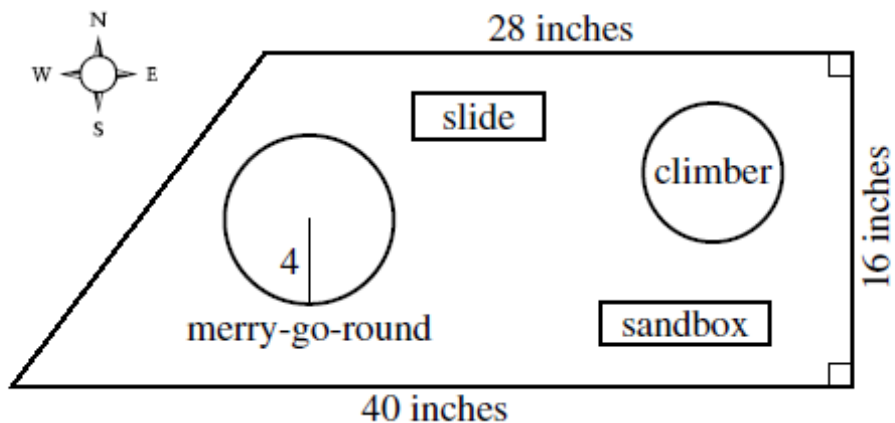


31. The number 1,001 is the product of the prime numbers 7, 11, and 13. Knowing this, what is the prime factorization of 30,030 ?

- A. $3 \cdot 7 \cdot 10 \cdot 13$
- B. $30 \cdot 7 \cdot 11 \cdot 13$
- C. $2 \cdot 5 \cdot 7 \cdot 11 \cdot 13$
- D. $3 \cdot 7 \cdot 10 \cdot 11 \cdot 13$
- E. $2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13$

Use the following information to answer questions 32–34.

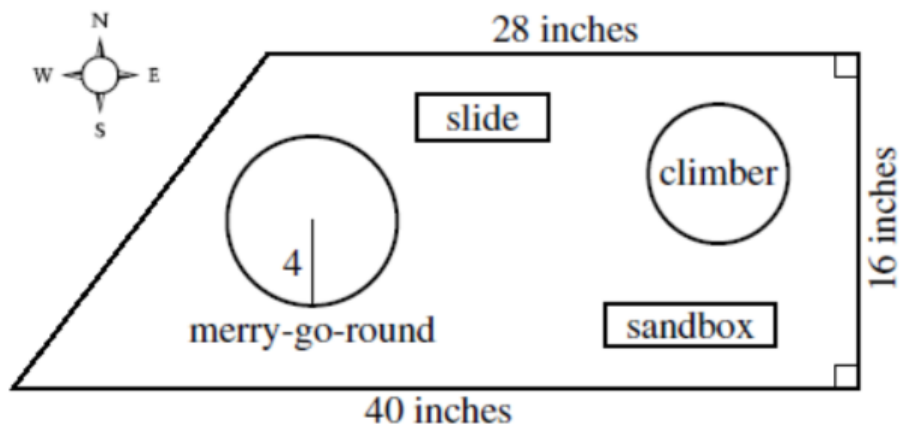
Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.



32. What is the area, in square inches, of the scale drawing of the park?

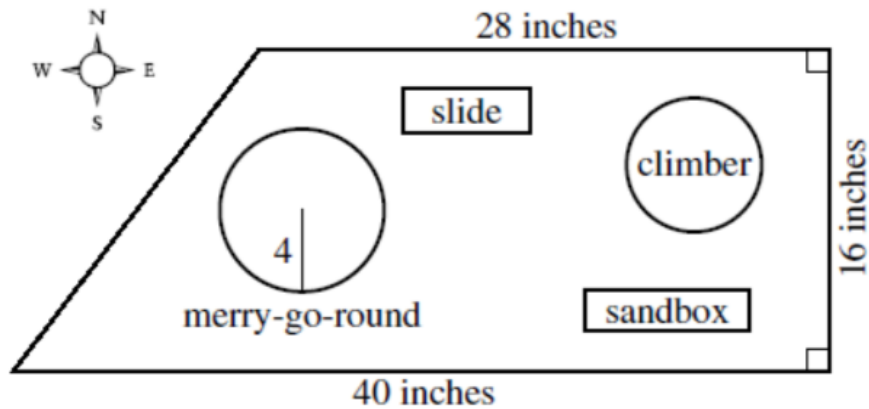
- F. 448
- G. 544
- H. 640
- J. 672
- K. 1,088

Mikea's scale drawing, 1 inch represents 1.5 feet.



33. Mikea's proposal includes installing a fence on the perimeter of the park. What is the perimeter, in *feet*, of the park?
- A. 84
 - B. 88
 - C. 104
 - D. 126
 - E. 156

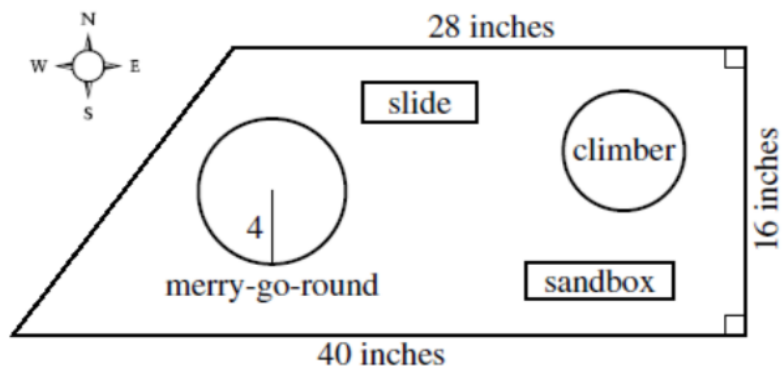
Mikea's scale drawing, 1 inch represents 1.5 feet.



34. The length of the south side of the park is what percent of the length of the north side?

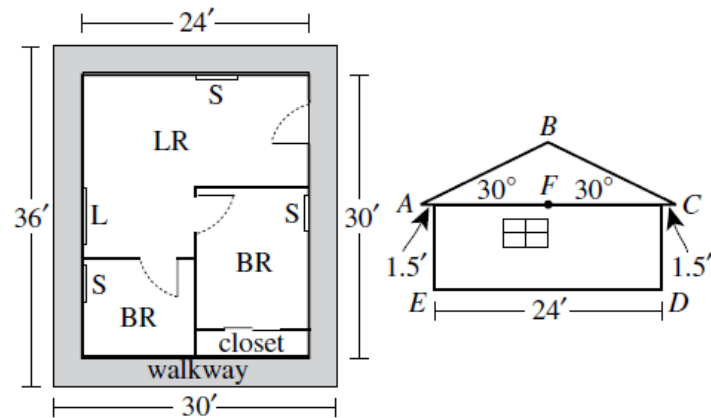
- F. 112%
- G. 124%
- H. $142\frac{6}{7}\%$
- J. 175%
- K. 250%

Mikea's scale drawing, 1 inch represents 1.5 feet.



Use the following information to answer questions 35–37.

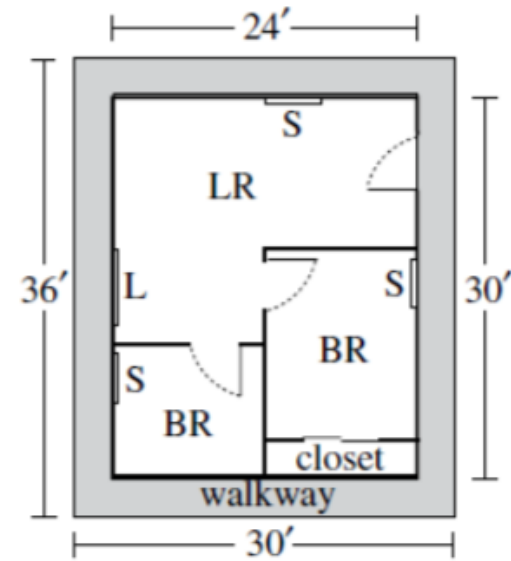
The Smith family is planning to build a 3-room cabin which consists of 2 bedrooms (BR) and 1 living room (LR). Shown below are the rectangular floor plan (left figure) and a side view of the cabin (right figure). In the side view, the roof forms an isosceles triangle ($\triangle ABC$), the walls are perpendicular to the level floor (\overline{ED}), $\overline{AC} \parallel \overline{ED}$, F is the midpoint of \overline{AC} , and $\overline{BF} \perp \overline{AC}$.



During the week the Smiths plan to roof the cabin, there is a 20% chance of rain each day.

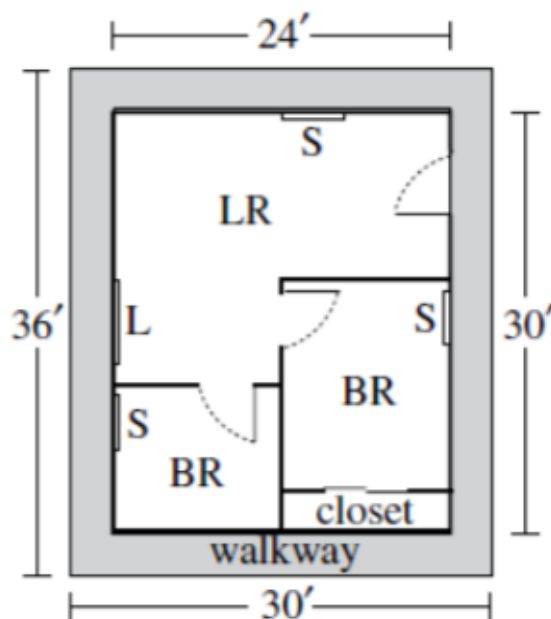
35. Mr. Smith plans to build a 3-foot-wide walkway around the outside of the cabin, as shown in the floor plan. What will be the area, in square feet, of the top surface of the walkway?

- A. 171
- B. 324
- C. 360
- D. 396
- E. 720



36. Mrs. Smith will install a ceiling fan in each room of the cabin and will place curtains over the 4 windows. Each of the ceiling fans has a price of \$52.00. The price of curtains for each small window (S) is \$39.50, and the price of curtains for the large window (L) is twice that for the small window. Based on this information, which of the following values is closest to the total price Mrs. Smith will pay for curtains and ceiling fans?

- F. \$262
- G. \$302
- H. \$341
- J. \$354
- K. \$393



37. Mr. and Mrs. Smith plan to roof the cabin on 2 consecutive days. Assuming that the chance of rain is independent of the day, what is the probability that it will rain both days?
- A. 0.04
 - B. 0.08
 - C. 0.16
 - D. 0.20
 - E. 0.40

During the week the Smiths plan to roof the cabin, there is a 20% chance of rain each day.

38. Which of the following expressions, when evaluated, equals an irrational number?

F. $\frac{\sqrt{2}}{\sqrt{8}}$

G. $\frac{\sqrt{8}}{\sqrt{2}}$

H. $(\sqrt{8})^2$

J. $\sqrt{2} \times \sqrt{8}$

K. $\sqrt{2} + \sqrt{8}$

39. A line through the origin and $(10,4)$ is shown in the standard (x,y) coordinate plane below. The acute angle between the line and the positive x -axis has measure θ . What is the value of $\tan \theta$?

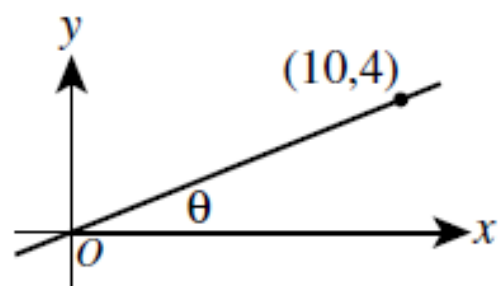
A. $\frac{\sqrt{29}}{2}$

B. $\frac{2}{\sqrt{29}}$

C. $\frac{5}{\sqrt{29}}$

D. $\frac{2}{5}$

E. $\frac{5}{2}$



40. The equation $|2x - 8| + 3 = 5$ has 2 solutions. Those solutions are equal to the solutions to which of the following pairs of equations?

F. $2x - 5 = 5$
 $-2x - 5 = -5$

G. $2x - 8 = 2$
 $-2x - 8 = 2$

H. $2x - 8 = 8$
 $-(2x - 8) = 8$

J. $2x - 8 = 2$
 $-(2x - 8) = 8$

K. $2x - 8 = 2$
 $-(2x - 8) = 2$

41. The frequency chart below shows the cumulative number of Ms. Hernandez's science students whose test scores fell within certain score ranges. All test scores are whole numbers.

Score range	Cumulative number of students
65–70	12
65–80	13
65–90	19
65–100	21

How many students have a test score in the interval 71–80 ?

- A. 1
- B. 6
- C. 8
- D. 12
- E. 13

42. The number of decibels, d , produced by an audio source can be modeled by the equation $d = 10 \log\left(\frac{I}{K}\right)$, where I is the sound intensity of the audio source and K is a constant. How many decibels are produced by an audio source whose sound intensity is 1,000 times the value of K ?

- F. 4
- G. 30
- H. 40
- J. 100
- K. 10,000

43. Mario plays basketball on a town league team. The table below gives Mario's scoring statistics for last season. How many points did Mario score playing basketball last season?

Type of shot	Number attempted	Percent successful
1-point free throw	80	75%
2-point field goal	60	90%
3-point field goal	60	25%

- A. 129
- B. 190
- C. 213
- D. 330
- E. 380

44. The graph of $y = |x - 6|$ is in the standard (x,y) coordinate plane. Which of the following transformations, when applied to the graph of $y = |x|$, results in the graph of $y = |x - 6|$?

- F. Translation to the right 6 coordinate units
- G. Translation to the left 6 coordinate units
- H. Translation up 6 coordinate units
- J. Translation down 6 coordinate units
- K. Reflection across the line $x = 6$

45. Toby wants to find the volume of a solid toy soldier. He fills a rectangular container 8 cm long, 6 cm wide, and 10 cm high with water to a depth of 4 cm. Toby totally submerges the toy soldier in the water. The height of the water with the submerged toy soldier is 6.6 cm. Which of the following is closest to the volume, in cubic centimeters, of the toy soldier?
- A. 125
 - B. 156
 - C. 192
 - D. 208
 - E. 317

46. A box in the shape of a cube has an interior side length of 18 inches and is used to ship a right circular cylinder with a radius of 6 inches and a height of 12 inches. The interior of the box not occupied by the cylinder is filled with packing material. Which of the following numerical expressions gives the number of cubic inches of the box filled with packing material?

F. $6(18)^2 - 2\pi(6)(12) - 2\pi(6)^2$

G. $6(18)^2 - 2\pi(6)(12)$

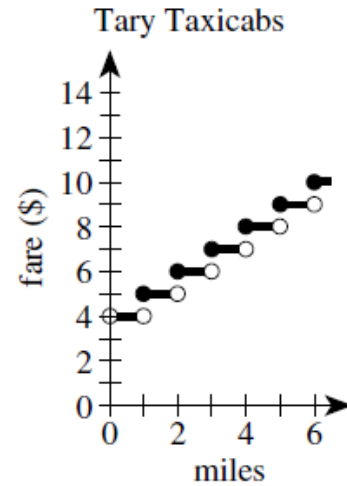
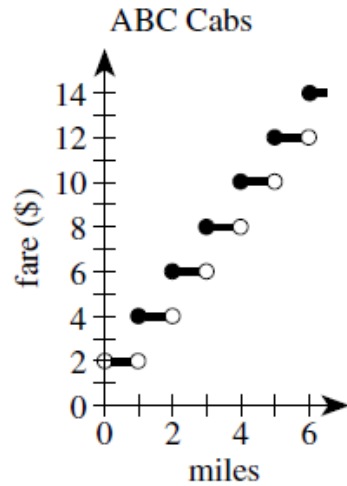
H. $18^3 - \pi(6)(12)^2$

J. $18^3 - \pi(6)^2(12)$

K. $18^3 - \pi(12)^3$

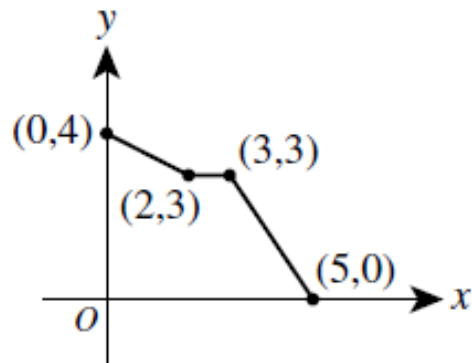
47. A room has a rectangular floor that is 15 feet by 21 feet. What is the area of the floor in square *yards* ?
- A. 24
 - B. 35
 - C. 36
 - D. 105
 - E. 144

48. ABC Cabs and Tary Taxicabs both have an initial fare of a whole number of dollars for 1 passenger. The fare increases a whole number of dollars at each whole number of miles traveled. The graphs below show the 1-passenger fares, in dollars, for both cab companies for trips up to 6 miles. When the fares of the 2 cab companies are compared, what is the cheaper fare for a 5-mile trip?



- F. \$ 8
- G. \$ 9
- H. \$10
- J. \$11
- K. \$12

49. The graph of a function $y = f(x)$ consists of 3 line segments. The graph and the coordinates of the endpoints of the 3 line segments are shown in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of the region bounded by the graph of $y = f(x)$, the positive y -axis, and the positive x -axis?



- A. 10
- B. 13
- C. 14
- D. 15
- E. 20

50. The sum of 2 positive numbers is 151. The lesser number is 19 more than the square root of the greater number. What is the value of the greater number minus the lesser number?

- F.** 19
- G.** 66
- H.** 85
- J.** 91
- K.** 121

51. The list of numbers 41, 35, 30, X , Y , 15 has a median of 25. The mode of the list of numbers is 15. To the nearest whole number, what is the mean of the list?
- A. 20
 - B. 25
 - C. 26
 - D. 27
 - E. 30

52. You are given the following system of equations:

$$\begin{aligned}y &= x^2 \\ rx + sy &= t\end{aligned}$$

where r , s , and t are integers. For which of the following will there be more than one (x,y) solution, with real-number coordinates, for the system?

F. $r^2 + 4st > 0$

G. $s^2 - 4rt > 0$

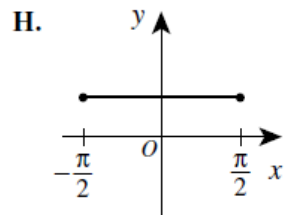
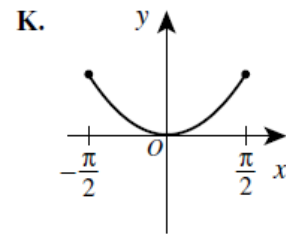
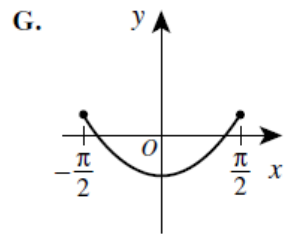
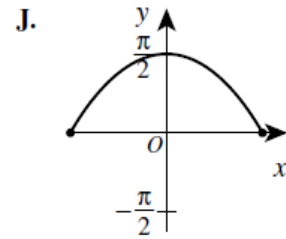
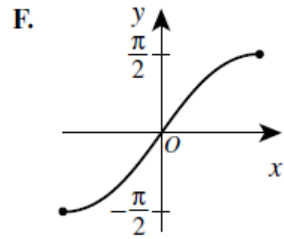
H. $r^2 - 4st < 0$

J. $s^2 - 4rt < 0$

K. $s^2 + 4rt < 0$

53. The 3rd and 4th terms of an arithmetic sequence are 13 and 18, respectively. What is the 50th term of the sequence?
- A. 248
 - B. 250
 - C. 253
 - D. 258
 - E. 263

54. One of the following graphs in the standard (x,y) coordinate plane is the graph of $y = \sin^2 x + \cos^2 x$ over the domain $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$. Which one?



55. What is the period of the function $f(x) = \csc(4x)$?

A. π

B. 2π

C. 4π

D. $\frac{\pi}{4}$

E. $\frac{\pi}{2}$

56. At the school carnival, Mike will play a game in which he will toss a penny, a nickel, and a dime at the same time. He will be awarded 3 points for each coin that lands with heads faceup. Let the random variable x represent the total number of points awarded on any toss of the coins. What is the expected value of x ?

F. 1

G. $\frac{3}{2}$

H. $\frac{9}{2}$

J. 6

K. 9

57. For what positive real value of k , if any, is the determinant of the matrix $\begin{bmatrix} k & 4 \\ 3 & k \end{bmatrix}$ equal to k ?

(Note: The determinant of matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ equals $ad - bc$.)

- A. 3
- B. 4
- C. 12
- D. $\sqrt{12}$
- E. There is no such value of k .

58. Given a positive integer n such that $i^n = 1$, which of the following statements about n must be true?

(Note: $i^2 = -1$)

- F. When n is divided by 4, the remainder is 0.
- G. When n is divided by 4, the remainder is 1.
- H. When n is divided by 4, the remainder is 2.
- J. When n is divided by 4, the remainder is 3.
- K. Cannot be determined from the given information

59. For $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$, $|\sin \theta| \geq 1$ is true for all and only the values of θ in which of the following sets?

A. $\left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\}$

B. $\left\{\frac{\pi}{2}\right\}$

C. $\left\{\theta \mid -\frac{\pi}{2} < \theta < \frac{\pi}{2}\right\}$

D. $\left\{\theta \mid -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}\right\}$

E. The empty set

60. Ray \overrightarrow{PK} bisects $\angle LPM$, the measure of $\angle LPM$ is $11x^\circ$, and the measure of $\angle LPK$ is $(4x + 18)^\circ$. What is the measure of $\angle KPM$?

F. 12°

G. $28\frac{2}{7}^\circ$

H. 42°

J. $61\frac{1}{5}^\circ$

K. 66°