

JEFFERSON MATH PROJECT

REGENTS BY TOPIC

NY Integrated Algebra Regents Exam Questions
from Fall 2007 to August 2009 Sorted by Topic

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Dear Sir

I have to acknowledge the receipt of your favor of May 14. in which you mention that you have finished the 6. first books of Euclid, plane trigonometry, surveying & algebra and ask whether I think a further pursuit of that branch of science would be useful to you. there are some propositions in the latter books of Euclid, & some of Archimedes, which are useful, & I have no doubt you have been made acquainted with them. trigonometry, so far as this, is most valuable to every man, there is scarcely a day in which he will not resort to it for some of the purposes of common life. the science of calculation also is indispensable as far as the extraction of the square & cube roots; Algebra as far as the quadratic equation & the use of logarithms are often of value in ordinary cases: but all beyond these is but a luxury; a delicious luxury indeed; but not to be indulged in by one who is to have a profession to follow for his subsistence. in this light I view the conic sections, curves of the higher orders, perhaps even spherical trigonometry, Algebraical operations beyond the 2d dimension, and fluxions.

Letter from Thomas Jefferson to William G. Munford, Monticello, June 18, 1799.

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NUMBERS, OPERATIONS AND PROPERTIES

ABSOLUTE VALUE

1. 080923ia, P.I. A.N.6
What is the value of the expression $|-5x + 12|$
when $x = 5$?
- [A] 13 [B] 37 [C] -13 [D] -37

IDENTIFYING PROPERTIES

2. 080802ia, P.I. A.N.1
The statement $2 + 0 = 2$ is an example of the
use of which property of real numbers?
- [A] additive inverse [B] distributive
[C] additive identity [D] associative
3. fall0705ia, P.I. A.N.1
Which property is illustrated by the equation
 $ax + ay = a(x + y)$?
- [A] commutative [B] identity
[C] associative [D] distributive

PROPERTIES OF REALS

4. 060926ia, P.I. A.N.1
What is the additive inverse of the expression
 $a - b$?
- [A] $a - b$ [B] $a + b$
[C] $-a + b$ [D] $-a - b$

SET THEORY

5. fall0704ia, P.I. A.A.29
Which interval notation represents the set of
all numbers from 2 through 7, inclusive?
- [A] $[2,7)$ [B] $(2,7]$ [C] $(2,7)$ [D] $[2,7]$

6. 010917ia, P.I. A.A.29
The set $\{1,2,3,4\}$ is equivalent to
- [A] $\{x|0 < x < 4, \text{ where } x \text{ is a whole number}\}$
[B] $\{x|1 < x < 4, \text{ where } x \text{ is a whole number}\}$
[C] $\{x|0 < x \leq 4, \text{ where } x \text{ is a whole number}\}$
[D] $\{x|1 < x \leq 4, \text{ where } x \text{ is a whole number}\}$

7. 060930ia, P.I. A.A.29
The set $\{11,12\}$ is equivalent to
- [A] $\{x|11 < x \leq 12, \text{ where } x \text{ is an integer}\}$
[B] $\{x|10 < x \leq 12, \text{ where } x \text{ is an integer}\}$
[C] $\{x|10 \leq x < 12, \text{ where } x \text{ is an integer}\}$
[D] $\{x|11 < x < 12, \text{ where } x \text{ is an integer}\}$

8. 080833ia, P.I. A.A.30
Twelve players make up a high school
basketball team. The team jerseys are
numbered 1 through 12. The players wearing
the jerseys numbered 3, 6, 7, 8, and 11 are the
only players who start a game. Using set
notation, list the complement of this subset.

9. 060818ia, P.I. A.A.30
Consider the set of integers greater than -2
and less than 6. A subset of this set is the
positive factors of 5. What is the complement
of this subset?
- [A] $\{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$
[B] $\{-2, -1, 0, 2, 3, 4, 6\}$
[C] $\{-1, 0, 2, 3, 4\}$ [D] $\{0, 2, 3, 4\}$

10. 080912ia, P.I. A.A.30
Given:
 $A = \{\text{All even integers from 2 to 20, inclusive}\}$
 $B = \{10, 12, 14, 16, 18\}$
What is the complement of set B within the
universe of set A ?
- [A] $\{2, 4, 6, 8\}$ [B] $\{2, 4, 6, 8, 20\}$
[C] $\{4, 6, 8\}$ [D] $\{4, 6, 8, 20\}$

11. fall0710ia, P.I. A.A.31

Given:

$$\text{Set } A = \{(-2,-1), (-1,0), (1,8)\}$$

$$\text{Set } B = \{(-3,-4), (-2,-1), (-1,2), (1,8)\}$$

What is the intersection of sets A and B ?

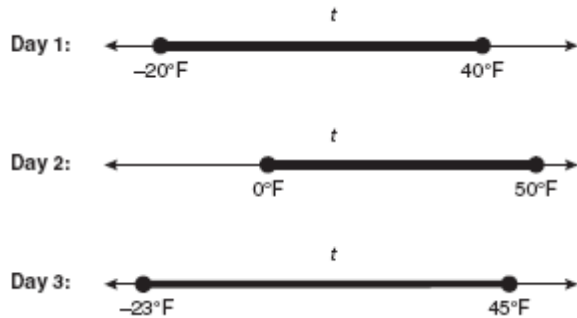
[A] $\{(-2,-1), (1,8)\}$ [B] $\{(-2,-1)\}$

[C] $\{(-3,-4), (-2,-1), (-1,2), (-1,0), (1,8)\}$

[D] $\{(1,8)\}$

12. 060833ia, P.I. A.A.31

Maureen tracks the range of outdoor temperatures over three days. She records the following information.



Express the intersection of the three sets as an inequality in terms of temperature, t .

GRAPHS & STATISTICS

FREQUENCY HISTOGRAMS, BAR GRAPHS AND TABLES

13. 060938ia, P.I. A.S.8

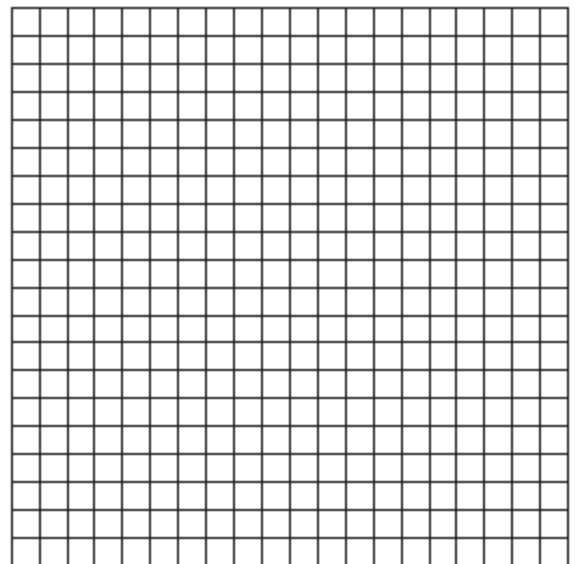
The Fahrenheit temperature readings on 30 April mornings in Stormville, New York, are shown below.

$41^\circ, 58^\circ, 61^\circ, 54^\circ, 49^\circ, 46^\circ, 52^\circ, 58^\circ, 67^\circ, 43^\circ, 47^\circ, 60^\circ, 52^\circ, 58^\circ, 48^\circ, 44^\circ, 59^\circ, 66^\circ, 62^\circ, 55^\circ, 44^\circ, 49^\circ, 62^\circ, 61^\circ, 59^\circ, 54^\circ, 57^\circ, 58^\circ, 63^\circ, 60^\circ$

Using the data, complete the frequency table below.

Interval	Tally	Frequency
40–44		
45–49		
50–54		
55–59		
60–64		
65–69		

On the grid below, construct and label a frequency histogram based on the table.



14. 080838ia, P.I. A.S.5

Twenty students were surveyed about the number of days they played outside in one week. The results of this survey are shown below.

{6,5,4,5,0,7,1,5,4,4,3,2,2,3,2,4,3,4,0,7}

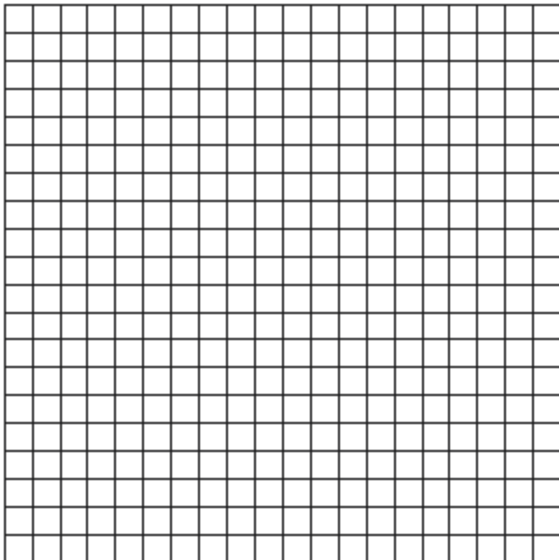
Complete the frequency table and cumulative frequency table below for these data. Create a cumulative frequency histogram based upon the table you made.

Number of Days Outside

Interval	Tally	Frequency
0-1		
2-3		
4-5		
6-7		

Number of Days Outside

Interval	Cumulative Frequency
0-1	
0-3	
0-5	
0-7	



15. 060822ia, P.I. A.S.9

The table below shows a cumulative frequency distribution of runners' ages.

Cumulative Frequency Distribution of Runners' Ages

Age Group	Total
20-29	8
20-39	18
20-49	25
20-59	31
20-69	35

According to the table, how many runners are in their forties?

- [A] 25 [B] 7 [C] 6 [D] 10

16. 060839ia, P.I. A.S.4

The prices of seven race cars sold last week are listed in the table below.

Price per Race Car	Number of Race Cars
\$126,000	1
\$140,000	2
\$180,000	1
\$400,000	2
\$819,000	1

What is the mean value of these race cars, in dollars? What is the median value of these race cars, in dollars? State which of these measures of central tendency best represents the value of the seven race cars. Justify your answer.

17. fall0737ia, P.I. A.S.4

The values of 11 houses on Washington St. are shown in the table below.

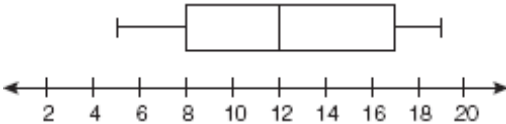

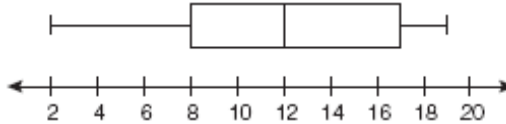
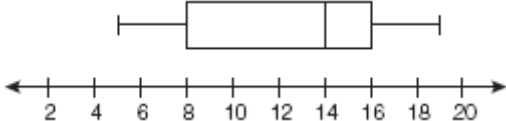
Value per House	Number of Houses
\$100,000	1
\$175,000	5
\$200,000	4
\$700,000	1

Find the mean value of these houses in dollars. Find the median value of these houses in dollars. State which measure of central tendency, the mean or the median, *best* represents the values of these 11 houses. Justify your answer.

BOX-AND-WHISKER PLOTS

18. fall0709ia, P.I. A.S.5

The data set 5, 6, 7, 8, 9, 9, 9, 10, 12, 14, 17, 17, 18, 19, 19 represents the number of hours spent on the Internet in a week by students in a mathematics class. Which box-and-whisker plot represents the data?

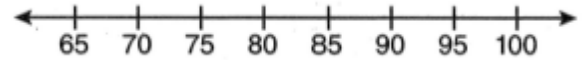
- [A] 
- [B] 
- [C] 
- [D] 

19. 080939ia, P.I. A.S.5

The test scores from Mrs. Gray's math class are shown below.

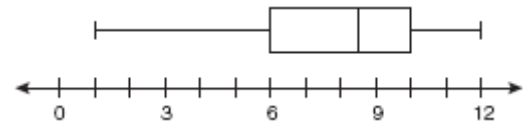
72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92

Construct a box-and-whisker plot to display these data.



20. 080818ia, P.I. A.S.6

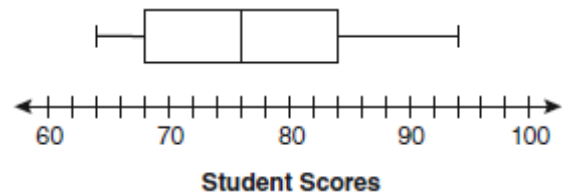
What is the value of the third quartile shown on the box-and-whisker plot below?



- [A] 8.5 [B] 12 [C] 6 [D] 10

21. 060915ia, P.I. A.S.6

The box-and-whisker plot below represents students' scores on a recent English test.

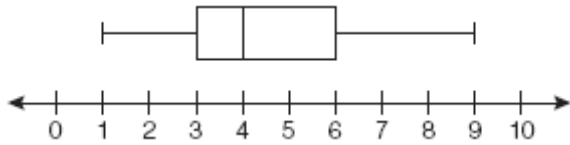


What is the value of the upper quartile?

- [A] 68 [B] 84 [C] 76 [D] 94

22. 010929ia, P.I. A.S.6

A movie theater recorded the number of tickets sold daily for a popular movie during the month of June. The box-and-whisker plot shown below represents the data for the number of tickets sold, in hundreds.



Which conclusion can be made using this plot?

- [A] The range of the attendance is 300 to 600.
- [B] Twenty-five percent of the attendance is between 300 and 400.
- [C] The second quartile is 600.
- [D] The mean of the attendance is 400.

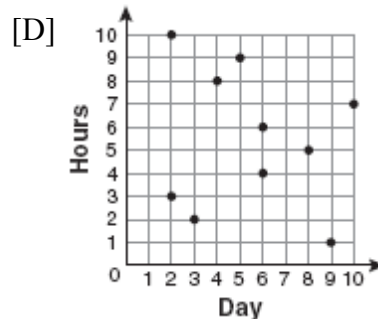
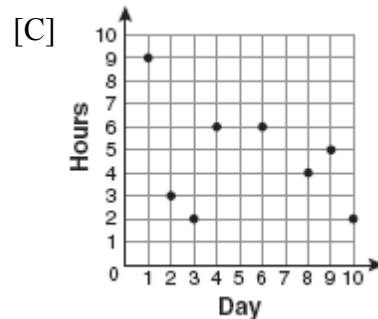
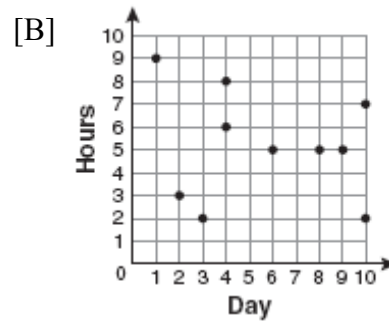
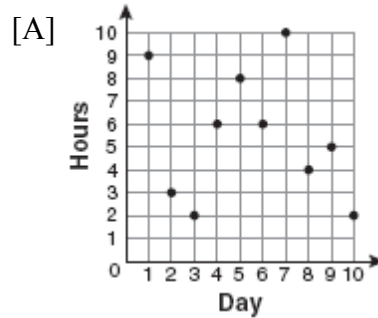
SCATTER PLOTS

23. fall0701ia, P.I. A.S.7

For 10 days, Romero kept a record of the number of hours he spent listening to music. The information is shown in the table below.

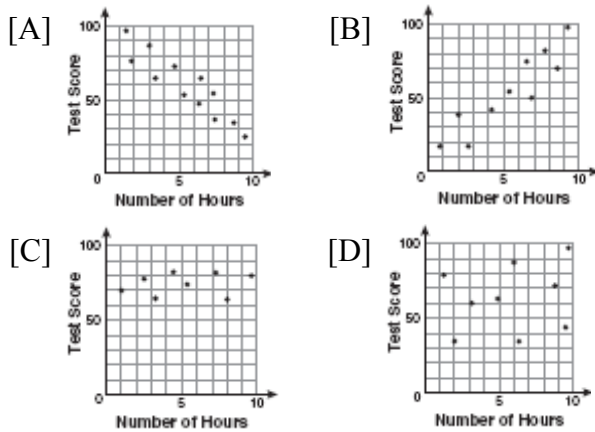
Day	1	2	3	4	5	6	7	8	9	10
Hours	9	3	2	6	8	6	10	4	5	2

Which scatter plot shows Romero's data graphically?



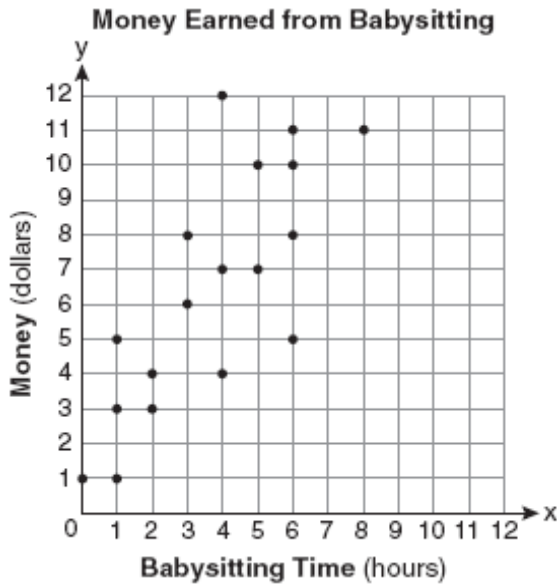
24. 060805ia, P.I. A.S.12

There is a negative correlation between the number of hours a student watches television and his or her social studies test score. Which scatter plot below displays this correlation?



25. 080822ia, P.I. A.S.8

Which equation most closely represents the line of best fit for the scatter plot below?



- [A] $y = \frac{3}{2}x + 1$ [B] $y = \frac{3}{2}x + 4$
 [C] $y = x$ [D] $y = \frac{2}{3}x + 1$

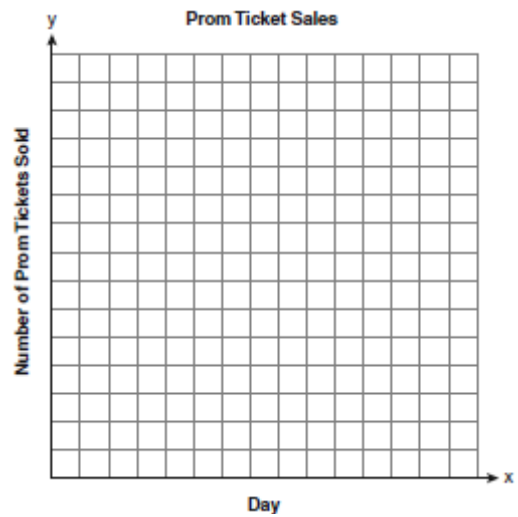
26. 060936ia, P.I. A.S.8

The table below shows the number of prom tickets sold over a ten-day period.

Prom Ticket Sales

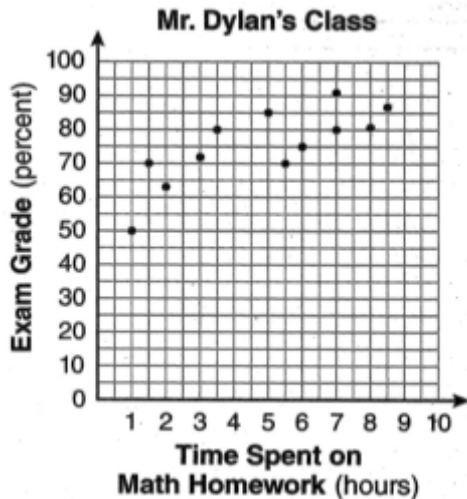
Day (x)	1	2	5	7	10
Number of Prom Tickets Sold (y)	30	35	55	60	70

Plot these data points on the coordinate grid below. Use a consistent and appropriate scale. Draw a reasonable line of best fit and write its equation.



27. 080930ia, P.I. A.S.17

The number of hours spent on math homework each week and the final exam grades for twelve students in Mr. Dylan's algebra class are plotted below.



Based on a line of best fit, which exam grade is the best prediction for a student who spends about 4 hours on math homework each week?

- [A] 82 [B] 72 [C] 92 [D] 62

CENTRAL TENDENCY

28. 010907ia, P.I. A.S.4

Alex earned scores of 60, 74, 82, 87, 87, and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

- [A] mean < median < mode
 [B] mean < mode < median
 [C] mode < median < mean
 [D] median < mode < mean

29. 080804ia, P.I. A.S.4

Which statement is true about the data set 3, 4, 5, 6, 7, 7, 10?

- [A] mean > mode [B] mean < median
 [C] mean = median [D] mean = mode

ANALYSIS OF DATA

30. fall0707ia, P.I. A.S.14

Which situation describes a correlation that is *not* a causal relationship?

- [A] The more powerful the microwave, the faster the food cooks.
 [B] The rooster crows, and the Sun rises.
 [C] The more miles driven, the more gasoline needed.
 [D] The faster the pace of a runner, the quicker the runner finishes.

31. 080908ia, P.I. A.S.13

Which relationship can best be described as causal?

- [A] number of students in a class and number of students with brown hair
 [B] height and intelligence
 [C] shoe size and running speed
 [D] number of correct answers on a test and test score

32. fall0714ia, P.I. A.S.2

Which situation should be analyzed using bivariate data?

- [A] Ms. Saleem keeps a list of the amount of time her daughter spends on her social studies homework.
 [B] Mr. DeStefan records his customers' best video game scores during the summer.
 [C] Mr. Benjamin tries to see if his students' shoe sizes are directly related to their heights.
 [D] Mr. Chan keeps track of his daughter's algebra grades for the quarter.

33. 060819ia, P.I. A.S.1
Which data set describes a situation that could be classified as qualitative?
- [A] the opinions of students regarding school lunches
 - [B] the shoe sizes of players on the basketball team
 - [C] the ages of presidents at the time of their inauguration
 - [D] the elevations of the five highest mountains in the world
34. 060905ia, P.I. A.S.1
Which data set describes a situation that could be classified as qualitative?
- [A] the ages of the students in Ms. Marshall's Spanish class
 - [B] the test scores of the students in Ms. Fitzgerald's class
 - [C] the heights of the players on the East High School basketball team
 - [D] the favorite ice cream flavor of each of Mr. Hayden's students
35. 060803ia, P.I. A.S.3
A school wants to add a coed soccer program. To determine student interest in the program, a survey will be taken. In order to get an unbiased sample, which group should the school survey?
- [A] every member of the varsity football team
 - [B] every member in Ms. Zimmer's drama classes
 - [C] every student having a second-period French class
 - [D] every third student entering the building
36. 010923ia, P.I. A.S.3
A survey is being conducted to determine which types of television programs people watch. Which survey and location combination would likely contain the most bias?
- [A] surveying 10 people who work in a sporting goods store
 - [B] randomly surveying 50 people during the day in a mall
 - [C] randomly surveying 75 people during the day in a clothing store
 - [D] surveying the first 25 people who enter a grocery store
37. 080910ia, P.I. A.S.3
Erica is conducting a survey about the proposed increase in the sports budget in the Hometown School District. Which survey method would likely contain the most bias?
- [A] Erica asks every fifth person leaving Saturday's Hometown High School football game.
 - [B] Erica asks every third person leaving the Hometown Shopping Mall this weekend.
 - [C] Erica asks every fifth student entering Hometown High School on Monday morning.
 - [D] Erica asks every third person entering the Hometown Grocery Store.

ERROR

38. fall0723ia, P.I. A.M.3

The groundskeeper is replacing the turf on a football field. His measurements of the field are 130 yards by 60 yards. The actual measurements are 120 yards by 54 yards. Which expression represents the relative error in the measurement?

[A] $\frac{(130)(60)}{(130)(60) - (120)(54)}$

[B] $\frac{(130)(60) - (120)(54)}{(120)(54)}$

[C] $\frac{(130)(60) - (120)(54)}{(130)(60)}$

[D] $\frac{(120)(54)}{(130)(60) - (120)(54)}$

39. 080828ia, P.I. A.M.3

Ryan estimates the measurement of the volume of a popcorn container to be 282 cubic inches. The actual volume of the popcorn container is 289 cubic inches. What is the relative error of Ryan's measurement to the *nearest thousandth*?

[A] 1.025 [B] 0.024

[C] 0.025 [D] 0.096

40. 060928ia, P.I. A.M.3

To calculate the volume of a small wooden cube, Ezra measured an edge of the cube as 2 cm. The actual length of the edge of Ezra's cube is 2.1 cm. What is the relative error in his volume calculation to the *nearest hundredth*?

[A] 0.16 [B] 0.14 [C] 0.15 [D] 0.13

41. 080926ia, P.I. A.M.3

Carrie bought new carpet for her living room. She calculated the area of the living room to be 174.2 square feet. The actual area was 149.6 square feet. What is the relative error of the area to the *nearest ten-thousandth*?

[A] 2.1644 [B] 0.1644

[C] 1.8588 [D] 0.1412

42. 010934ia, P.I. A.M.3

Sarah measures her rectangular bedroom window for a new shade. Her measurements are 36 inches by 42 inches. The actual measurements of the window are 36.5 inches and 42.5 inches. Using the measurements that Sarah took, determine the number of square inches in the area of the window. Determine the number of square inches in the actual area of the window. Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*.

43. 060838ia, P.I. A.M.3

Sophie measured a piece of paper to be 21.7 cm by 28.5 cm. The piece of paper is actually 21.6 cm by 28.4 cm. Determine the number of square centimeters in the area of the piece of paper using Sophie's measurements. Determine the number of square centimeters in the actual area of the piece of paper. Determine the relative error in calculating the area. Express your answer as a decimal to the *nearest thousandth*. Sophie does not think there is a significant amount of error. Do you agree or disagree? Justify your answer.

PROBABILITY

SAMPLE SPACE

44. 010939ia, P.I. A.S.19
A restaurant sells kids' meals consisting of one main course, one side dish, and one drink, as shown in the table below.

Kids' Meal Choices

Main Course	Side Dish	Drink
hamburger	French fries	milk
chicken nuggets	applesauce	juice
turkey sandwich		soda

Draw a tree diagram or list the sample space showing all possible kids' meals. How many different kids' meals can a person order? Jose does not drink juice. Determine the number of different kids' meals that do *not* include juice. Jose's sister will eat *only* chicken nuggets for her main course. Determine the number of different kids' meals that include chicken nuggets.

45. 080933ia, P.I. A.S.19
Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.
46. fall0736ia, P.I. A.S.19
Mr. Laub has three children: two girls (Sue and Karen) and one boy (David). After each meal, one child is chosen at random to wash dishes. If the same child can be chosen for both lunch and dinner, construct a tree diagram or list a sample space of all the possible outcomes of who will wash dishes after lunch and dinner on Saturday. Determine the probability that one boy and one girl will wash dishes after lunch and dinner on Saturday.

EXPERIMENTAL PROBABILITY

47. 060908ia, P.I. A.S.21
Students in Ms. Nazzeer's mathematics class tossed a six-sided number cube whose faces are numbered 1 to 6. The results are recorded in the table below.

Result	Frequency
1	3
2	6
3	4
4	6
5	4
6	7

Based on these data, what is the empirical probability of tossing a 4?

- [A] $\frac{5}{30}$ [B] $\frac{8}{30}$ [C] $\frac{1}{30}$ [D] $\frac{6}{30}$

THEORETICAL PROBABILITY

48. 010903ia, P.I. A.S.22
The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is *least* likely to occur?
- [A] rolling an even number
[B] rolling a number greater than 4
[C] rolling an odd number
[D] rolling a number less than 6

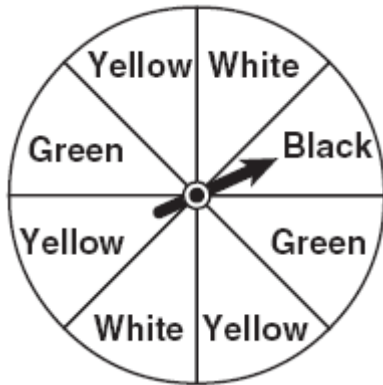
49. fall0702ia, P.I. A.S.23

Throughout history, many people have contributed to the development of mathematics. These mathematicians include Pythagoras, Euclid, Hypatia, Euler, Einstein, Agnesi, Fibonacci, and Pascal. What is the probability that a mathematician's name selected at random from those listed will start with either the letter E or the letter A?

- [A] $\frac{3}{8}$ [B] $\frac{4}{8}$ [C] $\frac{6}{8}$ [D] $\frac{2}{8}$

50. 060802ia, P.I. A.S.22

A spinner is divided into eight equal regions as shown in the diagram below.

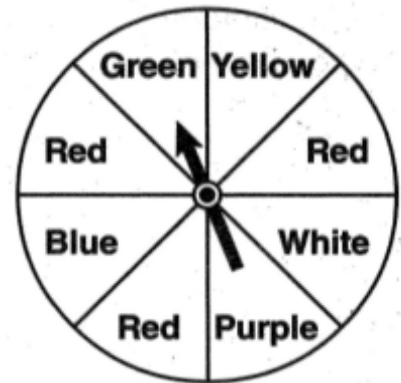


Which event is most likely to occur in one spin?

- [A] The arrow will land in a green or black area.
 [B] The arrow will land in a green or white area.
 [C] The arrow will land in a yellow or green area.
 [D] The arrow will land in a yellow or black area.

51. 080907ia, P.I. A.S.20

The spinner below is divided into eight equal regions and is spun once. What is the probability of not getting red?



- [A] $\frac{5}{8}$ [B] $\frac{7}{8}$ [C] $\frac{3}{8}$ [D] $\frac{3}{5}$

PROBABILITY OF INDEPENDENT EVENTS

52. 080832ia, P.I. A.S.23

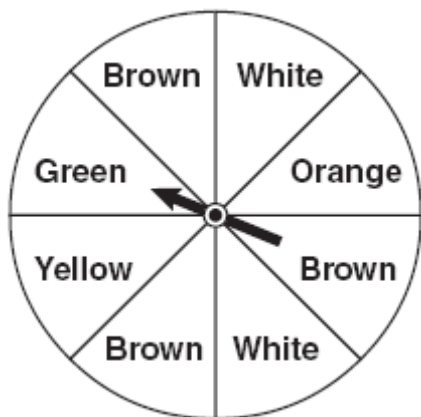
Brianna is using the two spinners shown below to play her new board game. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She uses the second spinner to determine whether her move from the first spinner will be forward or backward.



Find the probability that Brianna will move *fewer than* four spaces and *backward*.

53. 010928ia, P.I. A.S.23

Keisha is playing a game using a wheel divided into eight equal sectors, as shown in the diagram below. Each time the spinner lands on orange, she will win a prize.



If Keisha spins this wheel twice, what is the probability she will win a prize on *both* spins?

- [A] $\frac{1}{16}$ [B] $\frac{1}{64}$ [C] $\frac{1}{4}$ [D] $\frac{1}{56}$

PROBABILITY OF EVENTS NOT MUTUALLY EXCLUSIVE

54. 080830ia, P.I. A.S.23

The faces of a cube are numbered from 1 to 6. If the cube is tossed once, what is the probability that a prime number or a number divisible by 2 is obtained?

- [A] $\frac{5}{6}$ [B] $\frac{4}{6}$ [C] $\frac{1}{6}$ [D] $\frac{6}{6}$

CONDITIONAL PROBABILITY

55. 060933ia, P.I. A.S.18

Some books are laid on a desk. Two are English, three are mathematics, one is French, and four are social studies. Theresa selects an English book and Isabelle then selects a social studies book. Both girls take their selections to the library to read. If Truman then selects a book at random, what is the probability that he selects an English book?

MULTIPLICATION COUNTING PRINCIPLE

56. 080905ia, P.I. A.N.7

The local ice cream stand offers three flavors of soft-serve ice cream: vanilla, chocolate, and strawberry; two types of cone: sugar and wafer; and three toppings: sprinkles, nuts, and cookie crumbs. If Dawn does not order vanilla ice cream, how many different choices can she make that have one flavor of ice cream, one type of cone, and one topping?

- [A] 12 [B] 7 [C] 18 [D] 8

PERMUTATIONS

57. 060808ia, P.I. A.N.8

The bowling team at Lincoln High School must choose a president, vice president, and secretary. If the team has 10 members, which expression could be used to determine the number of ways the officers could be chosen?

- [A] ${}_3P_{10}$ [B] ${}_7P_3$ [C] ${}_{10}P_3$ [D] ${}_{10}P_7$

58. 060931ia, P.I. A.N.8

Determine how many three-letter arrangements are possible with the letters *A*, *N*, *G*, *L*, and *E* if no letter may be repeated.

59. 080816ia, P.I. A.N.8

John is going to line up his four golf trophies on a shelf in his bedroom. How many different possible arrangements can he make?

- [A] 4 [B] 10 [C] 16 [D] 24

EXPRESSIONS AND EQUATIONS

EXPRESSIONS

60. 080931ia, P.I. A.A.3
Chad complained to his friend that he had five equations to solve for homework. Are all of the homework problems equations? Justify your answer.

Math Homework	
1.	$3x^2 \cdot 2x^4$
2.	$5 - 2x = 3x$
3.	$3(2x + 7)$
4.	$7x^2 + 2x - 3x^2 - 9$
5.	$\frac{2}{3} = \frac{x+2}{6}$
Name <u>Chad</u>	

61. fall0727ia, P.I. A.A.17
What is the sum of $\frac{d}{2}$ and $\frac{2d}{3}$ expressed in simplest form?
[A] $\frac{3d}{6}$ [B] $\frac{7d}{5}$ [C] $\frac{3d}{5}$ [D] $\frac{7d}{6}$
62. fall0729ia, P.I. A.A.2
Which verbal expression represents $2(n-6)$?
[A] two times n minus six
[B] two times the quantity six less than n
[C] two times the quantity n less than six
[D] two times six minus n

63. 060904ia, P.I. A.A.1
Marie currently has a collection of 58 stamps. If she buys s stamps each week for w weeks, which expression represents the total number of stamps she will have?
[A] $58s + w$ [B] $58sw$
[C] $58 + sw$ [D] $58 + s + w$
64. 060823ia, P.I. A.A.1
Mr. Turner bought x boxes of pencils. Each box holds 25 pencils. He left 3 boxes of pencils at home and took the rest to school. Which expression represents the total number of pencils he took to school?
[A] $22x$ [B] $25 - 3x$
[C] $25x - 75$ [D] $25x - 3$

SOLVING EQUATIONS

65. 080801ia, P.I. A.A.22
Which value of p is the solution of $5p - 1 = 2p + 20$?
[A] $\frac{19}{7}$ [B] 3 [C] 7 [D] $\frac{19}{3}$
66. fall0732ia, P.I. A.A.22
Solve for g : $3 + 2g = 5g - 9$

SOLVING EQUATIONS WITH FRACTIONAL EXPRESSIONS

67. 060907ia, P.I. A.A.25
Which value of x is the solution of the equation $\frac{2x}{3} + \frac{x}{6} = 5$?
[A] 30 [B] 6 [C] 10 [D] 15
68. 080909ia, P.I. A.A.25
Solve for x : $\frac{3}{5}(x+2) = x - 4$
[A] 13 [B] 23 [C] 15 [D] 8

69. 010906ia, P.I. A.A.26

What is the solution of $\frac{k+4}{2} = \frac{k+9}{3}$?

- [A] 6 [B] 5 [C] 1 [D] 14

70. 080820ia, P.I. A.A.25

Which value of x is the solution of

$$\frac{2x}{5} + \frac{1}{3} = \frac{7x-2}{15}?$$

- [A] 7 [B] 3 [C] $\frac{31}{26}$ [D] $\frac{3}{5}$

MODELING EQUATIONS

71. 080901ia, P.I. A.A.4

If h represents a number, which equation is a correct translation of "Sixty more than 9 times a number is 375"?

- [A] $60h + 9 = 375$ [B] $9h - 60 = 375$
[C] $9h + 60 = 375$ [D] $9h = 375$

72. 010915ia, P.I. A.A.5

Rhonda has \$1.35 in nickels and dimes in her pocket. If she has six more dimes than nickels, which equation can be used to determine x , the number of nickels she has?

- [A] $0.05(x+6) + 0.10x = 1.35$
[B] $0.05 + 0.10(6x) = 1.35$
[C] $0.15(x+6) = 1.35$
[D] $0.05x + 0.10(x+6) = 1.35$

73. 080928ia, P.I. A.A.6

The ages of three brothers are consecutive even integers. Three times the age of the youngest brother exceeds the oldest brother's age by 48 years. What is the age of the youngest brother?

- [A] 18 [B] 22 [C] 26 [D] 14

TRANSFORMING FORMULAS

74. 080808ia, P.I. A.A.23

If $3ax + b = c$, then x equals

- [A] $\frac{c-b}{3a}$ [B] $c-b+3a$
[C] $c+b-3a$ [D] $\frac{b-c}{3a}$

75. 060913ia, P.I. A.A.23

If $a + ar = b + r$, the value of a in terms of b and r can be expressed as

- [A] $\frac{1+b}{r}$ [B] $\frac{b+r}{1+r}$
[C] $\frac{b}{r} + 1$ [D] $\frac{1+b}{r+b}$

76. 010911ia, P.I. A.A.23

If the formula for the perimeter of a rectangle is $P = 2l + 2w$, then w can be expressed as

- [A] $w = \frac{2l-P}{2}$ [B] $w = \frac{P-2l}{2}$
[C] $w = \frac{P-2w}{2l}$ [D] $w = \frac{P-l}{2}$

RATE

USING RATE

77. 060831ia, P.I. A.M.1

Tom drove 290 miles from his college to home and used 23.2 gallons of gasoline. His sister, Ann, drove 225 miles from her college to home and used 15 gallons of gasoline. Whose vehicle had better gas mileage? Justify your answer.

CONVERSIONS

78. 060911ia, P.I. A.M.2
If the speed of sound is 344 meters per second, what is the approximate speed of sound, in meters per hour?

60 seconds = 1 minute 60 minutes = 1 hour
--

- [A] 41,280 [B] 123,840
[C] 20,640 [D] 1,238,400
79. 010901ia, P.I. A.M.2
On a certain day in Toronto, Canada, the temperature was 15° Celsius (C). Using the formula $F = \frac{9}{5}C + 32$, Peter converts this temperature to degrees Fahrenheit (F). Which temperature represents 15° C in degrees Fahrenheit?

- [A] -9 [B] 59 [C] 35 [D] 85

DIRECT VARIATION

80. 080814ia, P.I. A.N.5
Nicole’s aerobics class exercises to fast-paced music. If the rate of the music is 120 beats per minute, how many beats would there be in a class that is 0.75 hour long?

- [A] 7,200 [B] 160 [C] 5,400 [D] 90

81. 010933ia, P.I. A.N.5
The table below represents the number of hours a student worked and the amount of money the student earned.

Number of Hours (h)	Dollars Earned (d)
8	\$50.00
15	\$93.75
19	\$118.75
30	\$187.50

Write an equation that represents the number of dollars, d , earned in terms of the number of hours, h , worked. Using this equation, determine the number of dollars the student would earn for working 40 hours.

PERCENTS

82. 060835ia, P.I. A.N.5
The Hudson Record Store is having a going-out-of-business sale. CDs normally sell for \$18.00. During the first week of the sale, all CDs will sell for \$15.00. Written as a fraction, what is the rate of discount? What is this rate expressed as a percent? Round your answer to the *nearest hundredth of a percent*. During the second week of the sale, the same CDs will be on sale for 25% off the *original* price. What is the price of a CD during the second week of the sale?
83. 080935ia, P.I. A.N.5
At the end of week one, a stock had increased in value from \$5.75 a share to \$7.50 a share. Find the percent of increase at the end of week one to the *nearest tenth of a percent*. At the end of week two, the same stock had decreased in value from \$7.50 to \$5.75. Is the percent of decrease at the end of week two the same as the percent of increase at the end of week one? Justify your answer.

SPEED

84. 010902ia, P.I. A.M.1
What is the speed, in meters per second, of a paper airplane that flies 24 meters in 6 seconds?
[A] 144 [B] 30 [C] 18 [D] 4
85. 080831ia, P.I. A.M.1
In a game of ice hockey, the hockey puck took 0.8 second to travel 89 feet to the goal line. Determine the average speed of the puck in feet per second.
86. 080936ia, P.I. A.M.1
The chart below compares two runners.

Runner	Distance, in miles	Time, in hours
Greg	11	2
Dave	16	3

Based on the information in this chart, state which runner has the faster rate. Justify your answer.

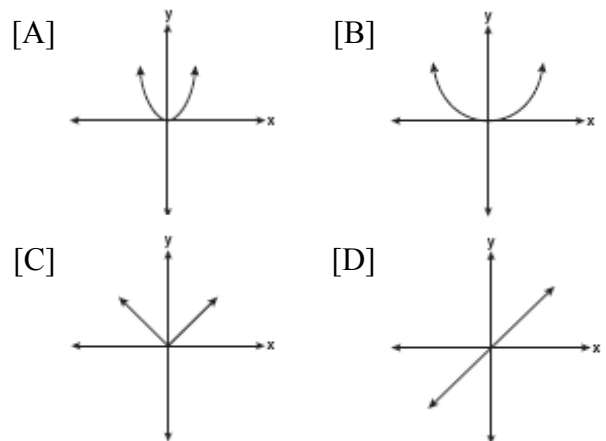
87. 060901ia, P.I. A.M.1
It takes Tammy 45 minutes to ride her bike 5 miles. At this rate, how long will it take her to ride 8 miles?
[A] 72 minutes [B] 0.89 hours
[C] 1.125 hours [D] 48 minutes

88. fall0734ia, P.I. A.M.1
Hannah took a trip to visit her cousin. She drove 120 miles to reach her cousin's house and the same distance back home. It took her 1.2 hours to get halfway to her cousin's house. What was her average speed, in miles per hour, for the first 1.2 hours of the trip? Hannah's average speed for the remainder of the trip to her cousin's house was 40 miles per hour. How long, in hours, did it take her to drive the remaining distance? Traveling home along the same route, Hannah drove at an average rate of 55 miles per hour. After 2 hours her car broke down. How many miles was she from home?

FUNCTIONS

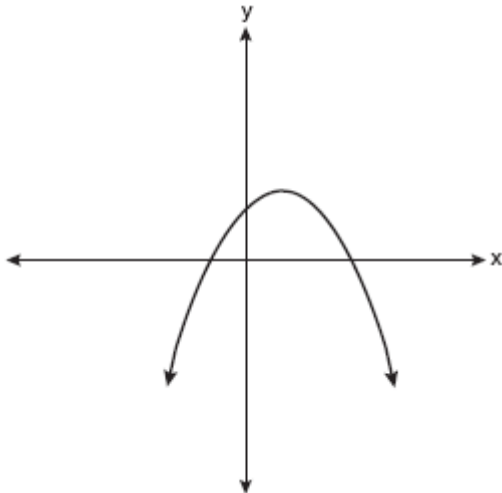
FAMILIES OF FUNCTIONS

89. 060801ia, P.I. A.G.4
Which graph represents a linear function?



90. fall0717ia, P.I. A.G.4

Which type of graph is shown in the diagram below?

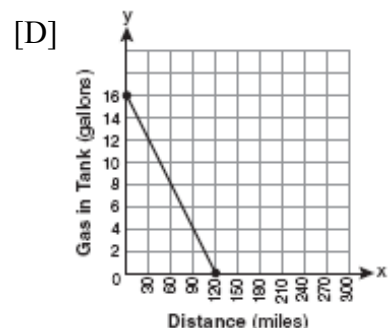
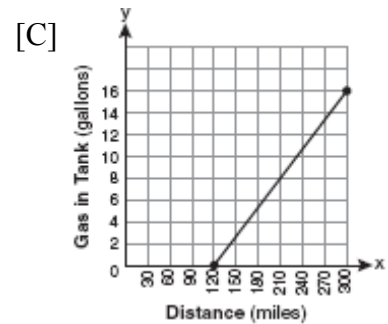
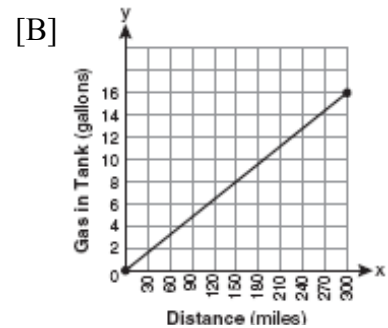
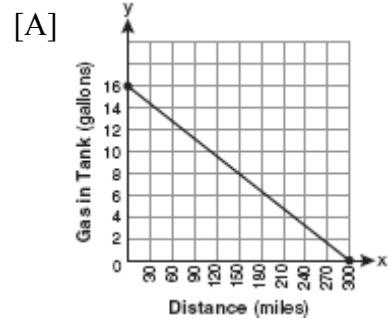


- [A] absolute value [B] linear
[C] quadratic [D] exponential

GRAPHING FUNCTIONS AND RELATIONS

91. 080807ia, P.I. A.G.4

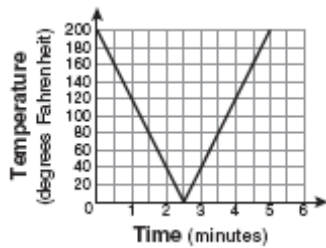
The gas tank in a car holds a total of 16 gallons of gas. The car travels 75 miles on 4 gallons of gas. If the gas tank is full at the beginning of a trip, which graph represents the rate of change in the amount of gas in the tank?



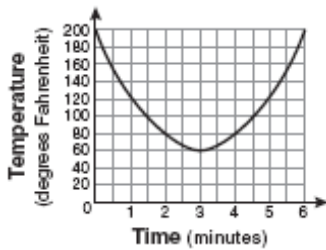
92. 010905ia, P.I. A.G.4

Antwaan leaves a cup of hot chocolate on the counter in his kitchen. Which graph is the best representation of the change in temperature of his hot chocolate over time?

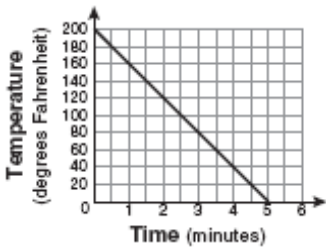
[A]



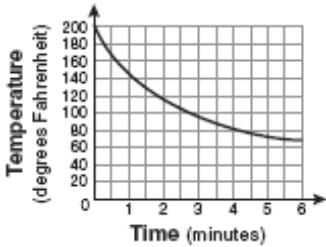
[B]



[C]

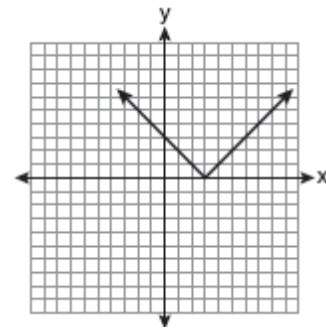


[D]



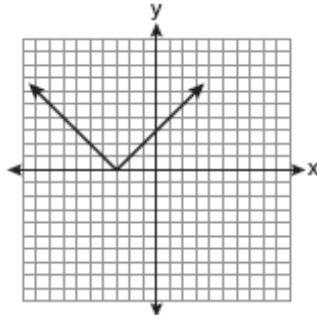
93. fall0722ia, P.I. A.G.4

The diagram below shows the graph of $y = |x - 3|$.

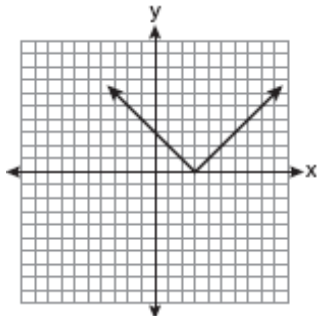


Which diagram shows the graph of $y = -|x - 3|$?

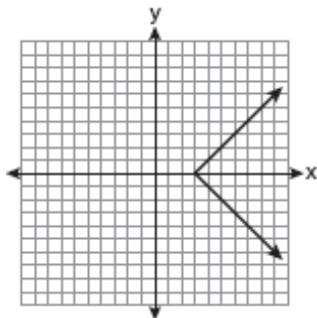
[A]



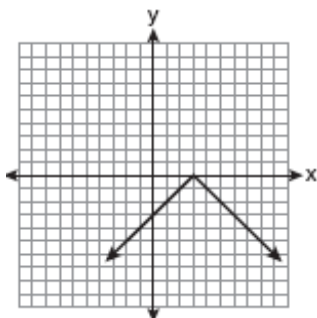
[B]



[C]

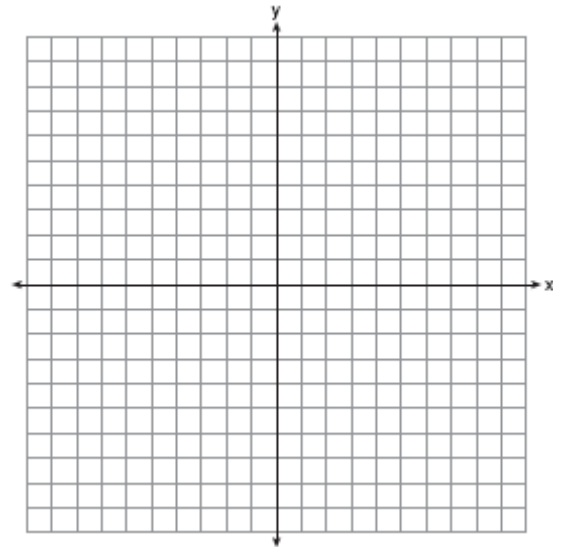


[D]



94. 080835ia, P.I. A.G.4

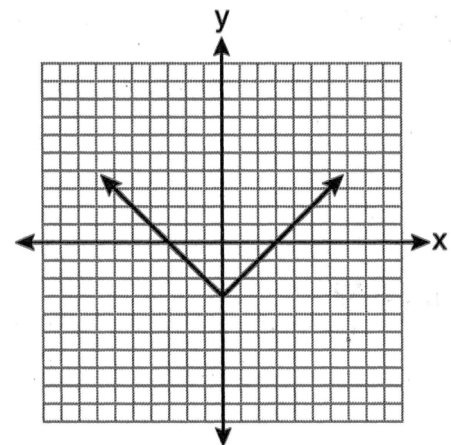
On the set of axes below, draw the graph of $y = 2^x$ over the interval $-1 \leq x \leq 3$. Will this graph ever intersect the x -axis? Justify your answer.



IDENTIFYING THE EQUATION OF A GRAPH

95. 080925ia, P.I. A.G.4

Which equation is represented by the graph below?



[A] $y = (x - 3)^2$

[B] $y = x^2 - 3$

[C] $y = |x| - 3$

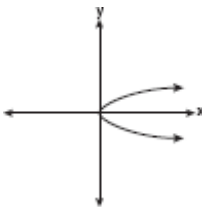
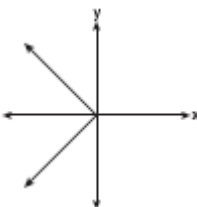
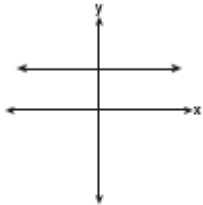
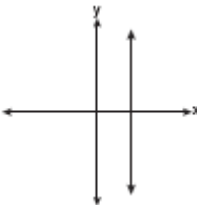
[D] $y = |x - 3|$

DEFINING FUNCTIONS

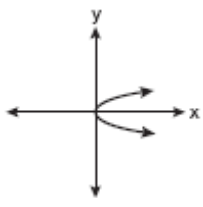
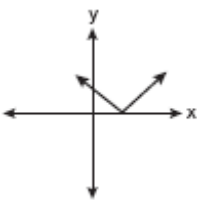
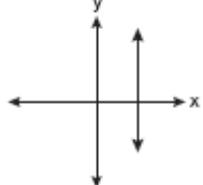
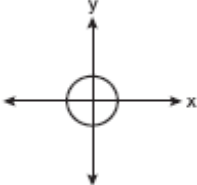
96. 080919ia, P.I. A.G.3
Which relation is *not* a function?

- [A] $\{(-1,2), (0,5), (5,0), (2,-1)\}$
- [B] $\{(1,5), (2,6), (3,6), (4,7)\}$
- [C] $\{(-1,6), (1,3), (2,5), (1,7)\}$
- [D] $\{(4,7), (2,1), (-3,6), (3,4)\}$

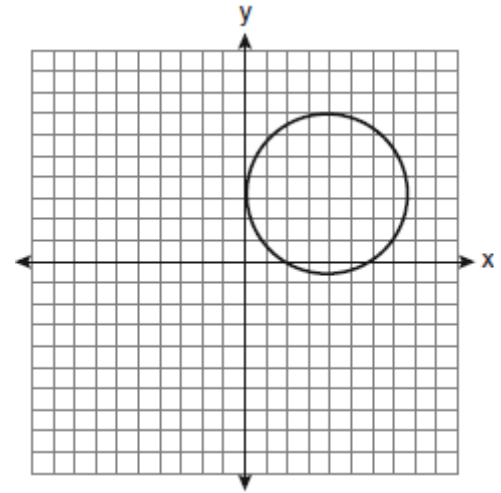
97. fall0730ia, P.I. A.G.3
Which graph represents a function?

- [A] 
- [B] 
- [C] 
- [D] 

98. 010930ia, P.I. A.G.3
Which graph represents a function?

- [A] 
- [B] 
- [C] 
- [D] 

99. 060919ia, P.I. A.G.3
Which statement is true about the relation shown on the graph below?



- [A] It is *not* a function because there are multiple y -values for a given x -value.
- [B] It is a function because there exists one x -coordinate for each y -coordinate.
- [C] It is *not* a function because there are multiple x -values for a given y -value.
- [D] It is a function because there exists one y -coordinate for each x -coordinate.

LINEAR EQUATIONS

SLOPE

100. 080823a, P.I. A.A.32
In a linear equation, the independent variable increases at a constant rate while the dependent variable decreases at a constant rate. The slope of this line is

- [A] negative
- [B] zero
- [C] positive
- [D] undefined

101. 010913ia, P.I. A.A.33
What is the slope of the line that passes through the points $(2,5)$ and $(7,3)$?

- [A] $-\frac{2}{5}$
- [B] $\frac{9}{8}$
- [C] $-\frac{5}{2}$
- [D] $\frac{8}{9}$

102. 060820ia, P.I. A.A.33
What is the slope of the line that passes through the points $(-6,1)$ and $(4,-4)$?

[A] 2 [B] $\frac{1}{2}$ [C] $-\frac{1}{2}$ [D] -2

103. fall0716ia, P.I. A.A.33
What is the slope of the line containing the points $(3,4)$ and $(-6,10)$?

[A] 2 [B] $\frac{1}{2}$ [C] $-\frac{2}{3}$ [D] $-\frac{3}{2}$

104. 080915ia, P.I. A.A.33
What is the slope of the line that passes through the points $(-5,4)$ and $(15,-4)$?

[A] $-\frac{2}{5}$ [B] undefined
[C] $-\frac{5}{2}$ [D] 0

WRITING LINEAR EQUATIONS

105. 060922ia, P.I. A.A.34
What is an equation of the line that passes through the point $(4,-6)$ and has a slope of -3 ?

[A] $y = -3x - 6$ [B] $y = -3x + 6$
[C] $y = -3x + 14$ [D] $y = -3x + 10$

106. 080927ia, P.I. A.A.34
What is an equation of the line that passes through the point $(3,-1)$ and has a slope of 2?

[A] $y = 2x + 5$ [B] $y = 2x - 7$
[C] $y = 2x - 1$ [D] $y = 2x - 4$

107. 010910ia, P.I. A.A.35
What is an equation of the line that passes through the points $(3,-3)$ and $(-3,-3)$?

[A] $y = 3$ [B] $x = y$
[C] $y = -3$ [D] $x = -3$

108. fall0713ia, P.I. A.A.35
What is an equation for the line that passes through the coordinates $(2,0)$ and $(0,3)$?

[A] $y = -\frac{2}{3}x - 2$ [B] $y = -\frac{3}{2}x + 3$
[C] $y = -\frac{3}{2}x - 3$ [D] $y = -\frac{2}{3}x + 2$

109. 080836ia, P.I. A.A.35
Write an equation that represents the line that passes through the points $(5,4)$ and $(-5,0)$.

PARALLEL AND PERPENDICULAR LINES

110. 080810ia, P.I. A.A.36
Which equation represents a line parallel to the x -axis?

[A] $y = 10$ [B] $x = 5$
[C] $x = \frac{1}{3}y$ [D] $y = 5x + 17$

111. 080911ia, P.I. A.A.36
Which equation represents a line parallel to the x -axis?

[A] $y = -5x$ [B] $x = 3$
[C] $y = -5$ [D] $x = 3y$

112. 060814ia, P.I. A.A.38
Which equation represents a line parallel to the line $y = -4x + 5$?

[A] $y = 4x + 5$ [B] $y = \frac{1}{4}x + 3$
[C] $y = -4x + 3$ [D] $y = -\frac{1}{4}x + 5$

113. 010926ia, P.I. A.A.38
Which equation represents a line that is parallel to the line $y = 3 - 2x$?

[A] $y = 4x - 2$ [B] $y = 3 - 4x$
[C] $2x + 4y = 1$ [D] $4x + 2y = 5$

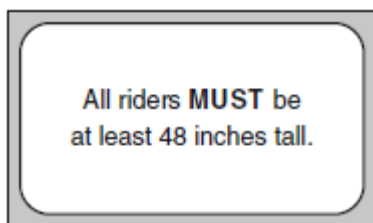
INEQUALITIES

INTERPRETING SOLUTIONS

114. fall0724ia, P.I. A.A.21
Which value of x is in the solution set of the inequality $-2x + 5 > 17$?
[A] -4 [B] 12 [C] -6 [D] -8
115. 080805ia, P.I. A.A.21
Which value of x is in the solution set of the inequality $-4x + 2 > 10$?
[A] -2 [B] -4 [C] 3 [D] 2
116. 060914ia, P.I. A.A.21
Which value of x is in the solution set of $\frac{4}{3}x + 5 < 17$?
[A] 8 [B] 16 [C] 9 [D] 12
117. 080913ia, P.I. A.A.21
Which value of x is in the solution set of the inequality $-2(x - 5) < 4$?
[A] 0 [B] 3 [C] 5 [D] 2

MODELING INEQUALITIES

118. 060906ia, P.I. A.A.4
The sign shown below is posted in front of a roller coaster ride at the Wadsworth County Fairgrounds.



If h represents the height of a rider in inches, what is a correct translation of the statement on this sign?

- [A] $h \leq 48$ [B] $h \geq 48$
[C] $h > 48$ [D] $h < 48$

119. 080803ia, P.I. A.A.4
Mrs. Smith wrote "Eight less than three times a number is greater than fifteen" on the board. If x represents the number, which inequality is a correct translation of this statement?
[A] $8 - 3x < 15$ [B] $3x - 8 > 15$
[C] $3x - 8 < 15$ [D] $8 - 3x > 15$
120. 060821a, P.I. A.A.5
Students in a ninth grade class measured their heights, h , in centimeters. The height of the shortest student was 155 cm, and the height of the tallest student was 190 cm. Which inequality represents the range of heights?
[A] $h > 155$ or $h < 190$
[B] $155 \leq h \leq 190$
[C] $h \geq 155$ or $h \leq 190$
[D] $155 < h < 190$
121. fall0715ia, P.I. A.A.5
An electronics store sells DVD players and cordless telephones. The store makes a \$75 profit on the sale of each DVD player (d) and a \$30 profit on the sale of each cordless telephone (c). The store wants to make a profit of at least \$255.00 from its sales of DVD players and cordless phones. Which inequality describes this situation?
[A] $75d + 30c \leq 255$ [B] $75d + 30c < 255$
[C] $75d + 30c > 255$ [D] $75d + 30c \geq 255$
122. 010904ia, P.I. A.A.6
Tamara has a cell phone plan that charges \$0.07 per minute plus a monthly fee of \$19.00. She budgets \$29.50 per month for total cell phone expenses without taxes. What is the maximum number of minutes Tamara could use her phone each month in order to stay within her budget?
[A] 150 [B] 692 [C] 271 [D] 421

123. 080904ia, P.I. A.A.6

An online music club has a one-time registration fee of \$13.95 and charges \$0.49 to buy each song. If Emma has \$50.00 to join the club and buy songs, what is the maximum number of songs she can buy?

- [A] 74 [B] 131 [C] 130 [D] 73

124. 060834ia, P.I. A.A.6

Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day. Write an inequality that can be used to determine how many days, d , it takes Peter to be able to spell *at least* 75 words. Use this inequality to determine the minimum number of whole days it will take for him to be able to spell *at least* 75 words.

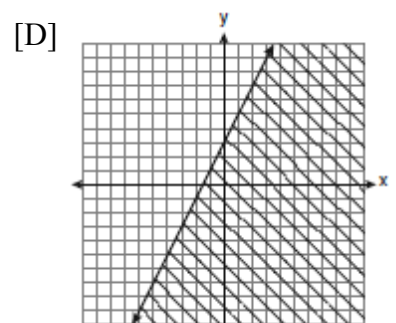
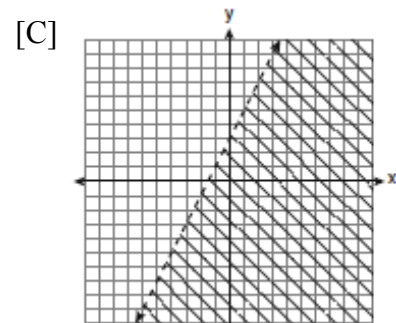
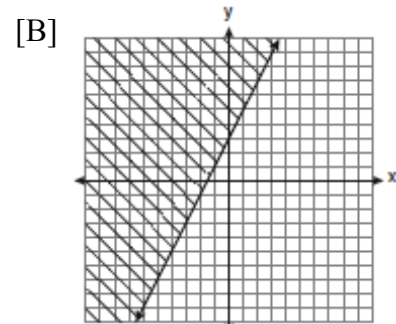
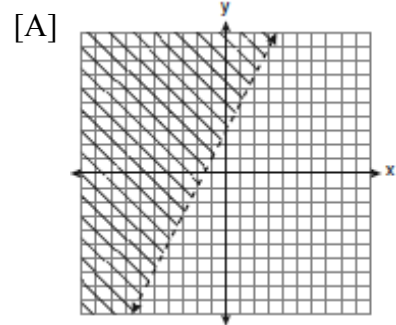
125. fall0735ia, P.I. A.A.6

A prom ticket at Smith High School is \$120. Tom is going to save money for the ticket by walking his neighbor's dog for \$15 per week. If Tom already has saved \$22, what is the minimum number of weeks Tom must walk the dog to earn enough to pay for the prom ticket?

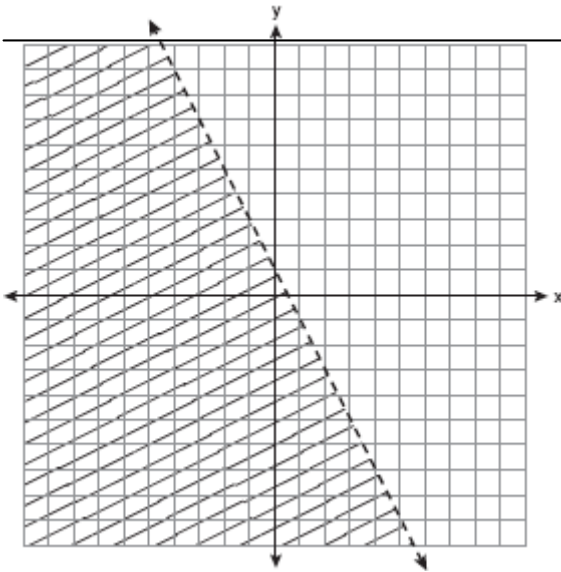
LINEAR INEQUALITIES

126. 060920ia, P.I. A.G.6

Which graph represents the solution of $3y - 9 \leq 6x$?



127. fall0720ia, P.I. A.G.6
Which inequality is represented by the graph below?



- [A] $y < 2x + 1$ [B] $y < -\frac{1}{2}x + 1$
[C] $y < \frac{1}{2}x + 1$ [D] $y < -2x + 1$

QUADRATICS

ADDITION AND SUBTRACTION OF POLYNOMIALS

128. 060923ia, P.I. A.A.13
When $4x^2 + 7x - 5$ is subtracted from $9x^2 - 2x + 3$, the result is
- [A] $-5x^2 + 5x - 2$ [B] $5x^2 + 5x - 2$
[C] $5x^2 - 9x + 8$ [D] $-5x^2 + 9x - 8$
129. 080819a, P.I. A.A.13
When $3g^2 - 4g + 2$ is subtracted from $7g^2 + 5g - 1$, the difference is
- [A] $-4g^2 - 9g + 3$ [B] $4g^2 + 9g - 3$
[C] $4g^2 + g + 1$ [D] $10g^2 + g + 1$

MULTIPLICATION AND DIVISION OF POLYNOMIALS

130. 060807ia, P.I. A.A.13
What is the product of $-3x^2y$ and $(5xy^2 + xy)$?
- [A] $-15x^3y^3 - 3x^3y^2$ [B] $-15x^3y^3 - 3x^3y$
[C] $-15x^3y^3 + xy$ [D] $-15x^2y^2 - 3x^2y$

FACTORING POLYNOMIALS

131. 080806ia, P.I. A.A.20
Factored completely, the expression $2x^2 + 10x - 12$ is equivalent to
- [A] $2(x + 6)(x - 1)$ [B] $2(x - 2)(x - 3)$
[C] $2(x - 6)(x + 1)$ [D] $2(x + 2)(x + 3)$

FACTORING THE DIFFERENCE OF PERFECT SQUARES

132. fall0706ia, P.I. A.A.19
The expression $x^2 - 16$ is equivalent to
- [A] $(x - 2)(x + 8)$ [B] $(x + 8)(x - 8)$
[C] $(x + 2)(x - 8)$ [D] $(x + 4)(x - 4)$
133. 080902ia, P.I. A.A.19
Which expression is equivalent to $9x^2 - 16$?
- [A] $(3x - 4)(3x - 4)$ [B] $(3x + 4)(3x - 4)$
[C] $(3x + 8)(3x - 8)$ [D] $(3x - 8)(3x - 8)$
134. 010909ia, P.I. A.A.19
The expression $9x^2 - 100$ is equivalent to
- [A] $(3x - 100)(3x - 1)$ [B] $(9x - 10)(x + 10)$
[C] $(9x - 100)(x + 1)$
[D] $(3x - 10)(3x + 10)$

135. 060804ia, P.I. A.A.19
Factored, the expression $16x^2 - 25y^2$ is equivalent to

[A] $(4x - 5y)(4x + 5y)$
[B] $(4x - 5y)(4x - 5y)$
[C] $(8x - 5y)(8x + 5y)$
[D] $(8x - 5y)(8x - 5y)$

136. 060932ia, P.I. A.A.19
Factor completely: $4x^3 - 36x$

SOLVING QUADRATICS BY FACTORING

137. 080921ia, P.I. A.A.27
The solution to the equation $x^2 - 6x = 0$ is

[A] 0, only [B] 0 and 6
[C] 6, only [D] $\pm\sqrt{6}$

ROOTS OF QUADRATICS

138. 010914ia, P.I. A.A.28
What are the roots of the equation $x^2 - 10x + 21 = 0$?
- [A] 3 and 7 [B] -5 and -5
[C] -3 and -7 [D] 1 and 21

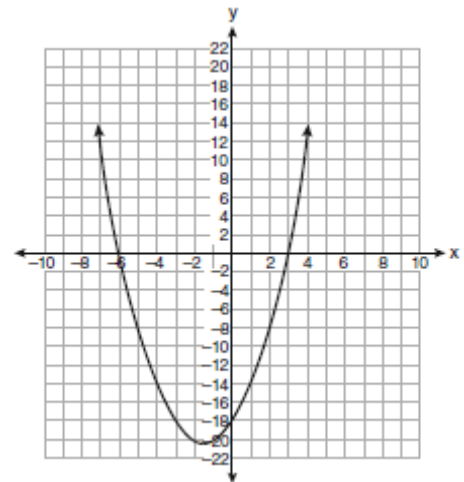
139. 060902ia, P.I. A.A.28
What are the roots of the equation $x^2 - 7x + 6 = 0$?
- [A] -1 and 7 [B] -1 and -6
[C] 1 and 7 [D] 1 and 6

GRAPHING QUADRATICS

140. 060829ia, P.I. A.G.5
Consider the graph of the equation $y = ax^2 + bx + c$, when $a \neq 0$. If a is multiplied by 3, what is true of the graph of the resulting parabola?
- [A] The vertex is 3 units above the vertex of the original parabola.
[B] The new parabola is wider than the original parabola.
[C] The new parabola is narrower than the original parabola.
[D] The new parabola is 3 units to the right of the original parabola.

SOLVING QUADRATICS BY GRAPHING

141. 060924ia, P.I. A.G.8
The equation $y = x^2 + 3x - 18$ is graphed on the set of axes below.

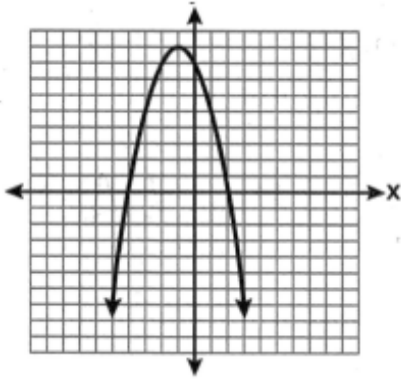


Based on this graph, what are the roots of the equation $x^2 + 3x - 18 = 0$?

- [A] 3 and -6 [B] 3 and -18
[C] 0 and -18 [D] -3 and 6

142. 080916ia, P.I. A.G.8

The equation $y = -x^2 - 2x + 8$ is graphed on the set of axes below.

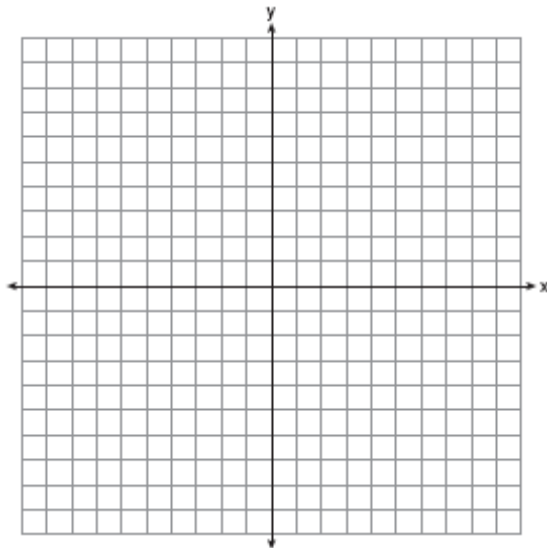


Based on this graph, what are the roots of the equation $-x^2 - 2x + 8 = 0$?

- [A] 8 and 0 [B] 2 and -4
[C] 9 and -1 [D] 4 and -2

143. 060836ia, P.I. A.G.8

Graph the equation $y = x^2 - 2x - 3$ on the accompanying set of axes. Using the graph, determine the roots of the equation $x^2 - 2x - 3 = 0$.



GEOMETRIC APPLICATIONS OF QUADRATICS

144. 010924ia, P.I. A.A.1

The length of a rectangular room is 7 less than three times the width, w , of the room. Which expression represents the area of the room?

- [A] $3w - 4$ [B] $3w^2 - 4w$
[C] $3w^2 - 7w$ [D] $3w - 7$

145. fall0726ia, P.I. A.A.5

The length of a rectangular window is 5 feet more than its width, w . The area of the window is 36 square feet. Which equation could be used to find the dimensions of the window?

- [A] $w^2 - 5w - 36 = 0$ [B] $w^2 - 5w + 36 = 0$
[C] $w^2 + 5w + 36 = 0$ [D] $w^2 + 5w - 36 = 0$

146. 080817ia, P.I. A.A.8

A rectangle has an area of 24 square units. The width is 5 units less than the length. What is the length, in units, of the rectangle?

- [A] 19 [B] 3 [C] 6 [D] 8

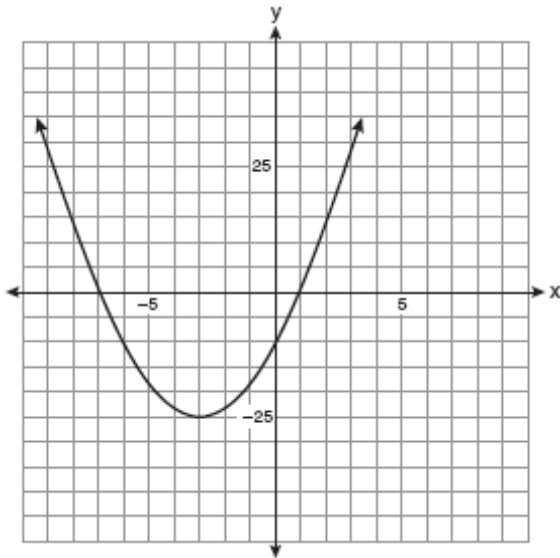
147. 060837ia, P.I. A.A.8

A contractor needs 54 square feet of brick to construct a rectangular walkway. The length of the walkway is 15 feet more than the width. Write an equation that could be used to determine the dimensions of the walkway. Solve this equation to find the length and width, in feet, of the walkway.

IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN GRAPH

148. 010916ia, P.I. A.G.10

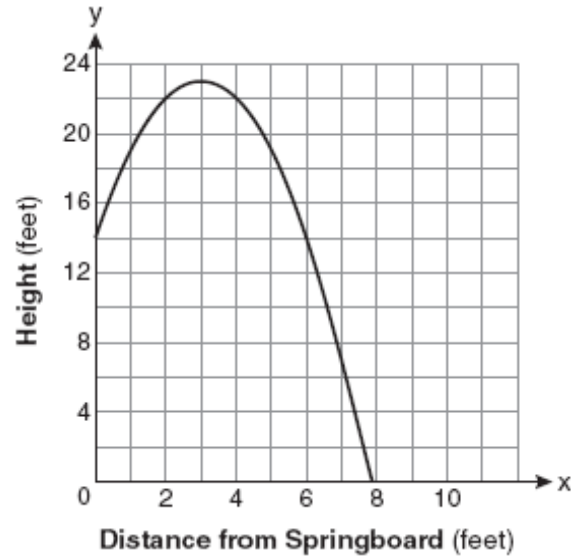
Which equation represents the axis of symmetry of the graph of the parabola below?



- [A] $x = -3$ [B] $y = -3$
[C] $x = -25$ [D] $y = -25$

149. 080813ia, P.I. A.G.10

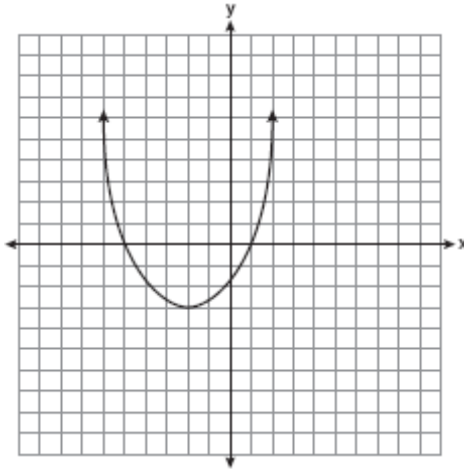
A swim team member performs a dive from a 14-foot-high springboard. The parabola below shows the path of her dive.



Which equation represents the axis of symmetry?

- [A] $x = 23$ [B] $y = 3$
[C] $y = 23$ [D] $x = 3$

150. 060811ia, P.I. A.G.10
What are the vertex and the axis of symmetry of the parabola shown in the diagram below?



- [A] The vertex is $(-3, -2)$, and the axis of symmetry is $x = -2$.
[B] The vertex is $(-2, -3)$, and the axis of symmetry is $y = -2$.
[C] The vertex is $(-2, -3)$, and the axis of symmetry is $x = -2$.
[D] The vertex is $(-3, -2)$, and the axis of symmetry is $y = -2$.

IDENTIFYING THE VERTEX OF A QUADRATIC GIVEN EQUATION

151. 060918ia, P.I. A.A.41
What are the vertex and axis of symmetry of the parabola $y = x^2 - 16x + 63$?
- [A] vertex: $(-8, 1)$; axis of symmetry: $x = -8$
[B] vertex: $(8, -1)$; axis of symmetry: $x = 8$
[C] vertex: $(8, 1)$; axis of symmetry: $x = 8$
[D] vertex: $(-8, -1)$; axis of symmetry: $x = -8$
152. 080934ia, P.I. A.A.41
Find algebraically the equation of the axis of symmetry and the coordinates of the vertex of the parabola whose equation is $y = -2x^2 - 8x + 3$.

SYSTEMS

SOLVING LINEAR SYSTEMS

153. 060925ia, P.I. A.A.10
What is the value of the y -coordinate of the solution to the system of equations $x + 2y = 9$ and $x - y = 3$?
- [A] 3 [B] 6 [C] 2 [D] 5
154. 080920ia, P.I. A.A.10
What is the value of the y -coordinate of the solution to the system of equations $x - 2y = 1$ and $x + 4y = 7$?
- [A] 1 [B] 4 [C] -1 [D] 3
155. fall0708ia, P.I. A.A.7
The equations $5x + 2y = 48$ and $3x + 2y = 32$ represent the money collected from school concert ticket sales during two class periods. If x represents the cost for each adult ticket and y represents the cost for each student ticket, what is the cost for each adult ticket?
- [A] \$20 [B] \$8 [C] \$4 [D] \$10
156. 010937ia, P.I. A.A.10
Solve the following system of equations algebraically:

$$3x + 2y = 4$$

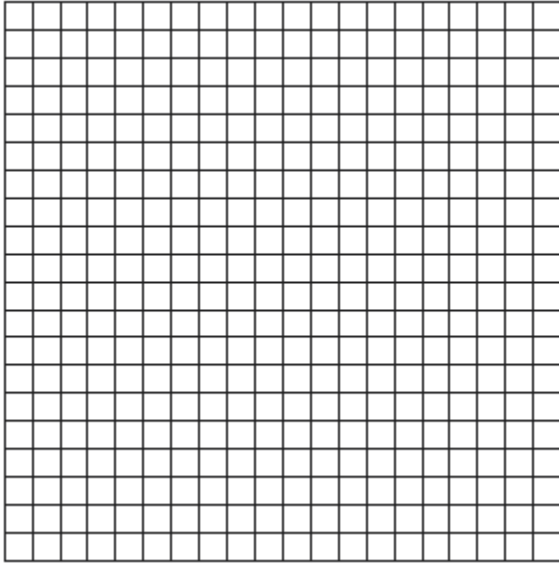
$$4x + 3y = 7$$

[Only an algebraic solution can receive full credit.]

157. 080938ia, P.I. A.G.7
On the grid below, solve the system of equations graphically for x and y .

$$4x - 2y = 10$$

$$y = -2x - 1$$



WRITING LINEAR SYSTEMS

158. 060806ia, P.I. A.A.7
Jack bought 3 slices of cheese pizza and 4 slices of mushroom pizza for a total cost of \$12.50. Grace bought 3 slices of cheese pizza and 2 slices of mushroom pizza for a total cost of \$8.50. What is the cost of one slice of mushroom pizza?

[A] \$1.50 [B] \$3.00

[C] \$3.50 [D] \$2.00

159. 080837ia, P.I. A.A.7
The cost of 3 markers and 2 pencils is \$1.80. The cost of 4 markers and 6 pencils is \$2.90. What is the cost of *each* item? Include appropriate units in your answer.

160. 060812ia, P.I. A.A.7
Pam is playing with red and black marbles. The number of red marbles she has is three more than twice the number of black marbles she has. She has 42 marbles in all. How many red marbles does Pam have?

[A] 29 [B] 33 [C] 13 [D] 15

161. 080811ia, P.I. A.A.7
Sam and Odel have been selling frozen pizzas for a class fundraiser. Sam has sold half as many pizzas as Odel. Together they have sold a total of 126 pizzas. How many pizzas did Sam sell?

[A] 84 [B] 42 [C] 21 [D] 63

162. 060912ia, P.I. A.A.7
The sum of two numbers is 47, and their difference is 15. What is the larger number?

[A] 36 [B] 16 [C] 31 [D] 32

163. 060917ia, P.I. A.A.7
At Genesee High School, the sophomore class has 60 more students than the freshman class. The junior class has 50 fewer students than twice the students in the freshman class. The senior class is three times as large as the freshman class. If there are a total of 1,424 students at Genesee High School, how many students are in the freshman class?

[A] 236 [B] 202 [C] 205 [D] 235

SYSTEMS OF LINEAR INEQUALITIES

164. 080825ia, P.I. A.A.40
Which ordered pair is in the solution set of the following system of inequalities?

$$y < \frac{1}{2}x + 4$$

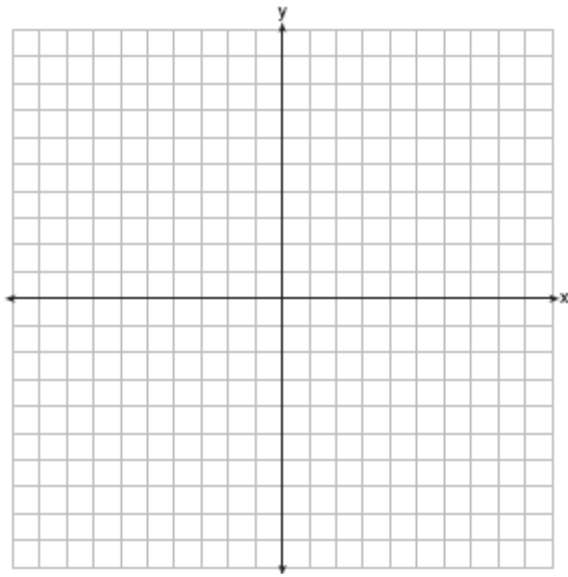
$$y \geq -x + 1$$

[A] (3, -5) [B] (-5, 3)

[C] (0, 4) [D] (4, 0)

165. 010938ia, P.I. A.G.7
On the set of axes below, graph the following system of inequalities and state the coordinates of a point in the solution set.

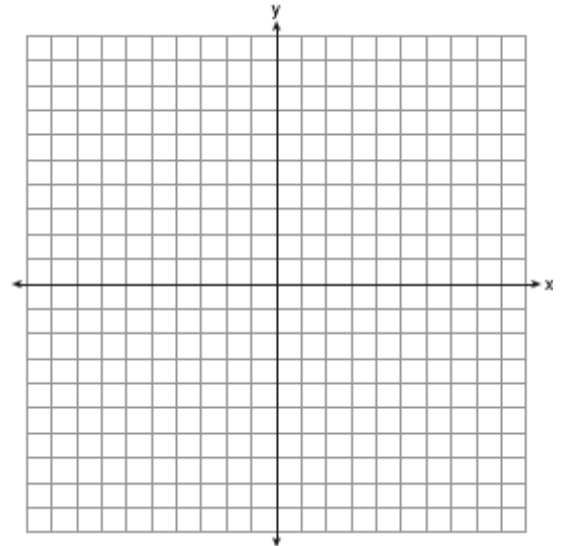
$$2x - y \geq 6$$
$$x > 2$$



168. 010922ia, P.I. A.A.11
Which ordered pair is a solution of the system of equations $y = x^2 - x - 20$ and $y = 3x - 15$?
- [A] (0, 5) [B] (-1, -18)
[C] (-5, -30) [D] (5, -1)

169. 080839ia, P.I. A.G.9
On the set of axes below, solve the following system of equations graphically and state the coordinates of all points in the solution set.

$$y = x^2 + 4x - 5$$
$$y = x - 1$$



QUADRATIC-LINEAR SYSTEMS

166. 060810ia, P.I. A.A.11
Which ordered pair is a solution to the system of equations $y = x$ and $y = x^2 - 2$?

- [A] (-2, -2) [B] (0, 0)
[C] (2, 2) [D] (-1, 1)

167. 080812ia, P.I. A.A.11
Which ordered pair is in the solution set of the system of equations $y = -x + 1$ and $y = x^2 + 5x + 6$?

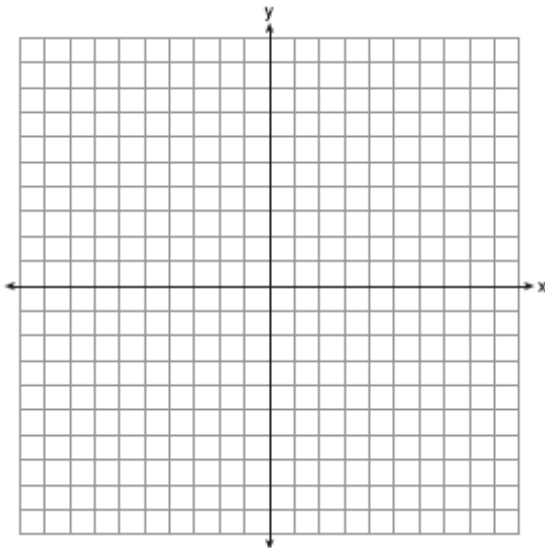
- [A] (5, -4) [B] (5, 2)
[C] (-5, 6) [D] (-5, -1)

170. fall0738ia, P.I. A.G.9

Solve the following systems of equations graphically, on the set of axes below, and state the coordinates of the point(s) in the solution set.

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

$$2x + y = 5$$

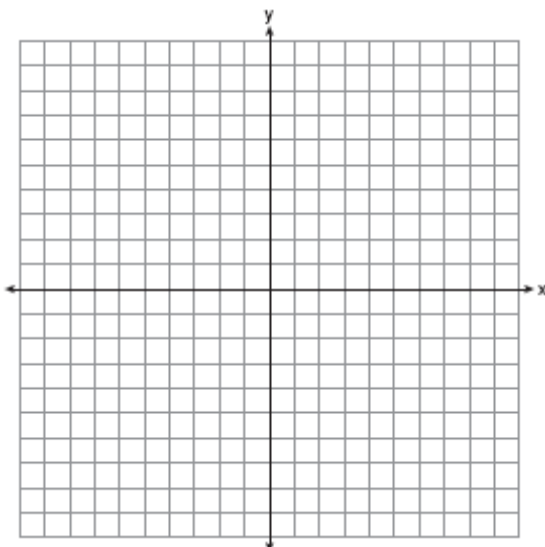


171. 060939ia, P.I. A.G.9

On the set of axes below, solve the following system of equations graphically for all values of x and y .

$$y = x^2 - 6x + 1$$

$$y + 2x = 6$$



POWERS

MULTIPLICATION OF POWERS

172. 080903ia, P.I. A.A.12

Which expression represents $(3x^2y^4)(4xy^2)$ in equivalent form?

- [A] $12x^2y^6$ [B] $12x^3y^8$
[C] $12x^3y^6$ [D] $12x^2y^8$

DIVISION OF POWERS

173. 060813ia, P.I. A.A.12

What is half of 2^6 ?

- [A] 1^6 [B] 1^3 [C] 2^3 [D] 2^5

174. 060903ia, P.I. A.A.12

Which equation represents $\frac{27x^{18}y^5}{9x^6y}$ in simplest form?

- [A] $3x^3y^5$ [B] $18x^{12}y^4$
[C] $18x^3y^5$ [D] $3x^{12}y^4$

175. fall0703ia, P.I. A.A.12

Which expression represents $\frac{(2x^3)(8x^5)}{4x^6}$ in simplest form?

- [A] $4x^2$ [B] x^9 [C] x^2 [D] $4x^9$

176. 010932ia, P.I. A.A.12

Simplify: $\frac{27k^5m^8}{(4k^3)(9m^2)}$

POWERS OF POWERS

177. 080827ia, P.I. A.A.12

Which expression is equivalent to $(3x^2)^3$?

- [A] $9x^5$ [B] $27x^6$ [C] $9x^6$ [D] $27x^5$

OPERATIONS WITH SCIENTIFIC NOTATION

178. 060927ia, P.I. A.N.4
What is the product of 12 and 4.2×10^6 expressed in scientific notation?
[A] 50.4×10^6 [B] 5.04×10^6
[C] 5.04×10^7 [D] 50.4×10^7
179. 010927ia, P.I. A.N.4
What is the product of 8.4×10^8 and 4.2×10^3 written in scientific notation?
[A] 2.0×10^5 [B] 3.528×10^{12}
[C] 35.28×10^{11} [D] 12.6×10^{11}
180. fall0725ia, P.I. A.N.4
What is the quotient of 8.05×10^6 and 3.5×10^2 ?
[A] 2.3×10^8 [B] 2.3×10^4
[C] 2.3×10^{12} [D] 2.3×10^3

EXPONENTIAL FUNCTIONS

181. 010908ia, P.I. A.A.9
The New York Volleyball Association invited 64 teams to compete in a tournament. After each round, half of the teams were eliminated. Which equation represents the number of teams, t , that remained in the tournament after r rounds?
[A] $t = 64(0.5)^r$ [B] $t = 64(r)^{0.5}$
[C] $t = 64(1.5)^r$ [D] $t = 64(-0.5)^r$

182. 060830ia, P.I. A.A.9
Kathy plans to purchase a car that depreciates (loses value) at a rate of 14% per year. The initial cost of the car is \$21,000. Which equation represents the value, v , of the car after 3 years?
[A] $v = 21,000(0.86)(3)$
[B] $v = 21,000(0.14)^3$
[C] $v = 21,000(0.86)^3$
[D] $v = 21,000(1.14)^3$
183. fall0719ia, P.I. A.A.9
Daniel's Print Shop purchased a new printer for \$35,000. Each year it depreciates (loses value) at a rate of 5%. What will its approximate value be at the end of the fourth year?
[A] \$33,250.00 [B] \$27,082.33
[C] \$30,008.13 [D] \$28,507.72
184. 080929ia, P.I. A.A.9
Cassandra bought an antique dresser for \$500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the nearest dollar?
[A] \$590 [B] \$596
[C] \$415 [D] \$770
185. 060935ia, P.I. A.A.9
A bank is advertising that new customers can open a savings account with a $3\frac{3}{4}\%$ interest rate compounded annually. Robert invests \$5,000 in an account at this rate. If he makes no additional deposits or withdrawals on his account, find the amount of money he will have, to the nearest cent, after three years.

RADICALS

SIMPLIFYING RADICALS

186. 060910ia, P.I. A.N.2
What is $\sqrt{32}$ expressed in simplest radical form?
[A] $4\sqrt{8}$ [B] $16\sqrt{2}$
[C] $2\sqrt{8}$ [D] $4\sqrt{2}$
187. 010920ia, P.I. A.N.2
What is $\sqrt{72}$ expressed in simplest radical form?
[A] $8\sqrt{3}$ [B] $2\sqrt{18}$
[C] $3\sqrt{8}$ [D] $6\sqrt{2}$
188. fall0731ia, P.I. A.N.2
Express $5\sqrt{72}$ in simplest radical form.
189. 080922ia, P.I. A.N.2
When $5\sqrt{20}$ is written in simplest radical form, the result is $k\sqrt{5}$. What is the value of k ?
[A] 7 [B] 4 [C] 20 [D] 10
190. 060828ia, P.I. A.N.2
What is $\frac{\sqrt{32}}{4}$ expressed in simplest radical form?
[A] $\sqrt{8}$ [B] $4\sqrt{2}$ [C] $\sqrt{2}$ [D] $\frac{\sqrt{8}}{2}$

OPERATIONS WITH RADICALS

191. 080834ia, P.I. A.N.3
Express the product of $3\sqrt{20}(2\sqrt{5} - 7)$ in simplest radical form.

RATIONALS

MULTIPLICATION AND DIVISION OF RATIONALS

192. 080826ia, P.I. A.A.18
What is the product of $\frac{4x}{x-1}$ and $\frac{x^2-1}{3x+3}$ expressed in simplest form?
[A] $\frac{4(x+1)}{3}$ [B] $\frac{4x^2}{3(x+1)}$
[C] $\frac{4x}{3}$ [D] $\frac{4x^2}{3}$
193. 060815ia, P.I. A.A.18
What is the product of $\frac{x^2-1}{x+1}$ and $\frac{x+3}{3x-3}$ expressed in simplest form?
[A] $\frac{x}{3}$ [B] $\frac{x+3}{3}$ [C] x [D] $x+3$
194. 010935ia, P.I. A.A.18
Perform the indicated operation and simplify:
 $\frac{3x+6}{4x+12} \div \frac{x^2-4}{x+3}$
195. 080937ia, P.I. A.A.18
Express in simplest form:
 $\frac{2x^2-8x-42}{6x^2} \div \frac{x^2-9}{x^2-3x}$

ADDITION AND SUBTRACTION OF RATIONALS

196. 080917ia, P.I. A.A.17
What is the sum of $\frac{3}{2x}$ and $\frac{4}{3x}$ expressed in simplest form?
[A] $\frac{12}{6x^2}$ [B] $\frac{17}{12x}$ [C] $\frac{17}{6x}$ [D] $\frac{7}{5x}$

197. 010921ia, P.I. A.A.17
What is $\frac{6}{5x} - \frac{2}{3x}$ in simplest form?
[A] $\frac{8}{15x^2}$ [B] $\frac{4}{15x}$ [C] $\frac{4}{2x}$ [D] $\frac{8}{15x}$
198. 060929ia, P.I. A.A.17
What is $\frac{6}{4a} - \frac{2}{3a}$ expressed in simplest form?
[A] $\frac{5}{6a}$ [B] $\frac{8}{7a}$ [C] $\frac{4}{a}$ [D] $\frac{10}{12a}$

SOLVING RATIONALS

199. 060826ia, P.I. A.A.26
Which value of x is a solution of $\frac{5}{x} = \frac{x+13}{6}$?
[A] -15 [B] -10 [C] -3 [D] -2
200. fall0739ia, P.I. A.A.26
Solve for x : $\frac{x+1}{x} = \frac{-7}{x-12}$
201. 010918ia, P.I. A.A.26
What is the value of x in the equation
 $\frac{2}{x} - 3 = \frac{26}{x}$?
[A] -8 [B] $-\frac{1}{8}$ [C] $\frac{1}{8}$ [D] 8

UNDEFINED RATIONALS

202. 060817ia, P.I. A.A.15
Which value of x makes the expression $\frac{x+4}{x-3}$ undefined?
[A] -4 [B] 0 [C] 3 [D] -3

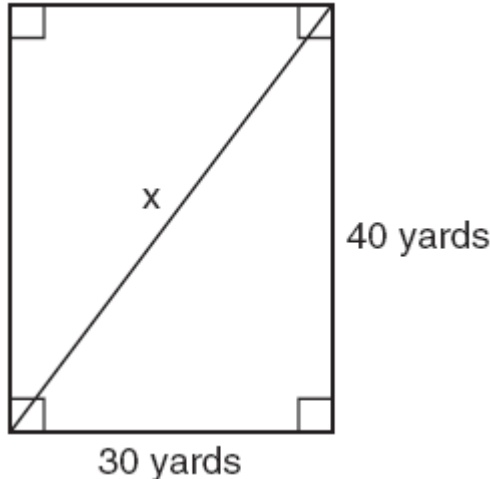
203. 060916ia, P.I. A.A.15
Which value of n makes the expression
 $\frac{5n}{2n-1}$ undefined?
[A] $-\frac{1}{2}$ [B] 1 [C] 0 [D] $\frac{1}{2}$
204. 010925ia, P.I. A.A.15
The function $y = \frac{x}{x^2-9}$ is undefined when the value of x is
[A] 3 or -3 [B] 3, only
[C] -3, only [D] 0 or 3
205. fall0728ia, P.I. A.A.15
For which value of x is $\frac{x-3}{x^2-4}$ undefined?
[A] -2 [B] 3 [C] 4 [D] 0
206. 080918ia, P.I. A.A.15
Which value of x makes the expression
 $\frac{x^2-9}{x^2+7x+10}$ undefined?
[A] 3 [B] -5 [C] -3 [D] 2

RATIONAL EXPRESSIONS

207. fall0718ia, P.I. A.A.14
The expression $\frac{9x^4-27x^6}{3x^3}$ is equivalent to
[A] $3x(1-9x^5)$ [B] $3x(1-3x)$
[C] $3x(1-3x^2)$ [D] $9x^3(1-x)$
208. 060824ia, P.I. A.A.16
Which expression represents $\frac{2x^2-12x}{x-6}$ in simplest form?
[A] $2x$ [B] $2x+2$ [C] 0 [D] $4x$

213. fall0711ia, P.I. A.A.45

Tanya runs diagonally across a rectangular field that has a length of 40 yards and a width of 30 yards, as shown in the diagram below.

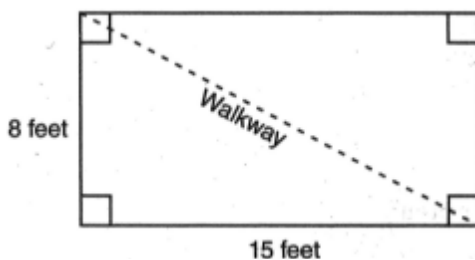


What is the length of the diagonal, in yards, that Tanya runs?

- [A] 80 [B] 70 [C] 60 [D] 50

214. 080906ia, P.I. A.A.45

Nancy's rectangular garden is represented in the diagram below.



If a diagonal walkway crosses her garden, what is its length, in feet?

- [A] $\sqrt{161}$ [B] $\sqrt{529}$ [C] 22 [D] 17

215. 080809ia, P.I. A.A.45

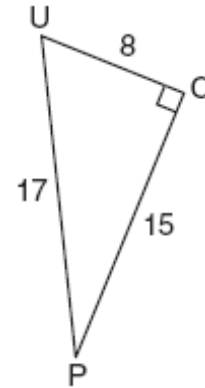
The length of the hypotenuse of a right triangle is 34 inches and the length of one of its legs is 16 inches. What is the length, in inches, of the other leg of this right triangle?

- [A] 16 [B] 25 [C] 30 [D] 18

BASIC TRIGONOMETRIC RATIOS

216. 010919ia, P.I. A.A.42

The diagram below shows right triangle UPC .



Which ratio represents the sine of $\angle U$?

- [A] $\frac{8}{15}$ [B] $\frac{8}{17}$ [C] $\frac{15}{8}$ [D] $\frac{15}{17}$

217. fall0721ia, P.I. A.A.42

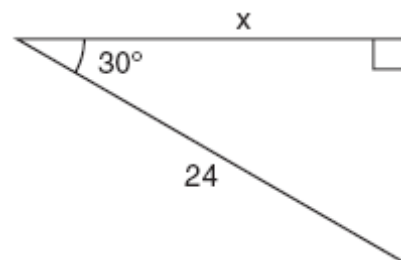
In triangle MCT , the measure of $\angle T = 90^\circ$, $MC = 85$ cm, $CT = 84$ cm, and $TM = 13$ cm. Which ratio represents the sine of $\angle C$?

- [A] $\frac{13}{84}$ [B] $\frac{84}{85}$ [C] $\frac{84}{13}$ [D] $\frac{13}{85}$

USING TRIGONOMETRY TO FIND A SIDE

218. 010912ia, P.I. A.A.44

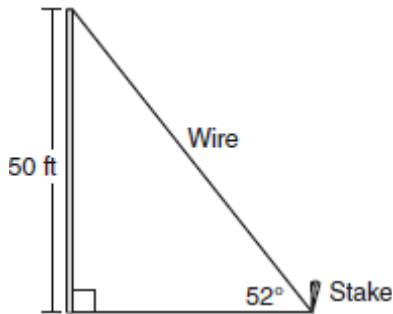
In the right triangle shown in the diagram below, what is the value of x to the nearest whole number?



- [A] 28 [B] 12 [C] 14 [D] 21

219. 060937ia, P.I. A.A.44

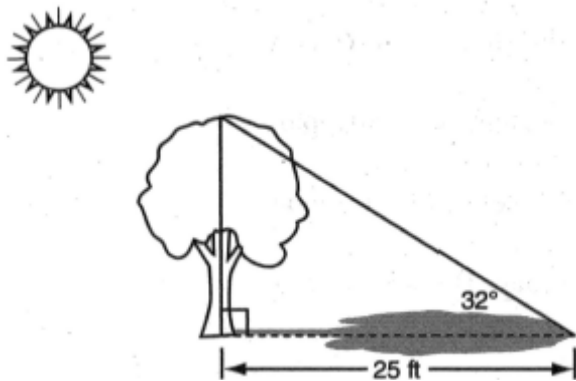
A stake is to be driven into the ground away from the base of a 50-foot pole, as shown in the diagram below. A wire from the stake on the ground to the top of the pole is to be installed at an angle of elevation of 52° .



How far away from the base of the pole should the stake be driven in, to the *nearest foot*? What will be the length of the wire from the stake to the top of the pole, to the *nearest foot*?

220. 080914ia, P.I. A.A.44

A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.



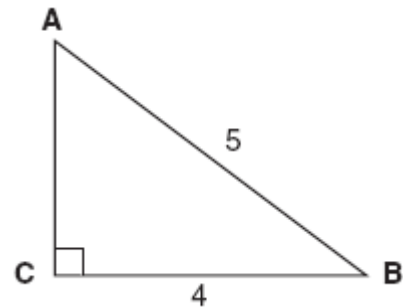
If the angle of elevation from the tip of the shadow to the top of the tree is 32° , what is the height of the tree to the *nearest tenth of a foot*?

- [A] 13.2 [B] 21.2 [C] 15.6 [D] 40.0

USING TRIGONOMETRY TO FIND AN ANGLE

221. 080824ia, P.I. A.A.43

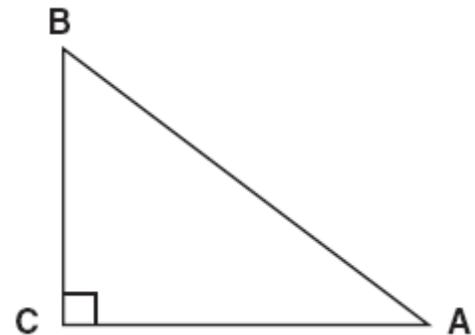
Which equation could be used to find the measure of one acute angle in the right triangle shown below?



- [A] $\sin A = \frac{4}{5}$ [B] $\tan A = \frac{5}{4}$
[C] $\cos B = \frac{5}{4}$ [D] $\tan B = \frac{4}{5}$

222. 080829ia, P.I. A.A.43

In the diagram of $\triangle ABC$ shown below, $BC = 10$ and $AB = 16$.

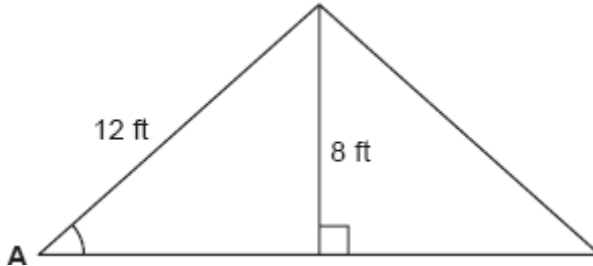


To the *nearest tenth of a degree*, what is the measure of the largest acute angle in the triangle?

- [A] 38.7 [B] 32.0 [C] 51.3 [D] 90.0

223. 060816ia, P.I. A.A.43

The center pole of a tent is 8 feet long, and a side of the tent is 12 feet long as shown in the diagram below.

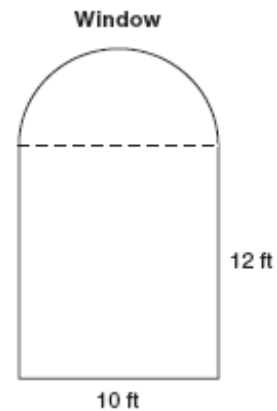


If a right angle is formed where the center pole meets the ground, what is the measure of angle A to the nearest degree?

- [A] 56 [B] 48 [C] 34 [D] 42

225. 010931ia, P.I. A.G.1

A window is made up of a single piece of glass in the shape of a semicircle and a rectangle, as shown in the diagram below. Tess is decorating for a party and wants to put a string of lights all the way around the outside edge of the window.



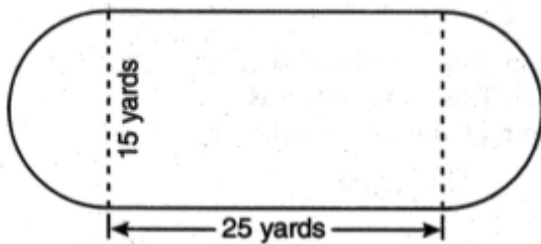
To the nearest foot, what is the length of the string of lights that Tess will need to decorate the window?

MEASURING IN THE PLANE AND SPACE

COMPOSITIONS OF POLYGONS AND CIRCLES

224. 080924ia, P.I. A.G.1

A playground in a local community consists of a rectangle and two semicircles, as shown in the diagram below.

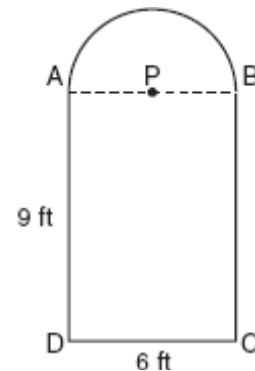


Which expression represents the amount of fencing, in yards, that would be needed to completely enclose the playground?

- [A] $15\pi + 80$ [B] $15\pi + 50$
[C] $30\pi + 80$ [D] $30\pi + 50$

226. fall0733ia, P.I. A.G.1

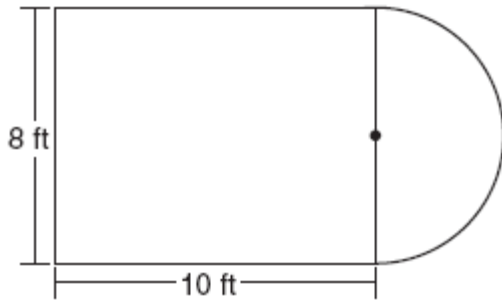
Serena's garden is a rectangle joined with a semicircle, as shown in the diagram below. Line segment AB is the diameter of semicircle P . Serena wants to put a fence around her garden.



Calculate the length of fence Serena needs to the nearest tenth of a foot.

227. 080815ia, P.I. A.G.1

Luis is going to paint a basketball court on his driveway, as shown in the diagram below. This basketball court consists of a rectangle and a semicircle.

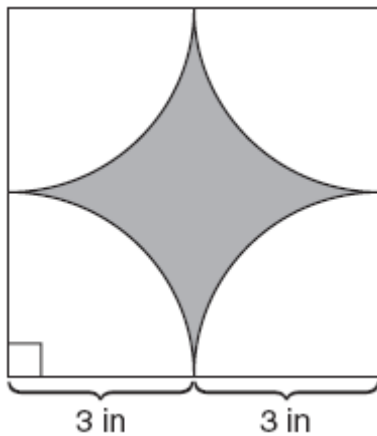


Which expression represents the area of this basketball court, in square feet?

- [A] $80 + 64\pi$ [B] 80
[C] $80 + 16\pi$ [D] $80 + 8\pi$

228. 060832ia, P.I. A.G.1

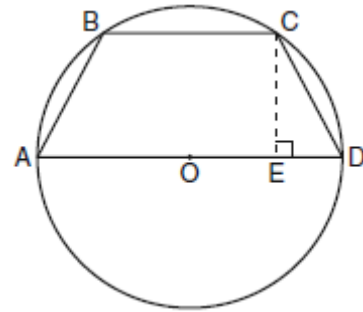
A designer created the logo shown below. The logo consists of a square and four quarter-circles of equal size.



Express, in terms of π , the exact area, in square inches, of the shaded region.

229. 060934ia, P.I. A.G.1

In the diagram below, the circumference of circle O is 16π inches. The length of \overline{BC} is three-quarters of the length of diameter \overline{AD} and $CE = 4$ inches. Calculate the area, in square inches, of trapezoid $ABCD$.



VOLUME

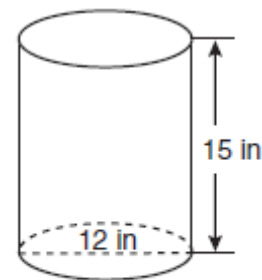
230. 060809ia, P.I. A.G.2

Lenny made a cube in technology class. Each edge measured 1.5 cm. What is the volume of the cube in cubic centimeters?

- [A] 9.0 [B] 2.25 [C] 3.375 [D] 13.5

231. fall0712ia, P.I. A.G.2

A cylindrical container has a diameter of 12 inches and a height of 15 inches, as illustrated in the diagram below.



(Not drawn to scale)

What is the volume of this container to the nearest tenth of a cubic inch?

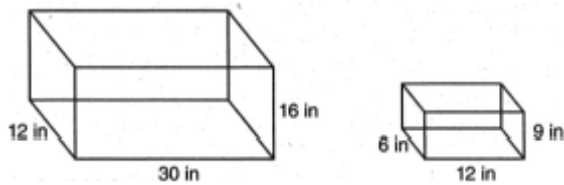
- [A] 4,241.2 [B] 6,785.8
[C] 1,696.5 [D] 2,160.0

232. 010936ia, P.I. A.G.2

A soup can is in the shape of a cylinder. The can has a volume of 342 cm^3 and a diameter of 6 cm. Express the height of the can in terms of π . Determine the maximum number of soup cans that can be stacked on their base between two shelves if the distance between the shelves is exactly 36 cm. Explain your answer.

233. 080932ia, P.I. A.G.2

The diagram below represents Joe's two fish tanks.



Joe's larger tank is completely filled with water. He takes water from it to completely fill the small tank. Determine how many cubic inches of water will remain in the larger tank.

SURFACE AREA

234. 060827ia, P.I. A.G.2

Mrs. Ayer is painting the outside of her son's toy box, including the top and bottom. The toy box measures 3 feet long, 1.5 feet wide, and 2 feet high. What is the total surface area she will paint?

[A] 27.0 ft^2

[B] 13.5 ft^2

[C] 9.0 ft^2

[D] 22.5 ft^2