26}\end{aligned}$$

PTS: 2 REF: 061722ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

191 ANS:

$$\begin{aligned} x^2-6x+9&=15+9\\ (x-3)^2&=24\\ x-3&=\pm\sqrt{24}\\ x&=3\pm2\sqrt{6}\end{aligned}$$

PTS: 2 REF: 081732ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: completing the square

192 ANS: 1

$$\begin{aligned} 3(x-4)^2&=27\\ (x-4)^2&=9\\ x-4&=\pm3\\ x&=1,7\end{aligned}$$

PTS: 2 REF: 011814ai NAT: A.REI.B.4 TOP: Solving Quadratics
KEY: taking square roots

193 ANS:

$b^2-4ac=(-2)^2-4(1)(5)=4-20=-16$ None

PTS: 2 REF: 081529ai NAT: A.REI.B.4 TOP: Using the Discriminant
KEY: AI

194 ANS: 3 PTS: 2 REF: 081409ai NAT: A.CED.A.1
TOP: Modeling Quadratics

195 ANS: 4 PTS: 2 REF: 081723ai NAT: A.CED.A.1
TOP: Modeling Quadratics

196 ANS: 4 PTS: 2 REF: spr1304ai NAT: A.CED.A.1
TOP: Geometric Applications of Quadratics

197 ANS:

$(x-3)(2x)=1.25x^2$ Because the original garden is a square, x^2 represents the original area, $x-3$ represents the side decreased by 3 meters, $2x$ represents the doubled side, and $1.25x^2$ represents the new garden with an area 25% larger. $(x-3)(2x)=1.25x^2$ $1.25(8)^2=80$

$$\begin{aligned} 2x^2-6x&=1.25x^2\\ .75x^2-6x&=0\\ x^2-8x&=0\\ x(x-8)&=0\\ x&=8\end{aligned}$$

PTS: 6 REF: 011537ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

198 ANS:
$(2x+16)(2x+12)=396$. The length, $2x+16$, and the width, $2x+12$, are multiplied and set equal to the area.

$$\begin{aligned}(2x+16)(2x+12)&=396\\4x^2+24x+32x+192&=396\\4x^2+56x-204&=0\\x^2+14x-51&=0\\(x+17)(x-3)&=0\\x&=3=\text{width}\end{aligned}$$

PTS: 4 REF: 061434ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

199 ANS:

$$\begin{aligned}w(w+40)&=6000\\w^2+40w-6000&=0\\(w+100)(w-60)&=0\\w&=60,\ l=100\end{aligned}$$

PTS: 4 REF: 081436ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

200 ANS:

$$\begin{aligned}(2w)(w)&=34\\w^2&=17\\w&\approx 4.1\end{aligned}$$

PTS: 2 REF: 061532ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

201 ANS:
$(2x+8)(2x+6)=100$ The frame has two parts added to each side, so $2x$ must be added to the length and width.

$$\begin{aligned}4x^2+28x+48&=100\\x^2+7x-13&=0\end{aligned}$$

Multiply length and width to find area and set equal to 100. $x=\dfrac{-7\pm\sqrt{7^2-4(1)(-13)}}{2(1)}=\dfrac{-7+\sqrt{101}}{2}\approx 1.5$

PTS: 6 REF: 081537ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

202 ANS: 2 PTS: 2 REF: 011611ai NAT: A.CED.A.1
TOP: Geometric Applications of Quadratics

203 ANS:

$$108 = x(24-x) \quad 18\times 6$$

$$108 = 24x - x^2$$

$$x^2 - 24x + 108 = 0$$

$$(x-18)(x-6) = 0$$

$$x = 18, 6$$

PTS: 4 REF: 011636ai NAT: A.CED.A.1 TOP: Geometric Applications of Quadratics

204 ANS:

The vertex represents a maximum since $a < 0$. $f(x) = -x^2 + 8x + 9$

$$= -(x^2 - 8x - 9)$$

$$= -(x^2 - 8x + 16) + 9 + 16$$

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

PTS: 4 REF: 011536ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

205 ANS: 1

$$x^2 - 12x + 7$$

$$x^2 - 12x + 36 - 29$$

$$(x-6)^2 - 29$$

PTS: 2 REF: 081520ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

206 ANS: 2 PTS: 2 REF: 011601ai NAT: F.IF.C.8
TOP: Vertex Form of a Quadratic

207 ANS: 4

$$y - 34 = x^2 - 12x$$

$$y = x^2 - 12x + 34$$

$$y = x^2 - 12x + 36 - 2$$

$$y = (x-6)^2 - 2$$

PTS: 2 REF: 011607ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

208 ANS: 3

$$j(x) = x^2 - 12x + 36 + 7 - 36$$

$$= (x-6)^2 - 29$$

PTS: 2 REF: 061616ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

209 ANS: 3

$$3(x^2+4x+4)-12+11$$

$$3(x+2)^2-1$$

PTS: 2 REF: 081621ai NAT: F.IF.C.8 TOP: Vertex Form of a Quadratic

210 ANS:

$t=\frac{-b}{2a}=\frac{-64}{2(-16)}=\frac{-64}{-32}=2$ seconds. The height decreases after reaching its maximum at $t=2$ until it lands at $t=5$ $-16t^2+64t+80=0$

$$t^2-4t-5=0$$

$$(t-5)(t+1)=0$$

$$t=5$$

PTS: 4 REF: 011633ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

211 ANS:

$-16t^2+64t=0$ $0\le t\le 4$ The rocket launches at $t=0$ and lands at $t=4$

$$-16t(t-4)=0$$

$$t=0,4$$

PTS: 2 REF: 081531ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

212 ANS: 3 PTS: 2 REF: 061409ai NAT: F.IF.B.4
TOP: Graphing Quadratic Functions KEY: context

213 ANS: 1

$$0=-16t^2+24t$$

$$0=-8t(2t-3)$$

$$t=0,\frac{3}{2}$$

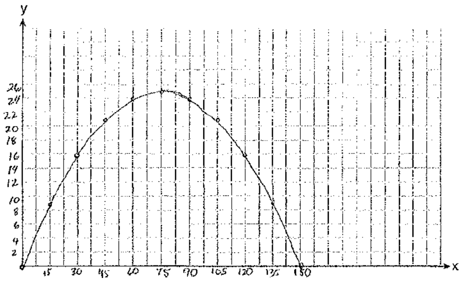
PTS: 2 REF: 061724ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

214 ANS: 3

The rocket was in the air more than 7 seconds before hitting the ground.

PTS: 2 REF: 081613ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

215 ANS:

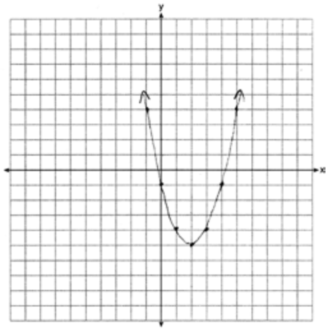


$$x=\frac{-\frac{2}{3}}{2\left(-\frac{1}{225}\right)}=-\frac{2}{3}\cdot-\frac{225}{2}=75\quad y=-\frac{1}{225}(75)^2+\frac{2}{3}(75)=-25+50=25$$

(75,25) represents the horizontal distance (75) where the football is at its greatest height (25). No, because the ball is less than 10 feet high $y=-\frac{1}{225}(135)^2+\frac{2}{3}(135)=-81+90=9$

PTS: 6 REF: 061537ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

216 ANS:



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

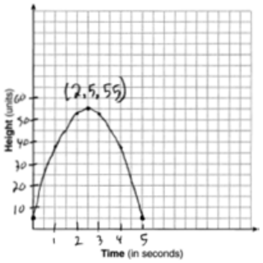
PTS: 2 REF: 061627ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: no context

217 ANS:

$x=1$ $\frac{-3+5}{2}=1$

PTS: 2 REF: 011829ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: no context

218 ANS:



The ball reaches a maximum height of 55 units at 2.5 seconds.

PTS: 4 REF: 011736ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

219 ANS:

$x = \frac{-128}{2(-16)} = 4$ $h(4) = -16(4)^2 + 128(4) + 9000 = -256 + 512 + 9000 = 9256$ $(4, 9256)$. The y coordinate represents the pilot's height above the ground after ejection. $9256 - 9000 = 256$

PTS: 4 REF: 081736ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

220 ANS: 2

$-4.9(0)^2 + 50(0) + 2$

PTS: 2 REF: 011811ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: context

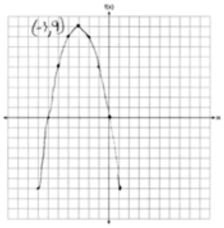
221 ANS: 4

Vertex $(15, 25)$, point $(10, 12.5)$

$$\begin{aligned} 12.5 &= a(10-15)^2 + 25 \\ -12.5 &= 25a \\ -\frac{1}{2} &= a \end{aligned}$$

PTS: 2 REF: 061716ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: no context

222 ANS:



PTS: 2 REF: 061726ai NAT: F.IF.B.4 TOP: Graphing Quadratic Functions
KEY: no context

223 ANS:

Yes, because from the graph the zeroes of $f(x)$ are -2 and 3.

PTS: 2 REF: 011832ai NAT: F.IF.C.7 TOP: Graphing Quadratic Functions

224 ANS:

$$\begin{aligned} 24x+27y&=144 \\ 24x+10y&=42 \\ 17y&=102 \\ y&=6 \\ 8x+9(6)&=48 \\ 8x&=-6 \\ x&=-\frac{3}{4} \end{aligned}$$

$$\begin{aligned} -8.5y&=-51 \\ y&=6 \\ 8x+9(6)&=48 \\ 8x&=-6 \\ x&=-\frac{3}{4} \end{aligned}$$

Agree, as both systems have the same solution.

PTS: 4 REF: 061533ai NAT: A.REI.C.5 TOP: Solving Linear Systems

225 ANS: 2

$$\begin{aligned} 2(3x-y&=4) \\ 6x-2y&=8 \end{aligned}$$

PTS: 2 REF: 061414ai NAT: A.REI.C.5 TOP: Solving Linear Systems

226 ANS: 4 PTS: 2 REF: 011621ai NAT: A.REI.C.5
TOP: Solving Linear Systems

227 ANS: 4 PTS: 2 REF: 081622ai NAT: A.REI.C.5
TOP: Solving Linear Systems

228 ANS: 2 PTS: 2 REF: 011815ai NAT: A.REI.C.5
TOP: Solving Linear Systems

229 ANS: 4

$36x+30y=96$

PTS: 2 REF: 081724ai NAT: A.REI.C.5 TOP: Solving Linear Systems

230 ANS:

$$\begin{aligned} 185+0.03x&=275+0.025x \\ 0.005x&=90 \\ x&=18000 \end{aligned}$$

PTS: 2 REF: 081427ai NAT: A.REI.C.6 TOP: Solving Linear Systems
KEY: substitution

231 ANS:

No. There are infinite solutions.

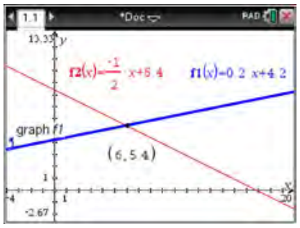
PTS: 2 REF: 011725ai NAT: A.REI.C.6 TOP: Solving Linear Systems
KEY: substitution

232 ANS: 1

$$3(-2x+2x+8)=12$$
$$24\neq 12$$

PTS: 2 REF: 061708ai NAT: A.REI.C.6 TOP: Solving Linear Systems
KEY: substitution

233 ANS: 4



$$m=\frac{5-4.6}{4-2}=\frac{.4}{2}=0.2 \quad 4(0.2x+4.2)+2x=33.6 \quad y=0.2(6)+4.2=5.4$$
$$5=.2(4)+b \quad 0.8x+16.8+2x=33.6$$
$$4.2=b \quad 2.8x=16.8$$
$$y=0.2x+4.2 \quad x=6$$

PTS: 2 REF: 061618ai NAT: A.REI.C.6 TOP: Solving Linear Systems
KEY: substitution

234 ANS:

$2.35c+5.50d=89.50$ Pat's numbers are not possible: $2.35(8)+5.50(14)\neq 89.50$ $c+d=22$

$$18.80+77.00\neq 89.50 \quad 2.35c+5.50(22-c)=89.50$$
$$95.80\neq 89.50 \quad 2.35c+121-5.50c=89.50$$
$$-3.15c=-31.50$$
$$c=10$$

PTS: 4 REF: 061436ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

235 ANS: 4 PTS: 2 REF: 081419ai NAT: A.CED.A.3
TOP: Modeling Linear Systems

236 ANS:

$$2p+3d=18.25 \quad 4p+6d=36.50 \quad 4p+2(2.25)=27.50$$
$$4p+2d=27.50 \quad 4p+2d=27.50 \quad 4p=23$$
$$4d=9 \quad p=5.75$$
$$d=2.25$$

PTS: 4 REF: 011533ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

237 ANS: 3

$$\begin{array}{rr} a+p=165 & 1.75(165-p)+2.5p=337.5 \\ 1.75a+2.5p=337.5 & 288.75-1.75p+2.5p=337.5 \\ & 0.75p=48.75 \\ & p=65 \end{array}$$

PTS: 2 REF: 061506ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

238 ANS:

$d=2c-5$; $20\neq 2(15)-5$ 20 dogs is not five less than twice 15 cats; $\dfrac{c+3}{2c-5+3}=\dfrac{3}{4}$, $d=2(9)-5=13$

$\dfrac{c+3}{d+3}=\dfrac{3}{4}$ $20\neq 25$

$$\begin{array}{r} 4c+12=6c-6 \\ 18=2c \\ c=9 \end{array}$$

PTS: 6 REF: 011837ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

239 ANS: 2

$$\begin{array}{rr} L+S=20 & 27.98L+10.98(20-L)=355.60 \\ 27.98L+10.98S=355.60 & 27.98L+219.60-10.98L=355.60 \\ & 17L=136 \\ & L=8 \end{array}$$

PTS: 2 REF: 081510ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

240 ANS: 1 PTS: 2 REF: 061605ai NAT: A.CED.A.3
TOP: Modeling Linear Systems

241 ANS:

$$\begin{array}{rlrr} 18j+32w=19.92 & 14(.52)+26(.33)=15.86\neq 15.76 & 7(18j+32w=19.92) & 18j+32(.24)=19.92 \\ 14j+26w=15.76 & & 9(14j+26w=15.76) & 18j+7.68=19.92 \\ & & 126j+224w=139.44 & 18j=12.24 \\ & & 126j+234w=141.84 & j=.68 \\ & & 10w=2.4 & \\ & & w=.24 & \end{array}$$

PTS: 6 REF: 081637ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

242 ANS: 1 PTS: 2 REF: 011803ai NAT: A.CED.A.3
TOP: Modeling Linear Systems

243 ANS:

$$\begin{aligned} p + 2s &= 15.95 & 5p + 10s &= 79.75 \\ 3p + 5s &= 45.90 & 6p + 10s &= 91.80 \\ & & p &= 12.05 \end{aligned}$$

PTS: 4 REF: 011734ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

244 ANS:

$I = 1000 - 60x$. $x = 10$. $1000 - 60(10) = 400$. Ian is incorrect because $I = 1000 - 6(16) = 40 \neq 0$

$K = 600 - 20x$

$1000 - 60x = 600 - 20x$

PTS: 6 REF: 011737ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

Algebra I Regents Exam Questions by Common Core State Standard: Topic
Answer Section

245 ANS:

Plan A: $C = 2G + 25$, Plan B: $C = 2.5G + 15$.

$$\begin{aligned} 50 &= 2.5G + 15 \\ 35 &= 2.5G \\ G &= 14 \end{aligned} \qquad \begin{aligned} 50 &= 2G + 25 \\ 25 &= 2G \\ G &= 12.5 \end{aligned}$$

With Plan B, Dylan can rent 14 games, but with Plan A, Dylan can rent only 12. $65 = 2(20) + 25 = 2.5(20) + 15$ Bobby can choose either plan, as he could rent 20 games for $65 with both plans.

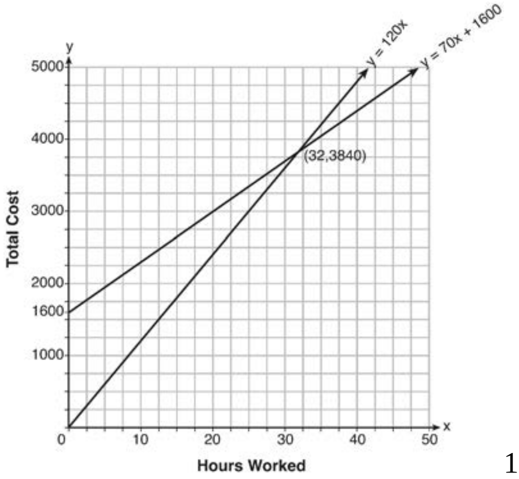
PTS: 2 REF: 081728ai NAT: A.CED.A.3 TOP: Modeling Linear Systems

246 ANS:

a) $\begin{aligned} A(x) &= 1.50x + 6 \\ B(x) &= 2x + 2.50 \end{aligned}$ b) $\begin{aligned} 1.50x + 6 &= 2x + 2.50 \\ .50x &= 3.50 \\ x &= 7 \end{aligned}$ c) $\begin{aligned} A(x) &= 1.50(5) + 6 = 13.50 \\ B(x) &= 2(5) + 2.50 = 12.50 \end{aligned}$ Carnival B has a lower cost.

PTS: 6 REF: spr1308ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

247 ANS:



$y = 120x$ and $y = 70x + 1600$

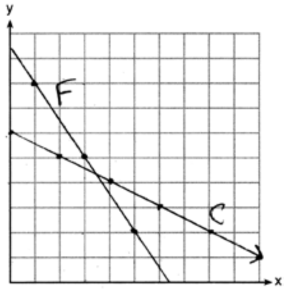
$$\begin{aligned} 120x &= 70x + 1600 \\ 50x &= 1600 \\ x &= 32 \end{aligned}$$

$$\begin{aligned} y &= 120(35) = 4200 \\ y &= 70(35) + 1600 = 4050 \end{aligned}$$

Green Thumb is less expensive.

PTS: 6 REF: fall1315ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

248 ANS:



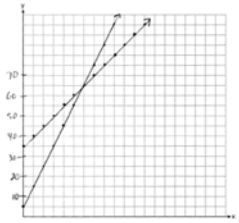
$3x + 2y = 19$

$2x + 4y = 24$

$$\begin{aligned} 6x + 4y &= 38 \\ 2x + 4y &= 24 \\ 4x &= 14 \\ x &= 3.50 \end{aligned} \qquad \begin{aligned} 2(3.50) + 4y &= 24 \\ 7 + 4y &= 24 \\ 4y &= 17 \\ y &= 4.25 \end{aligned}$$

PTS: 6 REF: 061637ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

249 ANS:



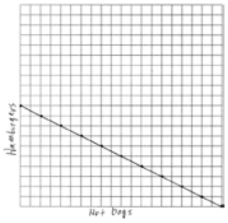
$y = 10x + 5$

$y = 5x + 35$

In 2016, the swim team and chorus will each have 65 members.

PTS: 6 REF: 061737ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

250 ANS:



$1.25x + 2.5y = 25$

$x + 2y = 20$

There are 11 combinations, as each dot represents a possible combination.

PTS: 6 REF: 081737ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

251 ANS: 3

$15 > 5$

PTS: 2 REF: 081502ai NAT: A.REI.C.6 TOP: Graphing Linear Systems

252 ANS:

a) $p + d \le 800$ b) $6(440) + 9d \ge 5000$ Since $440 + 263 \le 800$, it is possible.

$6p + 9d \ge 5000$ $\quad 2640 + 9d \ge 5000$

$$9d \ge 2360$$

$$d \ge 262.\overline{2}$$

PTS: 2 REF: spr1306ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

253 ANS:

$x + y \le 200$ $\quad 12x + 8.50(50) \ge 1000$

$12x + 8.50y \ge 1000$ $\quad 12x + 425 \ge 1000$

$$12x \ge 575$$

$$x \ge \frac{575}{12}$$

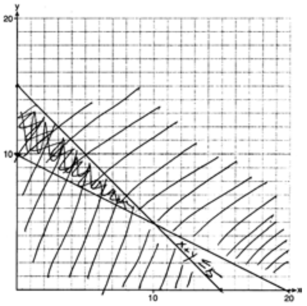
$$48$$

PTS: 4 REF: 081635ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

254 ANS:

$x + y \le 15$

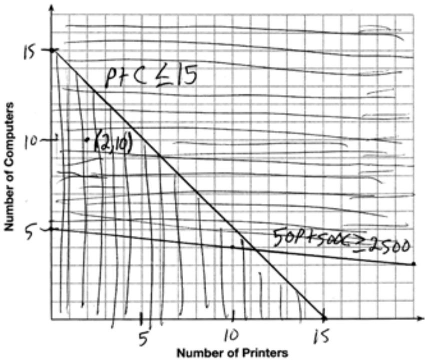
$4x + 8y \ge 80$



One hour at school and eleven hours at the library.

PTS: 6 REF: 081437ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

255 ANS:



A combination of 2 printers and 10 computers meets all the constraints because $(2,10)$ is in the solution set of the graph.

PTS: 4 REF: 061535ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

256 ANS:

$2L + 1.5W \ge 500$ $2(144) + 1.5W = 500$ 142 bottles of water must be sold to cover the cost of renting costumes.

$L + W \le 360$ $1.5W = 212$

$W = 141.\overline{3}$

PTS: 4 REF: 011835ai NAT: A.CED.A.3 TOP: Modeling Systems of Linear Inequalities

257 ANS: 1 PTS: 2 REF: 061711ai NAT: A.CED.A.3
TOP: Modeling Systems of Linear Inequalities

258 ANS: 2

$(4,3)$ is on the boundary of $y > -\frac{1}{2}x + 5$, so $(4,3)$ is not a solution of the system.

PTS: 2 REF: fall1301ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: solution set

259 ANS: 2 PTS: 2 REF: 061404ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph

260 ANS: 4

$2(2) < -12(-3) + 4$ $4 < -6(-3) + 4$

$4 < 40$ $4 < 22$

PTS: 2 REF: 011716ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: solution set

261 ANS: 1 PTS: 2 REF: 081407ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities KEY: solution set

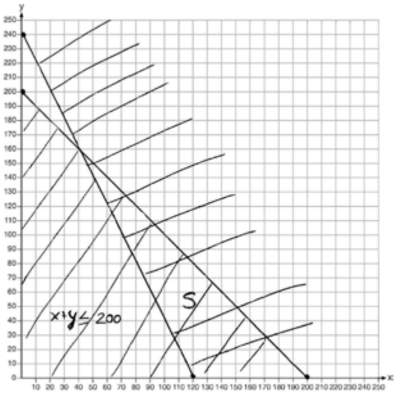
262 ANS: 3 PTS: 2 REF: 011820ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities

263 ANS:

$x + y \le 200$ Marta is incorrect because $12.5(30) + 6.25(80) < 1500$

$12.5x + 6.25y \ge 1500$ $375 + 500 < 1500$

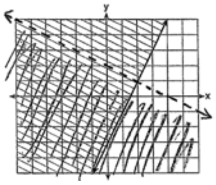
$875 < 1500$



PTS: 6 REF: 011637ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

264 ANS: 3 PTS: 2 REF: 081506ai NAT: A.REI.D.12
TOP: Graphing Systems of Linear Inequalities KEY: bimodalgraph | graph

265 ANS:

$y \geq 2x - 3$. 

Oscar is wrong. $(2) + 2(1) < 4$ is not true.

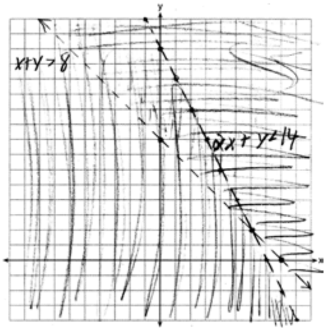
PTS: 4 REF: 011534ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

266 ANS:

No, because the point $(0,4)$ does not satisfy the inequality $y < \frac{1}{2}x + 4$. $4 < \frac{1}{2}(0) + 4$ is not a true statement.

PTS: 2 REF: 011828ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: solution set

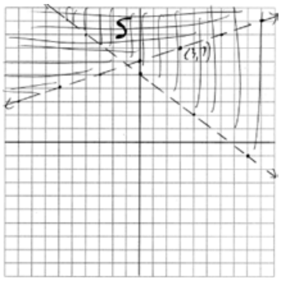
267 ANS:



$(6,2)$ is not a solution as its falls on the edge of each inequality.

PTS: 4 REF: 061634ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

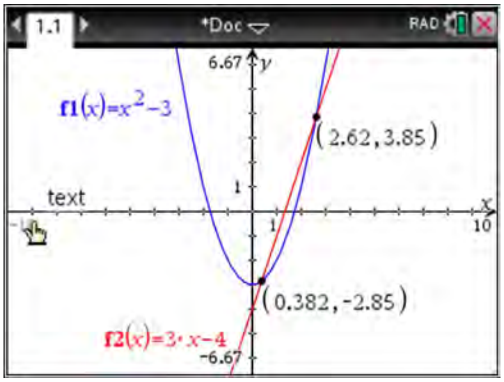
268 ANS:



No, $(3,7)$ is on the boundary line, and not included in the solution set, because this is a strict inequality.

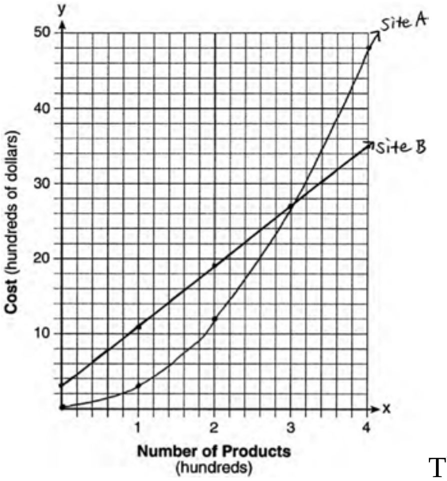
PTS: 4 REF: 081735ai NAT: A.REI.D.12 TOP: Graphing Systems of Linear Inequalities
KEY: graph

269 ANS: 3


1.1
*Doc
RAD
6.67
y
$f1(x)=x^2-3$
(2.62,3.85)
text
1
x
1
10
(0.382,-2.85)
$f2(x)=3\cdot x-4$
-6.67

PTS: 2 REF: 011810ai NAT: A.REI.C.7 TOP: Quadratic-Linear Systems
KEY: algebraically

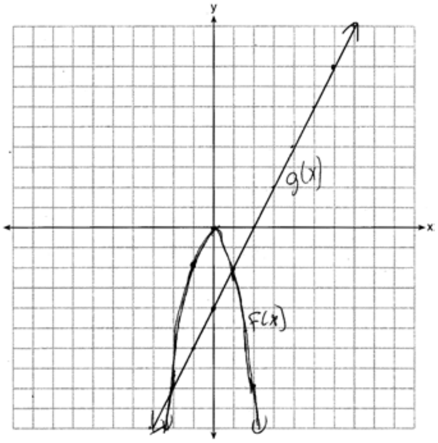
270 ANS:



The graphs of the production costs intersect at $x = 3$. The company should use Site A, because the cost of Site A is lower at $x = 2$.

PTS: 6 REF: 061437ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

271 ANS:



$x = -2, 1$

PTS: 4 REF: 081435ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

272 ANS:

$$x^2 + 46 = 60 + 5x$$
$$x^2 - 5x - 14 = 0$$
$$(x-7)(x+2) = 0$$
$$x = 7$$

John and Sarah will have the same amount of money saved at 7 weeks. I set the expressions representing their savings equal to each other and solved for the positive value of x by factoring.

PTS: 2 REF: 061527ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

273 ANS: 2

$$x^2 - 2x - 8 = \frac{1}{4}x - 1$$
$$4x^2 - 8x - 32 = x - 4$$
$$4x^2 - 9x - 28 = 0$$
$$(4x+7)(x-4) = 0$$
$$x = -\frac{7}{4}, 4$$

PTS: 2 REF: 081517ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

274 ANS:

$$\begin{aligned} x^2 &= x \\ x^2 - x &= 0 \\ x(x-1) &= 0 \\ x &= 0, 1 \end{aligned}$$

PTS: 2 REF: 061731ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

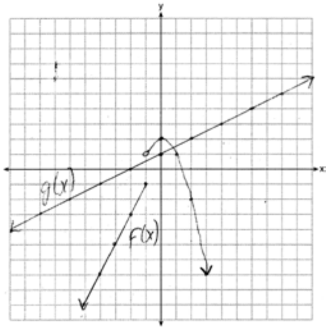
275 ANS:

$$\begin{aligned} 2x^2 + 3x + 10 &= 4x + 32 \\ 2x^2 - x - 22 &= 0 \end{aligned} \quad x = \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)} \approx -3.1, 3.6.$$ Quadratic formula, because the answer must be to the nearest tenth.

PTS: 4 REF: 061735ai NAT: A.REI.D.11 TOP: Quadratic-Linear Systems
KEY: AI

276 ANS: 3 PTS: 2 REF: 011518ai NAT: A.REI.D.11
TOP: Other Systems KEY: AI

277 ANS:



1, because the graphs only intersect once.

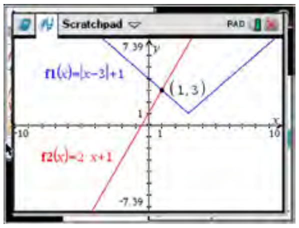
PTS: 4 REF: 061636ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

278 ANS: 1

$$\begin{aligned} \frac{1}{2}x + 3 &= |x| \\ \frac{1}{2}x + 3 &= x \\ x + 6 &= 2x \\ 6 &= x \end{aligned} \qquad \begin{aligned} -\frac{1}{2}x - 3 &= x \\ -x - 6 &= 2x \\ -6 &= 3x \\ -2 &= x \end{aligned}$$

PTS: 2 REF: 011617ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

279 ANS: 2



$$\begin{array}{ccc} |x-3|+1=2x+1 & x-3=2x & x-3=-2x \\ |x-3|=2x & -3=x & 3x=3 \\ & \text{extraneous} & x=1 \end{array}$$

PTS: 2 REF: 061622ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

280 ANS:
$-3, 1$

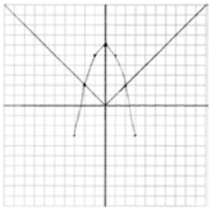
PTS: 2 REF: 081630ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

281 ANS: 2

$$\begin{aligned} |x+2| &= 3x-2 \\ x+2 &= 3x-2 \\ 4 &= 2x \\ x &= 2 \end{aligned}$$

PTS: 2 REF: 081702ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

282 ANS:



Yes, because the graph of $f(x)$ intersects the graph of $g(x)$ at $x=-2$.

PTS: 4 REF: 011733ai NAT: A.REI.D.11 TOP: Other Systems
KEY: AI

283 ANS: 4

$$\begin{aligned} 16^{2t} &= n^{4t} \\ (16^2)^t &= (n^4)^t \\ ((4^2)^2)^t &= ((n^2)^2)^t \end{aligned}$$

PTS: 2 REF: 011519ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions
KEY: AI

284 ANS:

$$\begin{array}{ll} f(5) = (8)\cdot 2^5 = 256 & f(t) = g(t) \\ g(5) = 2^{5+3} = 256 & (8)\cdot 2^t = 2^{t+3} \\ & 2^3 \cdot 2^t = 2^{t+3} \\ & 2^{t+3} = 2^{t+3} \end{array}$$

PTS: 2 REF: 011632ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions
KEY: AI

285 ANS: 3

$$C(t) = 10(1.029)^{24t} = 10(1.029^{24})^t \approx 10(1.986)^t$$

PTS: 2 REF: 061614ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions
KEY: AI

286 ANS: 2 PTS: 2 REF: 011714ai NAT: A.SSE.B.3
TOP: Modeling Exponential Functions

287 ANS: 2

$$V = 15{,}000(0.81)^t = 15{,}000((0.9)^2)^t = 15{,}000(0.9)^{2t}$$

PTS: 2 REF: 081716ai NAT: A.SSE.B.3 TOP: Modeling Exponential Functions

288 ANS: 4 PTS: 2 REF: 011821ai NAT: A.SSE.B.3
TOP: Modeling Exponential Functions

289 ANS: 3

$$\begin{array}{ll} E(10) = 1(1.11)^{10} \approx 3 & S(10) = 30(1.04)^{10} \approx 44 \\ E(53) = 1(1.11)^{53} \approx 252 & S(53) = 30(1.04)^{53} \approx 239 \end{array}$$

PTS: 2 REF: 081721ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

290 ANS:

$$A = 600(1.016)^2 \approx 619.35$$

PTS: 2 REF: 061529ai NAT: A.CED.A.1 TOP: Modeling Exponential Functions

291 ANS:

$$B = 3000(1.042)^t$$

PTS: 2 REF: 081426ai NAT: F.BF.A.1 TOP: Modeling Exponential Functions
KEY: AI

292 ANS: 1 PTS: 2 REF: 011504ai NAT: F.BF.A.1
TOP: Modeling Exponential Functions KEY: AI

293 ANS: 3 PTS: 2 REF: 081507ai NAT: F.BF.A.1
TOP: Modeling Exponential Functions KEY: AI

294 ANS: 2 PTS: 2 REF: 061617ai NAT: F.BF.A.1
TOP: Modeling Exponential Functions

295 ANS: 2 PTS: 2 REF: 061712ai NAT: F.BF.A.1
TOP: Modeling Exponential Functions KEY: AI

296 ANS:
$y = 0.25(2)^x$. I inputted the four integral values from the graph into my graphing calculator and determined the exponential regression equation.

PTS: 2 REF: 011532ai NAT: F.LE.A.2 TOP: Modeling Exponential Functions
297 ANS: 1 PTS: 2 REF: 081617ai NAT: F.LE.A.2
TOP: Modeling Exponential Functions KEY: AI
298 ANS: 3

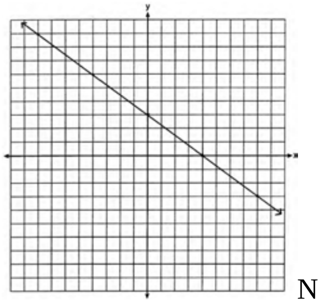
$$\frac{5.4-4}{4} = 0.35$$

PTS: 2 REF: 011802ai NAT: F.LE.A.2 TOP: Modeling Exponential Functions
KEY: AI
299 ANS:
0.5 represents the rate of decay and 300 represents the initial amount of the compound.

PTS: 2 REF: 061426ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions
300 ANS: 3 PTS: 2 REF: 011515ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions
301 ANS: 2 PTS: 2 REF: 061517ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions
302 ANS:
$1 - 0.95 = 0.05 = 5\%$ To find the rate of change of an equation in the form $y = ab^x$, subtract b from 1.

PTS: 2 REF: 081530ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions
303 ANS: 4 PTS: 2 REF: 011608ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions
304 ANS: 2 PTS: 2 REF: 081624ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions
305 ANS: 3 PTS: 2 REF: 011724ai NAT: F.LE.B.5
TOP: Modeling Exponential Functions
306 ANS:
$1 - 0.85 = 0.15 = 15\%$ To find the rate of change of an equation in the form $y = ab^x$, subtract b from 1.

PTS: 2 REF: 061728ai NAT: F.LE.B.5 TOP: Modeling Exponential Functions
307 ANS:



No, because $(3, 2)$ is not on the graph.

PTS: 2 REF: 061429ai NAT: A.REI.D.10 TOP: Identifying Solutions

308 ANS: 4 PTS: 2 REF: 081405ai NAT: A.REI.D.10
TOP: Identifying Solutions

309 ANS: 3 PTS: 2 REF: 081602ai NAT: A.REI.D.10
TOP: Identifying Solutions

310 ANS: 4

$$-2 \neq (-1)^3 - (-1)$$

$$-2 \neq 0$$

PTS: 2 REF: 011806ai NAT: A.REI.D.10 TOP: Identifying Solutions

311 ANS: 2 PTS: 2 REF: 061403ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: subtraction

312 ANS:

$$(2x^2 + 7x - 10)(x + 5)$$

$$2x^3 + 7x^2 - 10x + 10x^2 + 35x - 50$$

$$2x^3 + 17x^2 + 25x - 50$$

PTS: 2 REF: 081428ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

313 ANS: 2 PTS: 2 REF: 011510ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: multiplication

314 ANS:

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

PTS: 2 REF: 011528ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: subtraction

315 ANS:

$$(3x^2 - 2x + 5) - (x^2 + 3x - 2) = 2x^2 - 5x + 7$$

$$\frac{1}{2}x^2(2x^2 - 5x + 7) = x^4 - \frac{5}{2}x^3 + \frac{7}{2}x^2$$

PTS: 2 REF: 061528ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

316 ANS: 4

$$3(x^2 - 4x + 4) - 2x + 2 = 3x^2 - 12x + 12 - 2x + 2 = 3x^2 - 14x + 14$$

PTS: 2 REF: 081524ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

317 ANS: 3

$$5x^2 - (4x^2 - 12x + 9) = x^2 + 12x - 9$$

PTS: 2 REF: 011610ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

318 ANS: 2

$$3(x^2-1)-(x^2-7x+10)$$
$$3x^2-3-x^2+7x-10$$
$$2x^2+7x-13$$

PTS: 2 REF: 061610ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: subtraction

319 ANS: 3

$$(2x+3)(4x^2-5x+6)=8x^3-10x^2+12x+12x^2-15x+18=8x^3+2x^2-3x+18$$

PTS: 2 REF: 081612ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

320 ANS: 4

$$2(3g-4)-(8g+3)=6g-8-8g-3=-2g-11$$

PTS: 2 REF: 011707ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: subtraction

321 ANS:

$$5x^2-10$$

PTS: 2 REF: 061725ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: subtraction

322 ANS:

$$5x+4x^2(2x+7)-6x^2-9x=-4x+8x^3+28x^2-6x^2=8x^3+22x^2-4x$$

PTS: 2 REF: 081731ai NAT: A.APR.A.1 TOP: Operations with Polynomials
KEY: multiplication

323 ANS: 3 PTS: 2 REF: 011813ai NAT: A.APR.A.1
TOP: Operations with Polynomials KEY: addition

324 ANS: 1 PTS: 2 REF: 081415ai NAT: A.SSE.A.2
TOP: Factoring Polynomials KEY: higher power AI

325 ANS: 3 PTS: 2 REF: 081509ai NAT: A.SSE.A.2
TOP: Factoring Polynomials KEY: quadratic

326 ANS: 3 PTS: 2 REF: 011612ai NAT: A.SSE.A.2
TOP: Factoring Polynomials KEY: higher power AI

327 ANS:

$$x^4+6x^2-7$$
$$(x^2+7)(x^2-1)$$
$$(x^2+7)(x+1)(x-1)$$

PTS: 2 REF: 061431ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: higher power AI

328 ANS: 3 PTS: 2 REF: 011522ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: higher power AI

329 ANS: 2 PTS: 2 REF: 061503ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: multivariable AI

330 ANS: 3 PTS: 2 REF: 061601ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: higher power AI

331 ANS: 2

$$36x^2 - 100 = 4(9x^2 - 25) = 4(3x + 5)(3x - 5)$$

PTS: 2 REF: 081608ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: quadratic

332 ANS: 2

$$16x^2 - 36 = 4(2x + 3)(2x - 3)$$

PTS: 2 REF: 011701ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: quadratic

333 ANS: 3 PTS: 2 REF: 061706ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: higher power AI

334 ANS: 3 PTS: 2 REF: 081703ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: quadratic

335 ANS: 3 PTS: 2 REF: 011809ai NAT: A.SSE.A.2
TOP: Factoring the Difference of Perfect Squares KEY: higher power AI

336 ANS: 3 PTS: 2 REF: spr1302ai NAT: A.APR.B.3
TOP: Zeros of Polynomials KEY: AI

337 ANS: 2

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

PTS: 2 REF: 061512ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

338 ANS: 2

$$(x + 4)(x + 6) = 0$$

$$x^2 + 10x + 24 = 0$$

PTS: 2 REF: spr1303ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

339 ANS: 4

$$\begin{aligned} (x+2)^2 - 25 &= 0 \\ ((x+2)+5)((x+2)-5)) &= 0 \\ x &= -7, 3 \end{aligned}$$

PTS: 2 REF: 081418ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

340 ANS: 1

$$f(x) = (x + 2)(x + 4)(x - 1)$$

PTS: 2 REF: 081504ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

341 ANS: 1 PTS: 2 REF: 011524ai NAT: A.APR.B.3
TOP: Zeros of Polynomials KEY: AI

342 ANS: 4

$$x^2 - 13x - 30 = 0$$

$$(x - 15)(x + 2) = 0$$

$$x = 15, -2$$

PTS: 2 REF: 061510ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

343 ANS: 1

$$f(x) = x^2 - 5x - 6 = (x + 1)(x - 6) = 0$$

$$x = -1, 6$$

PTS: 2 REF: 061612ai NAT: A.APR.B.3 TOP: Zeros of Polynomials
KEY: AI

344 ANS: 1 PTS: 2 REF: 081623ai NAT: A.APR.B.3
TOP: Zeros of Polynomials KEY: AI

345 ANS: 4 PTS: 2 REF: 011706ai NAT: A.APR.B.3
TOP: Zeros of Polynomials

346 ANS: 3 PTS: 2 REF: 061710ai NAT: A.APR.B.3
TOP: Zeros of Polynomials

347 ANS: 3

$$2x^3 + 12x - 10x^2 = 0$$

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

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

$$x = 0, 2, 3$$

PTS: 2 REF: 081719ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

348 ANS:

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

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

$$x = 1, 3$$

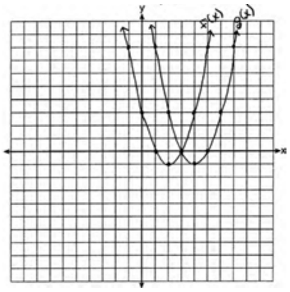
PTS: 2 REF: 011826ai NAT: A.APR.B.3 TOP: Zeros of Polynomials

349 ANS: 1 PTS: 2 REF: 081707ai NAT: A.APR.B.3
TOP: Zeros of Polynomials KEY: AI

350 ANS: 1 PTS: 2 REF: 081417ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

351 ANS: 2 PTS: 2 REF: 011512ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

352 ANS:



$(4,-1)$. $f(x-2)$ is a horizontal shift two units to the right.

PTS: 2 REF: 061428ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions

353 ANS: 2 PTS: 2 REF: 081501ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

354 ANS: 2 PTS: 2 REF: 011717ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

355 ANS:

$g(x)=x^3+2x^2-4$, because $g(x)$ is a translation down 4 units.

PTS: 2 REF: 061632ai NAT: F.BF.B.3 TOP: Graphing Polynomial Functions

356 ANS: 1 PTS: 2 REF: 081706ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

357 ANS: 2 PTS: 2 REF: 011819ai NAT: F.BF.B.3
TOP: Graphing Polynomial Functions

358 ANS: 3

$\sqrt{16}+\sqrt{9}=\frac{7}{1}$ may be expressed as the ratio of two integers.

PTS: 2 REF: 061413ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

359 ANS: 1 PTS: 2 REF: 081401ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify

360 ANS:

Correct. The sum of a rational and irrational is irrational.

PTS: 2 REF: 011525ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

361 ANS: 2 PTS: 2 REF: 061508ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify

362 ANS: 2

$$\frac{1}{\sqrt{4}}+\frac{1}{\sqrt{9}}=\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$$

PTS: 2 REF: 081522ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

363 ANS: 1 PTS: 2 REF: 011604ai NAT: N.RN.B.3
TOP: Operations with Radicals KEY: classify

364 ANS:

$3\sqrt{2} \cdot 8\sqrt{18} = 24\sqrt{36} = 144$ is rational, as it can be written as the ratio of two integers.

PTS: 2 REF: 061626ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

365 ANS:

$7\sqrt{2}$ is irrational because it can not be written as the ratio of two integers.

PTS: 2 REF: 081629ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

366 ANS:

No. The sum of a rational and irrational is irrational.

PTS: 2 REF: 011728ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

367 ANS:

$7 - \sqrt{2}$ is irrational because it can not be written as the ratio of two integers.

PTS: 2 REF: 061727ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

368 ANS:

$a + b$ is irrational because it cannot be written as the ratio of two integers. $b + c$ is rational because it can be written as the ratio of two integers, $\frac{35}{2}$.

PTS: 2 REF: 081725ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

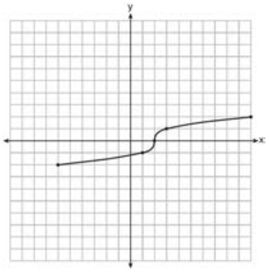
369 ANS: 3

$\sqrt{576} = 24$ $\sqrt{684} = 6\sqrt{19}$

PTS: 2 REF: 011808ai NAT: N.RN.B.3 TOP: Operations with Radicals
KEY: classify

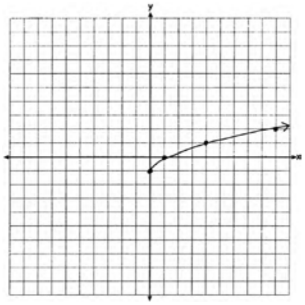
370 ANS: 4 PTS: 2 REF: 061703ai NAT: F.IF.C.7
TOP: Graphing Root Functions KEY: bimodalgraph

371 ANS:



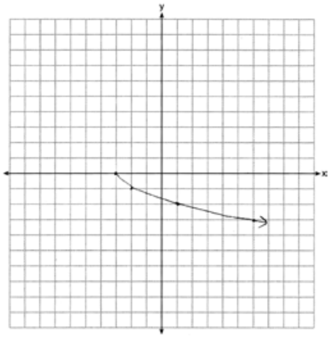
PTS: 2 REF: fall1304ai NAT: F.IF.C.7 TOP: Graphing Root Functions

372 ANS:



PTS: 2 REF: 061425ai NAT: F.IF.C.7 TOP: Graphing Root Functions

373 ANS:



PTS: 2 REF: 081625ai NAT: F.IF.C.7 TOP: Graphing Root Functions

374 ANS: 3 PTS: 2 REF: 061504ai NAT: F.IF.A.1
TOP: Defining Functions KEY: ordered pairs

375 ANS:
Yes, because every element of the domain is assigned one unique element in the range.

PTS: 2 REF: 061430ai NAT: F.IF.A.1 TOP: Defining Functions
KEY: ordered pairs

376 ANS: 2 PTS: 2 REF: 081511ai NAT: F.IF.A.1
TOP: Defining Functions KEY: mixed

377 ANS: 3 PTS: 2 REF: 061709ai NAT: F.IF.A.1
TOP: Defining Functions KEY: ordered pairs

378 ANS:
$(-4,1)$, because then every element of the domain is not assigned one unique element in the range.

PTS: 2 REF: 011527ai NAT: F.IF.A.1 TOP: Defining Functions
KEY: ordered pairs

379 ANS:
No, because the relation does not pass the vertical line test.

PTS: 2 REF: 011626ai NAT: F.IF.A.1 TOP: Defining Functions
KEY: graphs

380 ANS:
Neither is correct. Nora's reason is wrong since a circle is not a function because it fails the vertical line test. Mia is wrong since a circle is not a function because multiple values of y map to the same x-value.

PTS: 2 REF: 011732ai NAT: F.IF.A.1 TOP: Defining Functions
KEY: graphs

381 ANS: 2 PTS: 2 REF: 011804ai NAT: F.IF.A.1
TOP: Defining Functions KEY: graphs

382 ANS:

$$g(x) = 2(2x+1)^2 - 1 = 2(4x^2 + 4x + 1) - 1 = 8x^2 + 8x + 2 - 1 = 8x^2 + 8x + 1$$

PTS: 2 REF: 061625ai NAT: F.IF.A.2 TOP: Functional Notation

383 ANS: 1 PTS: 2 REF: 061420ai NAT: F.IF.A.2
TOP: Functional Notation

384 ANS: 1

$$25,000(0.86)^2 - 25,000(0.86)^3 = 18490 - 15901.40 = 2588.60$$

PTS: 2 REF: 011508ai NAT: F.IF.A.2 TOP: Functional Notation

385 ANS: 2

$$f(-2) = (-2-1)^2 + 3(-2) = 9 - 6 = 3$$

PTS: 2 REF: 081605ai NAT: F.IF.A.2 TOP: Functional Notation

386 ANS:

$$\begin{array}{cc} w(52) - w(38) & 15(x-40) + 400 = 445 \\ 15(52-40) + 400 - 10(38) & 15(x-40) = 45 \\ 180 + 400 - 380 & x - 40 = 3 \\ 200 & x = 43 \end{array}$$

Since $w(x) > 400$, $x > 40$. I substituted 445 for $w(x)$ and solved for x.

PTS: 4 REF: 061534ai NAT: F.IF.A.2 TOP: Functional Notation

387 ANS: 3

$$\frac{\sqrt{2\left(\frac{1}{2}\right) + 3}}{6\left(\frac{1}{2}\right) - 5} = \frac{\sqrt{4}}{-2} = \frac{2}{-2} = -1$$

PTS: 2 REF: 081512ai NAT: F.IF.A.2 TOP: Functional Notation

388 ANS: 1

$$f(3) = -2(3)^2 + 32 = -18 + 32 = 14$$

PTS: 2 REF: 061705ai NAT: F.IF.A.2 TOP: Functional Notation

389 ANS: 3

$$f(8) = \frac{1}{2}(8)^2 - \left(\frac{1}{4}(8) + 3\right) = 32 - 5 = 27$$

PTS: 2 REF: 081704ai NAT: F.IF.A.2 TOP: Functional Notation

390 ANS: 3

$$119.67(0.61)^5 - 119.67(0.61)^3 \approx 17.06$$

PTS: 2 REF: 011603ai NAT: F.IF.A.2 TOP: Evaluating Functions

391 ANS: 4 PTS: 2 REF: 061509ai NAT: F.IF.A.2
TOP: Domain and Range KEY: graph

392 ANS: 4 PTS: 2 REF: 061417ai NAT: F.IF.A.2
TOP: Domain and Range KEY: real domain, linear

393 ANS: 1

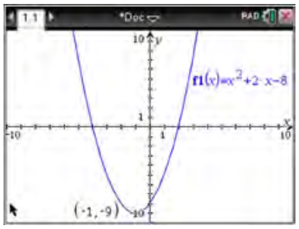
$f(2) = 0$

$f(6) = 8$

PTS: 2 REF: 081411ai NAT: F.IF.A.2 TOP: Domain and Range
KEY: limited domain

394 ANS: 2 PTS: 2 REF: 011619ai NAT: F.IF.A.2
TOP: Domain and Range KEY: real domain, exponential

395 ANS: 2



$$f(x) = x^2 + 2x - 8 = x^2 + 2x + 1 - 9 = (x + 1)^2 - 9$$

PTS: 2 REF: 061611ai NAT: F.IF.A.2 TOP: Domain and Range
KEY: real domain, quadratic

396 ANS: 1 PTS: 2 REF: 081710ai NAT: F.IF.A.2
TOP: Domain and Range KEY: limited domain

397 ANS: 3

$f(-2) = 0,\ f(3) = 10,\ f(5) = 42$

PTS: 2 REF: 011812ai NAT: F.IF.A.2 TOP: Domain and Range
KEY: limited domain

398 ANS: 4

There are no negative or fractional cars.

PTS: 2 REF: 061402ai NAT: F.IF.B.5 TOP: Domain and Range

399 ANS: 2

$$0 = -16t^2 + 144$$
$$16t^2 = 144$$
$$t^2 = 9$$
$$t = 3$$

PTS: 2 REF: 081423ai NAT: F.IF.B.5 TOP: Domain and Range

400 ANS: 2 PTS: 2 REF: 011506ai NAT: F.IF.B.5
TOP: Domain and Range

401 ANS: 4 PTS: 2 REF: 061623ai NAT: F.IF.B.5
TOP: Domain and Range

402 ANS: 1 PTS: 2 REF: 011615ai NAT: F.IF.B.5
TOP: Domain and Range

403 ANS: 2 PTS: 2 REF: 081620ai NAT: F.IF.B.5
TOP: Domain and Range

404 ANS: 4 PTS: 2 REF: 011719ai NAT: F.IF.B.5
TOP: Domain and Range

405 ANS: 2

$$P(x) = -0.5x^2 + 800x - 100 - (300x + 250) = -0.5x^2 + 500x - 350$$

PTS: 2 REF: 081406ai NAT: F.BF.A.1 TOP: Operations with Functions

406 ANS: 3 PTS: 2 REF: 081412ai NAT: F.LE.A.1
TOP: Families of Functions

407 ANS: 2 PTS: 2 REF: 061624ai NAT: F.LE.A.1
TOP: Families of Functions

408 ANS: 3 PTS: 2 REF: 081410ai NAT: F.LE.A.1
TOP: Families of Functions KEY: bimodalgraph

409 ANS: 3 PTS: 2 REF: 011505ai NAT: F.LE.A.1
TOP: Families of Functions

410 ANS: 4 PTS: 2 REF: 061406ai NAT: F.LE.A.1
TOP: Families of Functions

411 ANS:

Exponential, because the function does not grow at a constant rate.

PTS: 2 REF: 081527ai NAT: F.LE.A.1 TOP: Families of Functions

412 ANS:

Linear, because the function has a constant rate of change.

PTS: 2 REF: 011625ai NAT: F.LE.A.1 TOP: Families of Functions

413 ANS: 1 PTS: 2 REF: 061606ai NAT: F.LE.A.1
TOP: Families of Functions

414 ANS: 1 PTS: 2 REF: 011623ai NAT: F.LE.A.1
TOP: Families of Functions

415 ANS:
Exponential, because the function does not have a constant rate of change.

PTS: 2 REF: 081627ai NAT: F.LE.A.1 TOP: Families of Functions

416 ANS: 3 PTS: 2 REF: 011711ai NAT: F.LE.A.1
TOP: Families of Functions

417 ANS: 3 PTS: 2 REF: 061721ai NAT: F.LE.A.1
TOP: Families of Functions

418 ANS: 1 PTS: 2 REF: 081717ai NAT: F.LE.A.1
TOP: Families of Functions

419 ANS: 1 PTS: 2 REF: 011805ai NAT: F.LE.A.1
TOP: Families of Functions

420 ANS: 2 PTS: 2 REF: 081714ai NAT: F.LE.A.2
TOP: Families of Functions KEY: AI

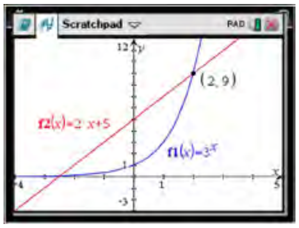
421 ANS: 3 PTS: 2 REF: 061415ai NAT: F.LE.A.2
TOP: Families of Functions

422 ANS: 2 PTS: 2 REF: 061513ai NAT: F.LE.A.2
TOP: Families of Functions

423 ANS: 4 PTS: 2 REF: 011616ai NAT: F.LE.A.2
TOP: Families of Functions

424 ANS: 1 PTS: 2 REF: 061707ai NAT: F.LE.A.2
TOP: Families of Functions

425 ANS: 1



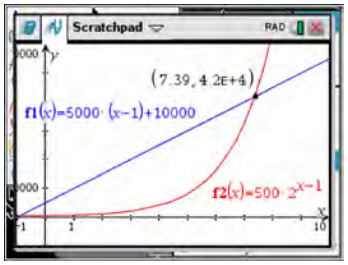
$$f(-1) < g(-1)$$

$$3^{-1} < 2(-1)+5$$

$$\frac{1}{3} < 3$$

PTS: 2 REF: 061515ai NAT: F.LE.A.3 TOP: Families of Functions

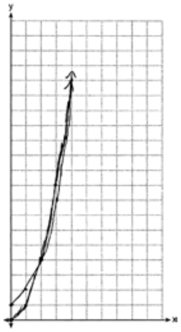
426 ANS: 3


Scratchpad
RAD
y
(7.39, 4.2E+4)
f1(x)=5000·(x−1)+10000
f2(x)=500·2^{x−1}
x
1
10

x	$A = 5000(x-1)+10000$	$B = 500(2)^{x-1}$
6	35,000	16,000
7	40,000	32,000
8	45,000	64,000
9	50,000	128,000

PTS: 2 REF: 081518ai NAT: F.LE.A.3 TOP: Families of Functions

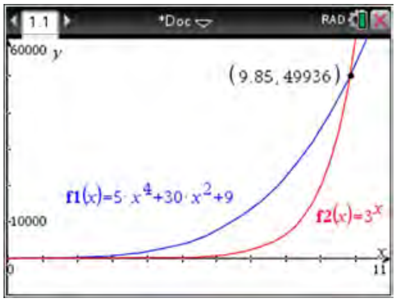
427 ANS:



$g(x)$ has a greater value: $2^{20} > 20^2$

PTS: 4 REF: 081533ai NAT: F.LE.A.3 TOP: Families of Functions

428 ANS: 3


1.1
*Doc
RAD
60000 y
(9.85, 49936)
f1(x)=5·x^4+30·x^2+9
f2(x)=3^x
10000
0
x
11

PTS: 2 REF: 061621ai NAT: F.LE.A.3 TOP: Families of Functions

429 ANS: 1 PTS: 2 REF: 081618ai NAT: F.LE.A.3
TOP: Families of Functions

430 ANS:

$f(x) = 10 + 100x$, $g(x) = 10(2)^x$; both, since $f(7) = 10 + 100(7) = 710$ and $g(7) = 10(2)^7 = 1280$

PTS: 4 REF: 061736ai NAT: F.LE.A.3 TOP: Families of Functions

431 ANS: 1 PTS: 2 REF: 011620ai NAT: F.BF.B.3
TOP: Transformations with Functions KEY: bimodalgraph

432 ANS:
2 units right and 3 units down.

PTS: 2 REF: 081626ai NAT: F.BF.B.3 TOP: Transformations with Functions

433 ANS: 4
1) $b = 0$; 2) $b = 4$; 3) $b = -6$; 4) $b = 5$

PTS: 2 REF: 081611ai NAT: F.IF.C.9 TOP: Comparing Functions
KEY: AI

434 ANS: 4

1) $\frac{g(1)-g(-1)}{1--1} = \frac{4-6}{2} = \frac{-2}{2} = -1$ 2) $g(0) = 6$ 3) $x = \frac{-(-1)}{2(-1)} = -\frac{1}{2}$; $g\left(-\frac{1}{2}\right) = -\left(-\frac{1}{2}\right)^2 + \frac{1}{2} + 6 = 6\frac{1}{4}$

$\frac{n(1)-n(-1)}{1--1} = \frac{9-5}{2} = \frac{4}{2} = 2$ $n(0) = 8$ $x = 1$; $n(1) = 9$

4) $g{:}\,S = \frac{-(-1)}{-1} = -1$

$n{:}\,S = -2 + 4 = 2$

PTS: 2 REF: 081521ai NAT: F.IF.C.9 TOP: Comparing Functions
KEY: AI

435 ANS:

g. The maximum of *f* is 6. For *g*, the maximum is 11. $x = \frac{-b}{2a} = \frac{-4}{2\left(-\frac{1}{2}\right)} = \frac{-4}{-1} = 4$

$$y = -\frac{1}{2}(4)^2 + 4(4) + 3 = -8 + 16 + 3 = 11$$

PTS: 2 REF: 081429ai NAT: F.IF.C.9 TOP: Comparing Functions
KEY: AI

436 ANS: 3

$h(x) = -x^2 + x + 6$ Maximum of $f(x) = 9$ $k(x) = -5x^2 - 12x + 4$ Maximum of $g(x) < 5$

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

$$y = -\left(\frac{1}{2}\right)^2 + \frac{1}{2} + 6$$

$$= -\frac{1}{4} + \frac{2}{4} + 6$$

$$= 6\frac{1}{4}$$

$$x = \frac{12}{2(-5)} = -\frac{6}{5}$$

$$y = -5\left(-\frac{6}{5}\right)^2 - 12\left(-\frac{6}{5}\right) + 4$$

$$= -\frac{36}{5} + \frac{72}{5} + \frac{20}{5}$$

$$= \frac{56}{5}$$

$$= 11\frac{1}{5}$$

PTS: 2 REF: 061514ai NAT: F.IF.C.9 TOP: Comparing Functions
KEY: AI

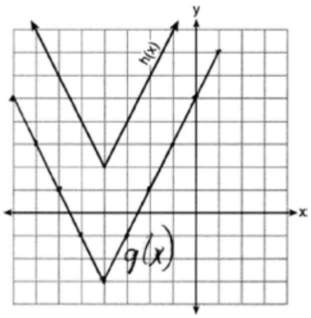
437 ANS: 3
$x = 3$

PTS: 2 REF: 061717ai NAT: F.IF.C.9 TOP: Comparing Functions
KEY: AI

438 ANS: 3 PTS: 2 REF: 011622ai NAT: F.IF.C.9
TOP: Comparing Functions KEY: AI

439 ANS: 2 PTS: 2 REF: 011723ai NAT: F.IF.C.9
TOP: Comparing Functions

440 ANS: 2



PTS: 2 REF: 081718ai NAT: F.IF.C.9 TOP: Comparing Functions

441 ANS: 2

1) $x = \frac{-2}{2(-1)} = 1$; 2) $h = \frac{3}{2}$ Using $(0,3)$, $3 = a\left(0 - \frac{3}{2}\right)^2 + k$; Using $(1,5)$, $5 = a\left(1 - \frac{3}{2}\right)^2 + k$

$y = -1^2 + 2(1) + 4 = 5$

vertex $(1,5)$

$3 = \frac{9}{4}a + k$ $\quad$ $5 = \frac{1}{4}a + k$

$k = 3 - \frac{9}{4}a$ $\quad$ $k = 5 - \frac{1}{4}a$

$5 - \frac{1}{4}a = 3 - \frac{9}{4}a$ $\quad k = 5 - \frac{1}{4}(-1) = \frac{21}{4}$; 3) vertex $(5,5)$; 4) Using $c = 1$ $\quad -9 = (-2)^2a + (-2)b + 1$

$20 - a = 12 - 9a$ $\quad$ vertex $\left(\frac{3}{2}, \frac{21}{4}\right)$ $\quad -10 = 4a - 2b$

$8a = -8$ $\quad b = 2a + 5$

$a = -1$

$-3 = (-1)^2a + (-1)b + 1$ $\quad 2a + 5 = a + 4$ $\quad x = \frac{-3}{2(-1)} = \frac{3}{2}$ $\quad$ vertex $\left(\frac{3}{2}, \frac{13}{4}\right)$

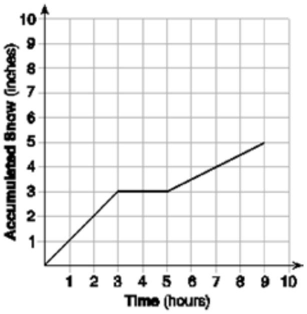
$-3 = a - b + 1$ $\quad a = -1$

$b = a + 4$ $\quad b = -1 + 4 = 3$ $\quad y = -\left(\frac{3}{2}\right)^2 + 3\left(\frac{3}{2}\right) + 1 = -\frac{9}{4} + \frac{18}{4} + \frac{4}{4} = \frac{13}{4}$

PTS: 2 REF: 011823ai NAT: F.IF.C.9 TOP: Comparing Functions

442 ANS: 3 PTS: 2 REF: 061701ai NAT: F.IF.B.4
TOP: Relating Graphs to Events

443 ANS:



At 6 hours, $3\frac{1}{2}$ inches of snow have fallen.

PTS: 4 REF: spr1307ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

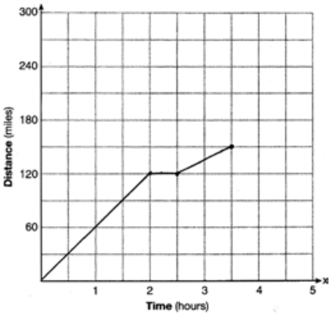
444 ANS:

D-*E*, because his speed was slower. Craig may have stayed at a rest stop during *B*-*C*. $\frac{230 - 0}{7 - 0} \approx 32.9$

PTS: 4 REF: 061734ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

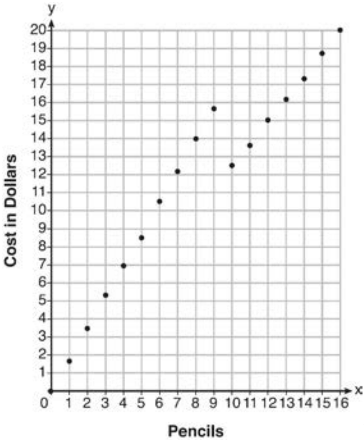
445 ANS: 4 PTS: 2 REF: 061502ai NAT: F.IF.B.4
TOP: Relating Graphs to Events

446 ANS:



PTS: 2 REF: 081528ai NAT: F.IF.B.4 TOP: Relating Graphs to Events

447 ANS:



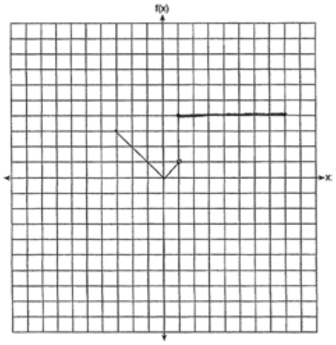
Since according to the graph, 8 pencils cost $14 and 10 pencils cost $12.50, the cashier is correct.

PTS: 4 REF: fall1312ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

448 ANS: 2 PTS: 2 REF: 081516ai NAT: F.IF.C.7
TOP: Graphing Piecewise-Defined Functions KEY: bimodalgraph

449 ANS: 2 PTS: 2 REF: 081422ai NAT: F.IF.C.7
TOP: Graphing Piecewise-Defined Functions

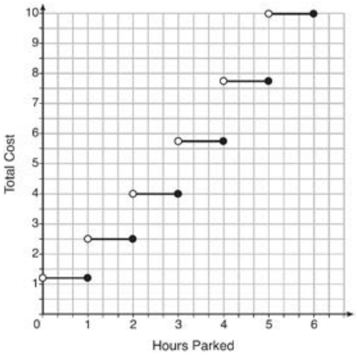
450 ANS:



PTS: 2 REF: 011530ai NAT: F.IF.C.7 TOP: Graphing Piecewise-Defined Functions

451 ANS: 1 PTS: 2 REF: 061507ai NAT: F.IF.C.7
TOP: Graphing Step Functions KEY: bimodalgraph

452 ANS:



The cost for each additional hour increases after the first 2 hours.

PTS: 4 REF: fall1311ai NAT: F.IF.C.7 TOP: Graphing Step Functions

453 ANS: 4

$f(1) = 3$; $f(2) = -5$; $f(3) = 11$; $f(4) = -21$; $f(5) = 43$

PTS: 2 REF: 081424ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

454 ANS: 3

$$f(0 + 1) = -2f(0) + 3 = -2(2) + 3 = -1$$

$$f(1 + 1) = -2f(1) + 3 = -2(-1) + 3 = 5$$

PTS: 2 REF: 011520ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

455 ANS: 3

$$a_n = 3n + 1$$

$$a_5 = 3(5) + 1 = 16$$

PTS: 2 REF: 061613ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

456 ANS: 2

$f(1) = 2$; $f(2) = -5(2) + 2 = -8$; $f(3) = -5(-8) + 2 = 42$; $f(4) = -5(42) + 2 = -208$

PTS: 2 REF: 061718ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

457 ANS: 3

1, 3, 6, 10, 15, 21, 28, ...

PTS: 2 REF: 081715ai NAT: F.IF.A.3 TOP: Sequences
KEY: term

458 ANS:

Yes, because the sequence has a common ratio, 3.

PTS: 2 REF: 081726ai NAT: F.IF.A.3 TOP: Sequences
KEY: difference or ratio

459 ANS: 4 PTS: 2 REF: 061421ai NAT: F.LE.A.2
TOP: Sequences

460 ANS: 2 PTS: 2 REF: 061424ai NAT: F.LE.A.2
TOP: Sequences

461 ANS: 3 PTS: 2 REF: 061522ai NAT: F.LE.A.2
TOP: Sequences

462 ANS: 2 PTS: 2 REF: 081416ai NAT: F.LE.A.2
TOP: Sequences

463 ANS: 1 PTS: 2 REF: 081514ai NAT: F.LE.A.2
TOP: Sequences

464 ANS: 3 PTS: 2 REF: 011618ai NAT: F.LE.A.2
TOP: Sequences

465 ANS: 1 PTS: 2 REF: 081610ai NAT: F.LE.A.2
TOP: Sequences

466 ANS: 1 PTS: 2 REF: 011708ai NAT: F.LE.A.2
TOP: Sequences

467 ANS: 3 PTS: 2 REF: 011818ai NAT: F.LE.A.2
TOP: Sequences