

1. Every year in the Chinese calendar is named for an animal. Each year in the table below has been designated as a "Year of the Ox."

**SOME CHINESE CALENDAR
YEARS OF THE OX**

Year
1973
1985
1997
2009

If n represents any "Year of the Ox," which of the following expressions represents the previous "Year of the Ox"?

(a) $n-12$

(c) $12n$

(b) $n+12$

(d) $n/12$

2. A salesperson's total salary includes a base pay of \$500 per month plus 8.5% of the monthly sales. If x = sales per month and y = total salary, which of the following shows how to determine the total salary for any month?

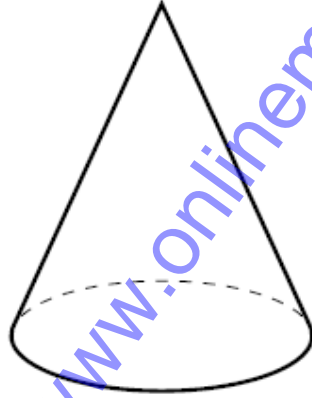
(a) $500 - y = 0.085x$

(c) $y = -500 - 0.085x$

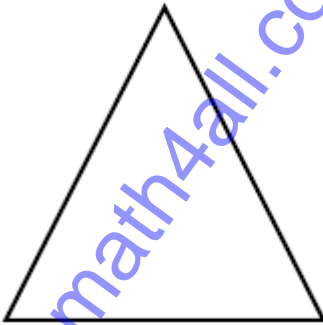
(b) $y = 500 + 0.085x$

(d) $-0.085x + y = -500$

3. The figure below is a right circular cone.



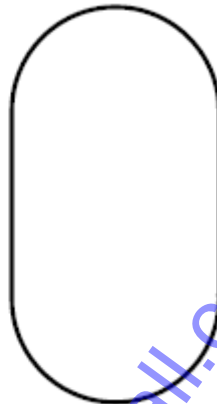
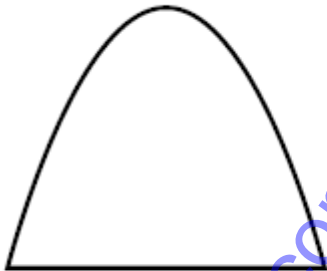
(a)



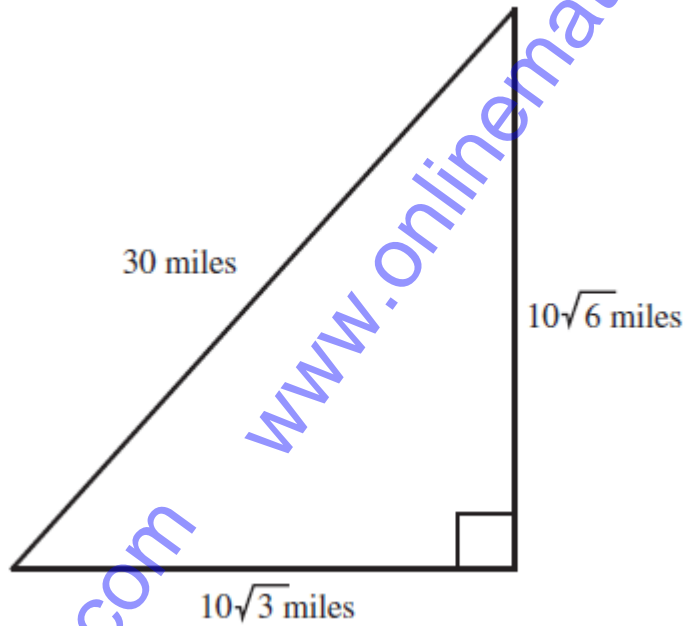
(b)



(d)



4. The dimensions of a right triangle are shown below.



The ratio of the base of the triangle to its height is $\frac{10\sqrt{3}}{10\sqrt{6}}$.

Which of the following is equivalent to $\frac{10\sqrt{3}}{10\sqrt{6}}$?

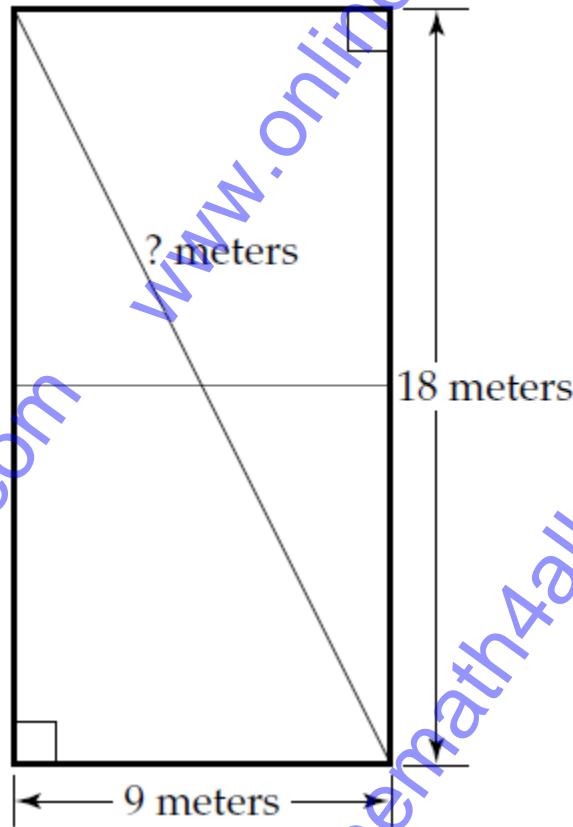
(a) $1/2$

(c) $\sqrt{2}$

(b) $\sqrt{2}/2$

(d) $2/\sqrt{2}$

5. The dimensions and shape of a volleyball court are shown in this picture. What is the approximate distance of a serve that is hit diagonally from one corner of the court to the other?



(a) 27.0 meters

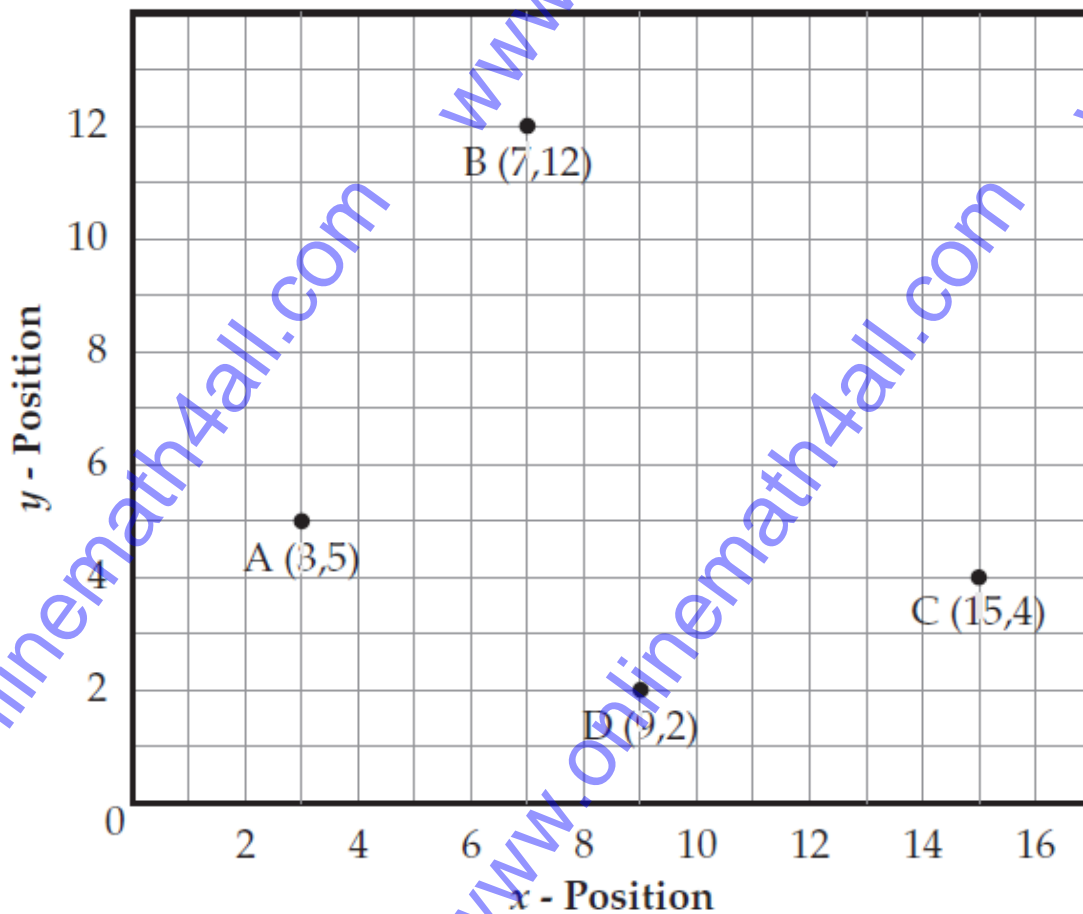
(c) 15.6 meters

(b) 20.1 meters

(d) 12.7 meters

6. The course of the monorail at an amusement park must be changed to make room for a new parking lot. Engineers have decided that only the main supporting column located at point C on the grid below should be relocated. They have also decided that the rebuilt course should be in the shape of a parallelogram. Plot the new location of the supporting column and write its coordinates.

MONORAIL COURSE



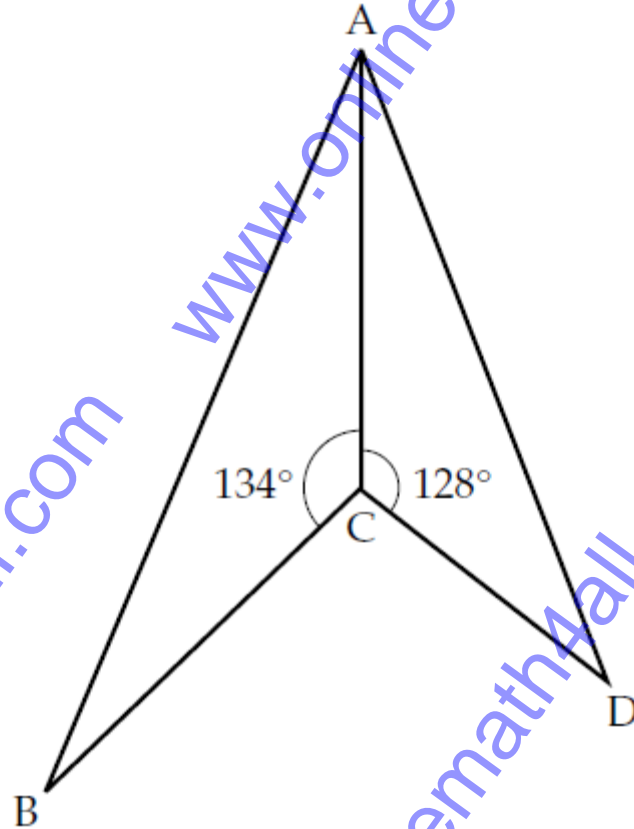
(a) $C (15, 4)$

(c) $C (15, 2)$

(b) $C (13, 9)$

(d) $C (13, 6)$

7. The diagram below shows a design found on a mask from Nigeria. In the diagram, $\angle ACB$ measures 134° and $\angle ACD$ measures 128°



What is the measure, in degrees, of $\angle BCD$?

(a) 134

(c) 98

(b) 90

(d) 128

8. Ed bowled six games at Jordan's Bowlerama. For the first 5 games that Ed bowled, his mean score was 120. He bowled a score of 180 for his 6th game. What was his mean bowling score for all 6 games?

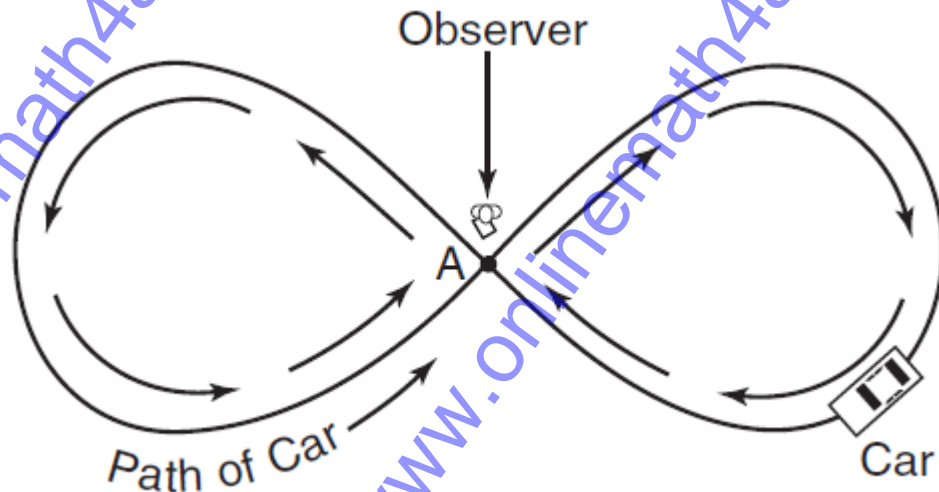
(a) 110

(c) 130

(b) 120

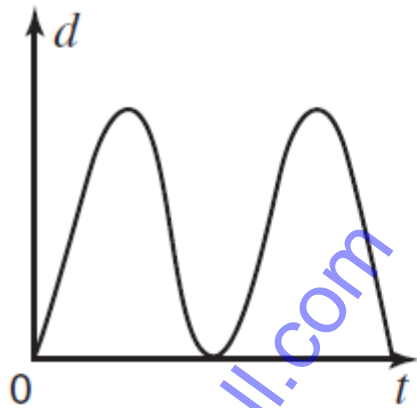
(d) 140

9. An observer stood at the intersection of a figure-eight racetrack. The diagram shows the observer and a single car as it started at point A next to the observer and traveled once around the track and returned to point A .

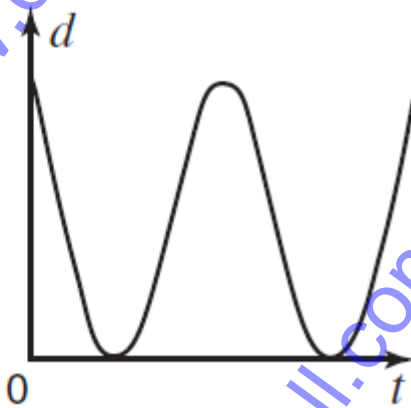


Which graph best shows d , the distance of the car from the observer as it traveled t seconds around the track?

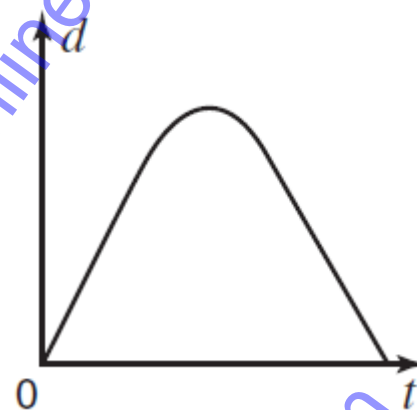
(a)



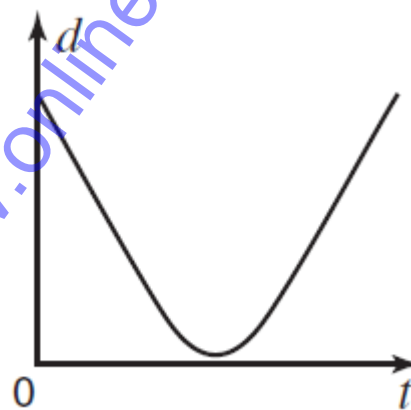
(c)



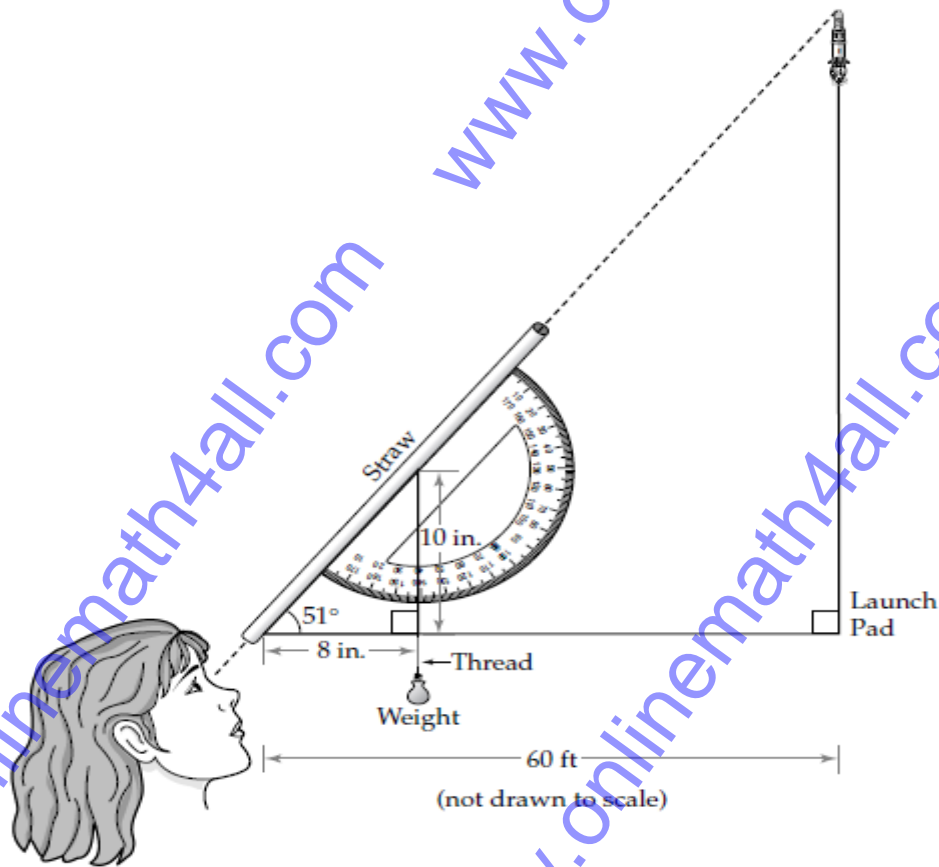
(b)



(d)



10. Rita designs and tests model rockets. She made a device that allows her to measure the angle of the rocket's elevation at the peak of its path. During one test, she used the device at a point 60 feet from the launch pad. When the rocket reached the peak of its path, the measurements on Rita's device were as shown in the diagram below.



Based on Rita's measurements, what was the approximate height, in feet, that the rocket reached at the peak of its path?

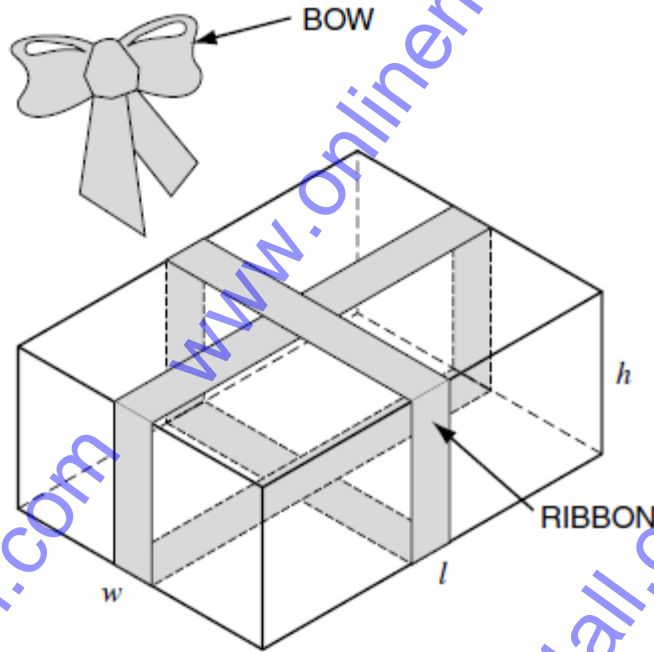
(a) 48

(c) 96

(b) 75

(d) 128

11. Sonya needs to buy ribbon to wrap around the rectangular-shaped present shown.



(a) $l + w + h + 25$

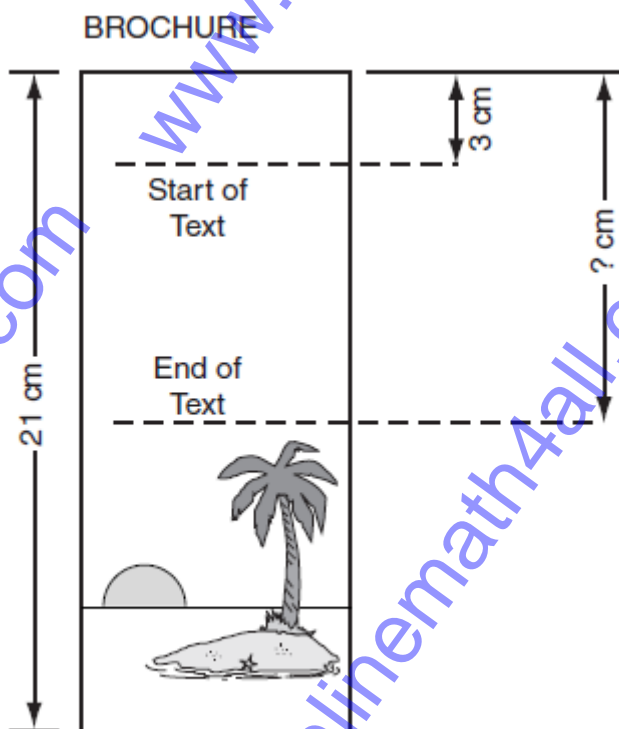
(c) $l \times w \times h + 25$

(b) $2l + 2w + 2h + 25$

(d) $2l + 2w + 4h + 25$

12. A graphic artist is creating a brochure according to the following specifications.

- The length of the brochure is 21 centimeters.
- The text must start 3 centimeters from the top of the brochure.
- The total amount of space the text occupies must not exceed one-third of the total length of the brochure.



What is the maximum distance in centimeters (cm) between the top of the brochure and the end of the text?

- (a) 5
- (b) 9
- (c) 7
- (d) 10

13. A bicycle store owner sells all merchandise at 25% above original cost. A customer bought a bicycle for \$140.00. How many dollars did the store owner originally pay for the bicycle?

(a) 112

(c) 113

(b) 114

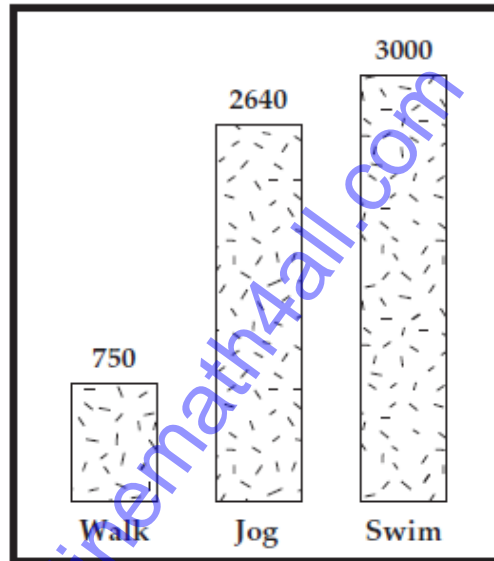
(d) 115

14. A nutritionist has a female client who has been inactive, but plans to begin swimming one hour each day. This change in her level of activity will result in her daily energy requirement increasing by the same amount she expends swimming. According to the information below, what will be the woman's new daily energy requirement in kilojoules (kJ) after she begins swimming one hour each day?

AVERAGE DAILY ENERGY REQUIREMENT

Subject	kJ/day
Infant, 9–12 months	4200
Child, 8 years	8770
Boy, 15 years	12 560
Girl, 15 years	9560
Woman (inactive)	7950
Man (inactive)	10 460

ENERGY EXPENDED DURING CERTAIN ACTIVITIES
(in kJ per hour)



(a) 8950

(b) 10950

(c) 9950

(d) 11950

15. Arturo was evaluating some formulas as part of a science experiment. What is the value of the following expression?

$$(-2.1)^2 + (-0.5)^3$$

(a) 4.285

(c) 4.385

(b) 4.485

(d) 4.585

16. The table lists 4 stars and their approximate distances from Earth.

APPROXIMATE DISTANCE FROM EARTH

Star	Distance (in km)
Star Q	4.2×10^{15}
Star R	3.9×10^{15}
Star S	1.2×10^{16}
Star T	9.0×10^{14}

Which star is the greatest distance from Earth?

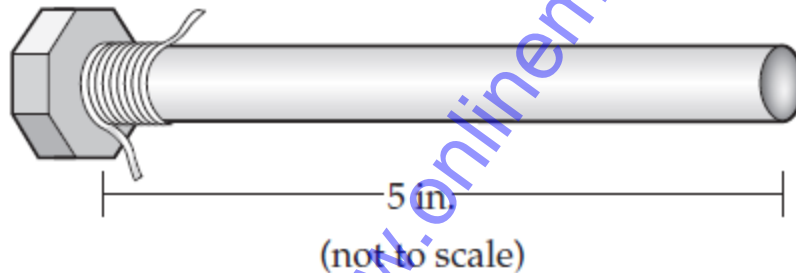
(a) Star Q

(c) Star S

(b) Star R

(d) Star T

17. Jenny is making an electromagnet by wrapping wire around an iron bolt, as shown in the picture below.



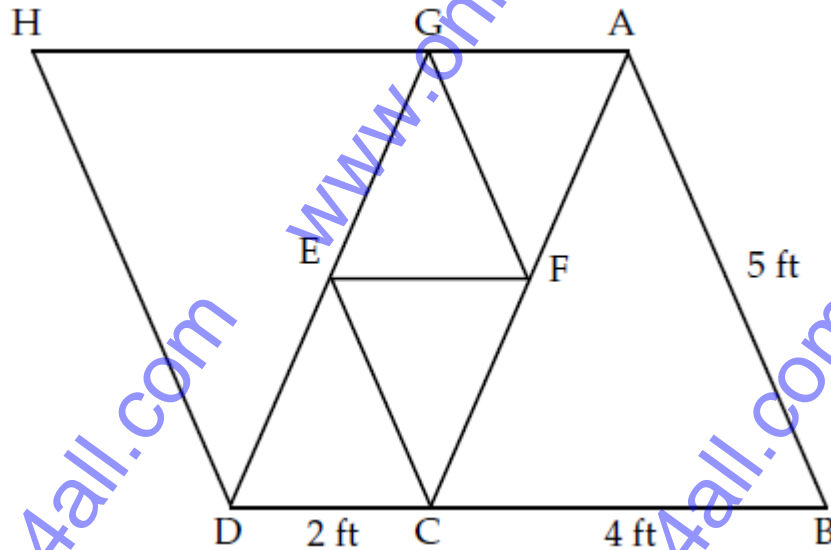
The wire is 0.1 inch in diameter so each wrap is 0.1 inch wide. If Jenny makes one wrap every 3 seconds, how many **seconds** will it take to wrap the 5-inch bolt?

- (a) 16.7 seconds (c) 150.0 seconds
(b) 30.0 seconds (d) 166.7 seconds

18. On December 17, 1903, Wilbur and Orville Wright flew their first powered airplane near Kitty Hawk, North Carolina. They flew the plane a distance of 852 feet in 59 seconds. If the Wrights' plane had continued at the same rate of speed, about how many minutes would it have taken them to fly 1 mile?

- (a) 6 minutes (c) 14 minutes
(b) 9 minutes (d) 90 minutes

19. An architect is using isosceles triangles in the design of a bridge. In the diagram below, all line segments represent the steel beams needed to build this section of the bridge. Line segment HA is parallel to line segment DB . Triangle DEC is similar to triangle CAB and congruent to triangle AFG .



Write and solve a proportion to determine the length of EC in feet.

(a) 1.5

(c) 2.5

(b) 3.5

(d) 4.5

20. The drama club plans to sell cans of orange soda and lemon-lime soda at its annual theater event. The club has enough money to buy a total of 288 cans of soda and has decided to buy twice as many cans of lemon-lime soda as orange soda.

Determine the number of cans of orange soda that the drama club will buy for the event

(a) 96

(c) 105

(b) 104

(d) 95

21. A fishing boat captain organized his fishing records in the table below.

APRIL FISHING RECORDS

Type of Fish	Cost per Pound	Pounds Sold	Total Dollars Earned
Snapper	\$5.50	s	\$8,250.00
Grouper	\$4.75	g	
Total		2,600	\$13,475.00

The following equations represent the information in the table, where s is the number of pounds of snapper and g is the number of pounds of grouper.

$$s + g = 2,600$$

$$5.50s + 4.75g = 13,475$$

The captain used these equations to determine that \$8,250.00 was received from the sale of the snapper. How many pounds of grouper, g , were sold in April?

(a) 900

(c) 1000

(b) 1100

(d) 1200

22. At the surface of the ocean, a scuba diver's pressure gauge reads zero pounds per square inch (psi). At 33 feet below the surface of the ocean, the pressure is 14.7 psi. At 66 feet below the surface, the pressure is 29.4 psi. The table below shows the relationship between depth and pressure.

PRESSURE AT GIVEN DEPTHS

Depth (in feet)	Pressure (in psi)
0	0
33	14.7
66	29.4
99	

If the pressure increases at a constant rate, what will be the pressure in psi at 99 feet?

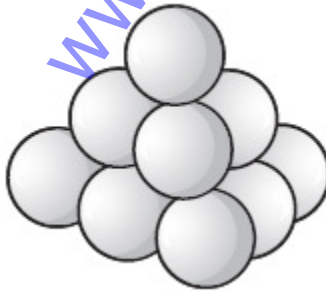
(a) 40.1

(c) 41.1

(b) 42.1

(d) 44.1

23. The pirates who plundered ships in the Caribbean Sea used cannons in their attacks. Cannonballs were stacked on the deck in a square pyramid like the one shown below. The top layer had 1 ball, the second layer had 4 balls, and the third layer had 9 balls.



If the pyramid were 5 layers high, how many cannonballs would be in the fifth layer?

(a) 25

(c) 44

(b) 39

(d) 55

24. A geneticist studying twins read that fraternal twins occur in 1 out of every 80 births. In a sample of 560 mothers-to-be, how many would be expected to give birth to fraternal twins?

(a) $1/7$

(c) 7

(b) $1/70$

(d) 70

25. Becky's 16th birthday is on September 4th. On the last day of February, she calculates how many more days there will be until her birthday by making the table below.

NUMBER OF DAYS UNTIL 16TH BIRTHDAY

Month	Number of Days
March	31
April	30
May	31
June	30
July	31
August	31
September	3

Which of the following expressions could Becky use to calculate the number of days there will be until her 16th birthday?

(a) $3 \times 31 + 3 \times 30 + 3$

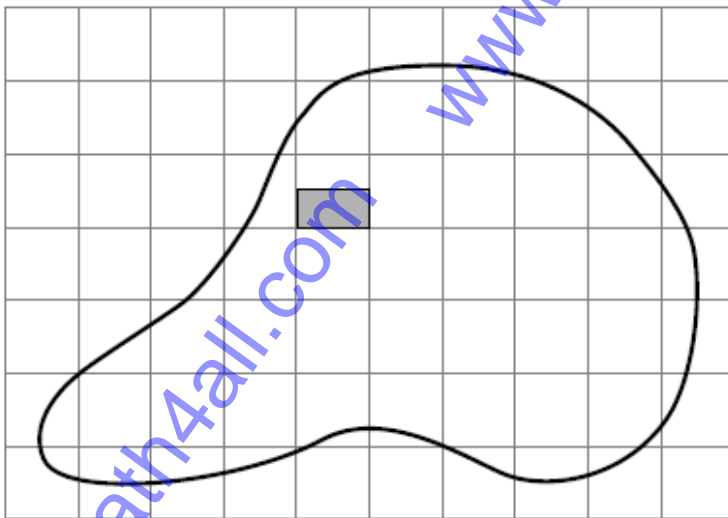
(c) $4 \times 31 + 2 \times 30 + 3$


(b) $3 \times 31 + 4 \times 30 + 3$

(d) $4 \times 31 + 3 \times 30 + 3$

26. For the following problem, you will be required to use ESTIMATION strategies. Luisa, a ranger at a desert preserve, is estimating the number of snakes in the preserve. She counted 25 snakes in a 0.5-square kilometer area as represented by the shaded area on the grid below. The total area of the preserve is also outlined on the grid.

DESERT PRESERVE MAP



 = 1 km²

If Luisa assumes the snakes are evenly distributed throughout the preserve, how many snakes should she ESTIMATE are in the entire preserve?

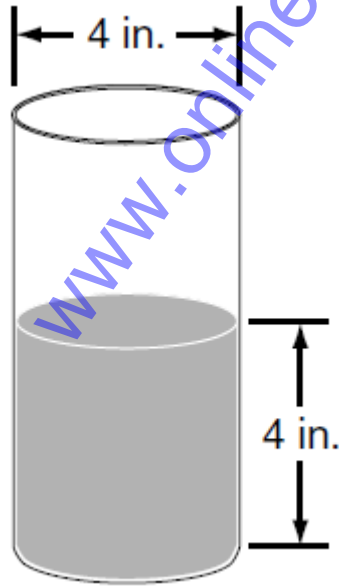
(a) 1400 - 1800

(c) 2000 - 2400

(b) 2500 - 3000

(d) 3100 - 3200

27. A scientist studying global warming conducted an experiment in her lab. She poured 4 inches of water into a cylinder as shown below.



According to her study, the volume of water in the cylinder should rise by 0.1% when she raises the water temperature by 10 degrees. Which of these is closest to the volume of water in the cylinder after the temperature is raised 10 degrees?

(a) 50.29 cubic inches

(c) 55.26 cubic inches

(b) 200.96 cubic inches

(d) 201.16 cubic inches

28. Frank plans to set up a fruit juice stand at the state fair. He will purchase 500 cans of juice for \$135, and he will charge \$2 for each can he sells. In addition to the cost of the juice, Frank will need to pay \$20 to set up the stand. Which of the following expressions could Frank use to find out how much money he could make, after expenses, for selling j cans of juice?

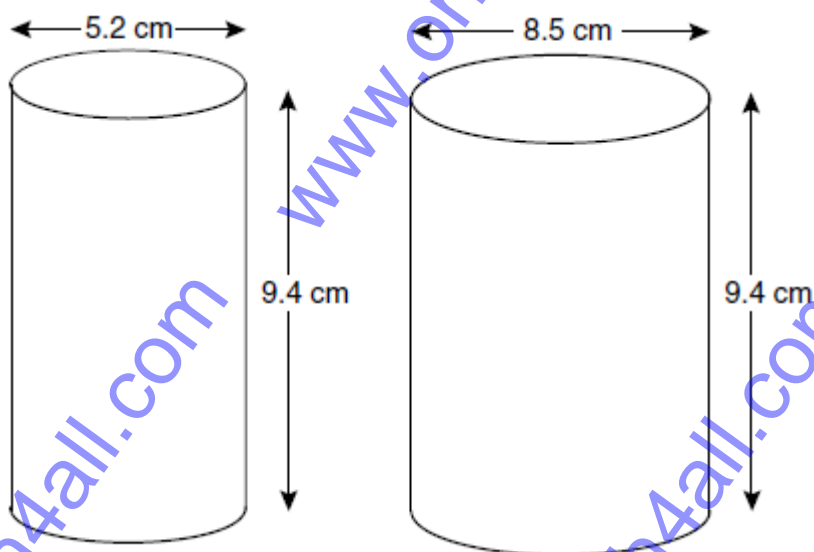
(a) $500j - 135 - 20$

(c) $2j - 500 - 20$

(b) $135j - 500 - 20$

(d) $2j - 135 - 20$

29. An orange juice company sells a can of frozen orange juice that measures 9.4 centimeters in height and 5.2 centimeters in diameter.



The company wants to sell a larger can of juice. The height of the can is kept at 9.4 cm, but the diameter is increased to 8.5 cm. About how many times more juice will the new can hold?

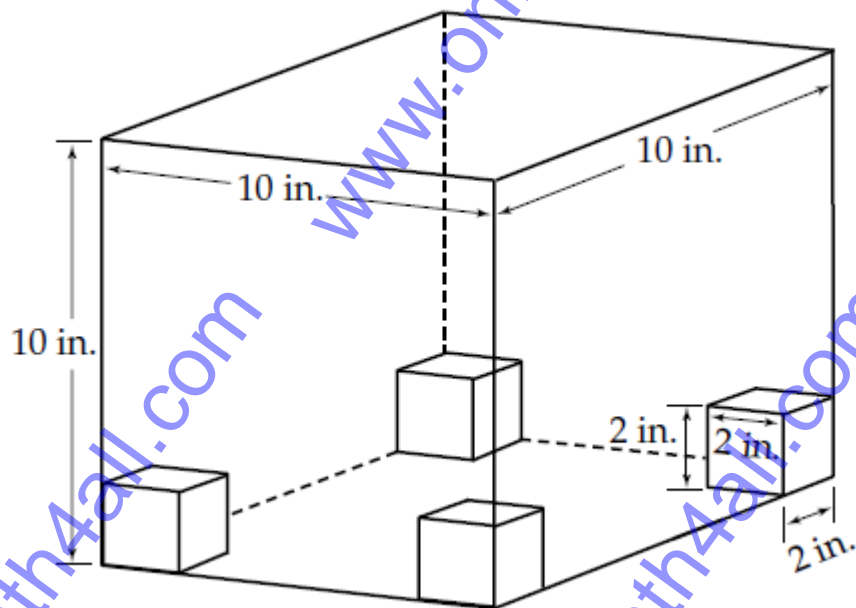
(a) 1.6 times as much

(c) 2.7 times as much

(b) 1.7 times as much

(d) 3.3 times as much

30. A shipping carton for computer parts is in the shape of a cube that measures 10 inches on each edge. In each of its bottom corners, the carton has 1 foam cube. Each foam cube measures 2 inches on an edge, as shown in the diagram below.



What is the volume, in cubic inches, of the empty space in the shipping carton when the 4 foam cubes are inside the box?

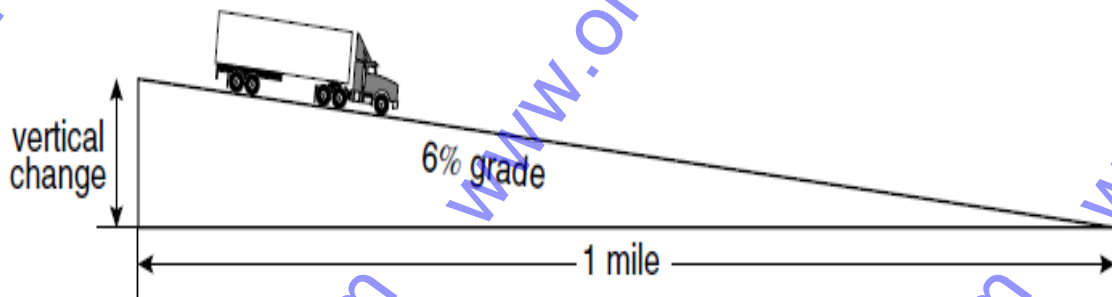
(a) 968

(c) 582

(b) 322

(d) 122

31. On some mountain highways, trucks are advised to use low gear on roads that have a 6% grade. A 6% grade means the road changes vertically 6 feet for every 100 feet of horizontal distance.



With a 6% grade, what is the vertical change, in feet, if the horizontal distance traveled is 1 mile?

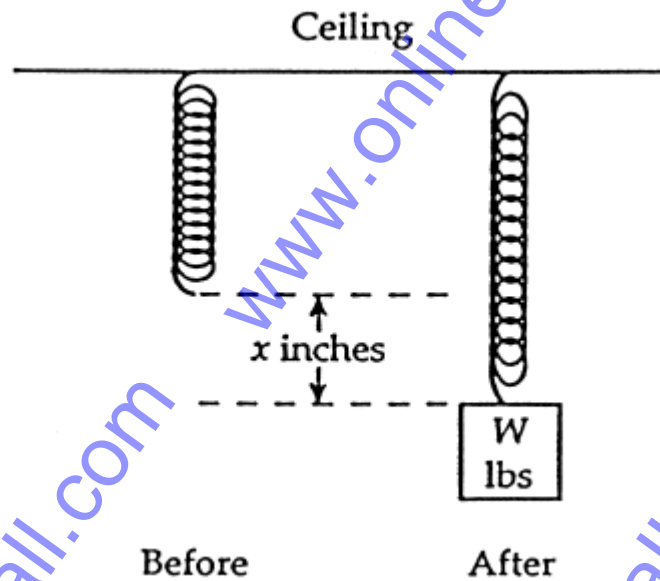
(a) 316.8

(c) 256.3

(b) 189.2

(d) 458.1

32. When an object that weighs W pounds is hung from a spring, the spring stretches x inches, as shown in the picture below.



Use the equation below to determine how many inches the spring will stretch if an object weighing 5 pounds is attached to the end of the spring.

$$W = (2/3)x$$

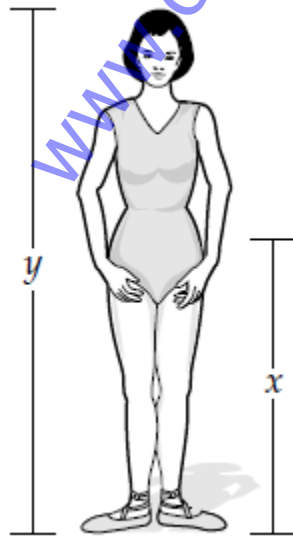
(a) 5.5

(c) 7.5

(b) 6.5

(d) 8.5

33. Artists have traditionally studied human proportions to draw human figures realistically. When drawing a female figure like the one in this picture, the realistic ratio of the distance from the hip to the toe (x) to the height of the woman (y) is 0.613. An artist is creating a 9-inch-high drawing of a woman. What should be the approximate distance in inches from the hip to the toe?



(a) 0.07 inch

(c) 5.5 inches

(b) 3.5 inches

(d) 14.7 inches

34. The four members of an a cappella singing group, two men and two women, always stand in a row when they sing. If they line up in random order, what is the probability that a woman will be at each end of the row?

(a) $1/2$

(c) $1/12$

(b) $1/6$

(d) $1/24$

35. The Regal High Debate Club qualified for the state meet. How many possible two-member debate teams can be formed from a pool of six students in the Regal High Debate Club?

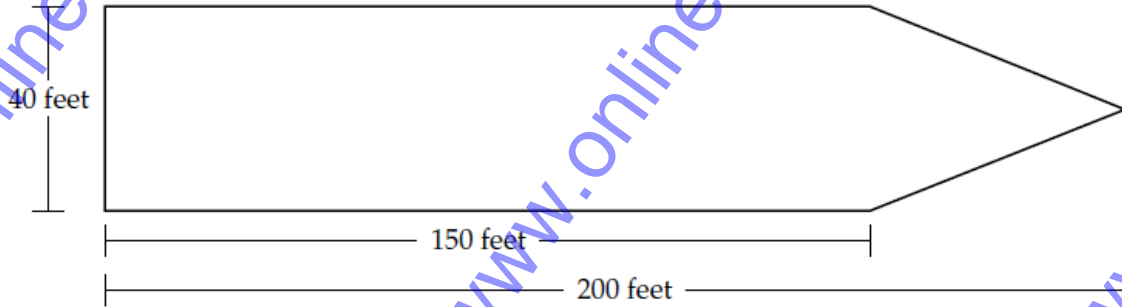
(a) 720

(c) 30

(b) 360

(d) 15

36. Jackie wants to determine the number of gallons of paint needed to paint the entire deck of a cargo ship. A sketch of the deck is shown below.



How many square feet will be painted?

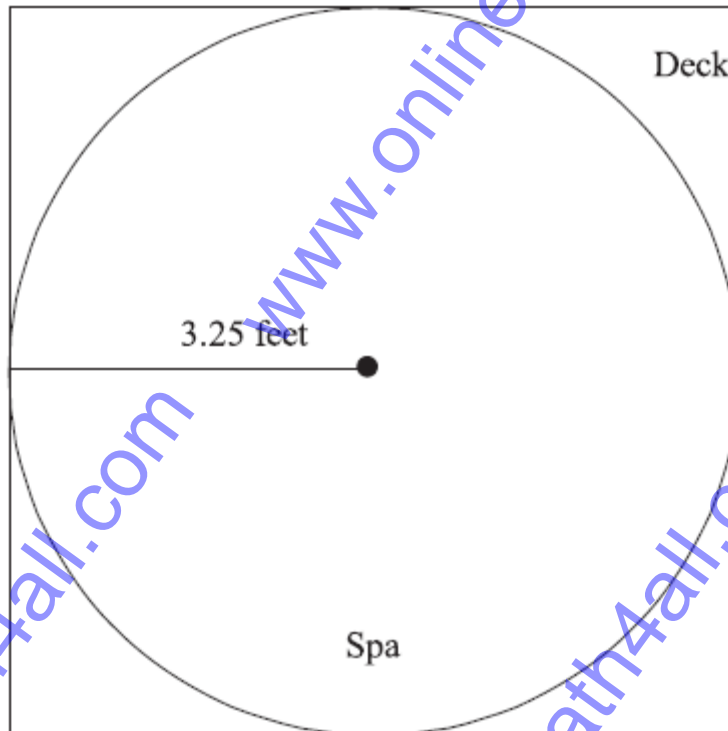
(a) 7000

(c) 7500

(b) 8000

(d) 8200

37. Roderick works for JB Spas. He is installing a circular spa that will be enclosed by a square deck. The figure below illustrates the spa and the deck as seen from above.



The radius of the spa is 3.25 feet. What will be the perimeter, in feet, of the deck?

(a) 16

(c) 18

(b) 24

(d) 26

38. The sun travels along the Milky Way's spiral arm at a rate of 250 kilometers per second. How far, in kilometers, will the sun travel in $7\frac{1}{2}$ minutes?

(a) 52500

(c) 62500

(b) 72500

(d) 82500

39. Louella runs a messenger service and must keep track of the gas mileage of each car. When she filled the gas tank of one car, she used a calculator to find the gas mileage. The calculator display read "23.355178." Which of these numbers most closely represents the gas mileage in miles per gallon?

(a) 2.335×10^2

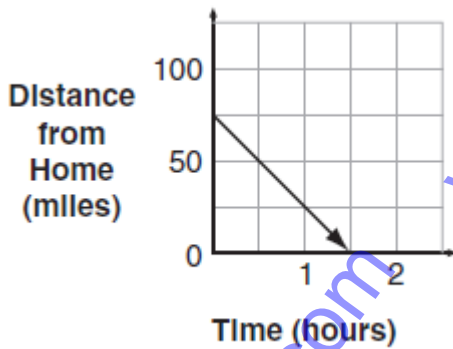
(c) $70/3$

(b) $24/3$

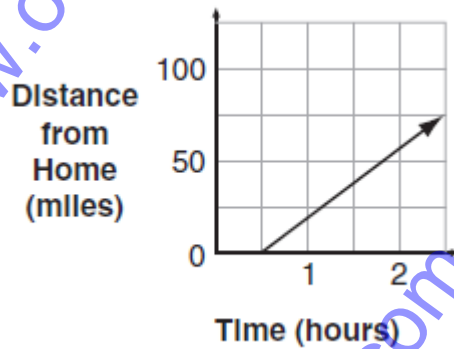
(d) $2335/1000$

40. It took Myron 90 minutes, at an average rate of 50 miles per hour, to drive home from a business trip. Which of these graphs best represents Myron's drive home?

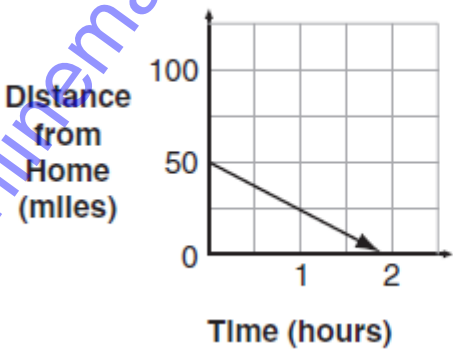
(a)



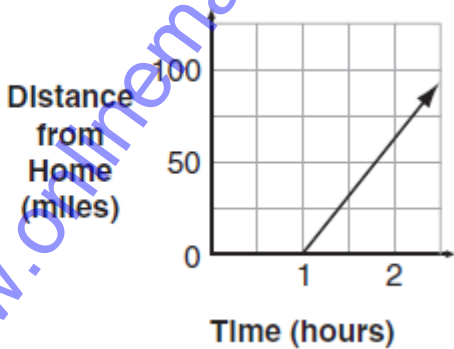
(c)



(b)



(d)



41. Each ship that passes through the Panama Canal requires about 52 million gallons of water to move the ship through the canal from the Atlantic Ocean to the Pacific Ocean.

If 36 ships passed through the canal, moving from the Atlantic Ocean to the Pacific Ocean, which is closest to the number of gallons of water that was required?

(a) 1.9×10^8 gallons

(c) 8.8×10^8 gallons

(b) 1.9×10^9 gallons

(d) 8.8×10^9 gallons

42. At the close of the stock market on Monday, the value of a certain stock was \$12.00 per share. By the close on Tuesday, the value of the stock went up 50% per share. At close on Wednesday, the value of the stock was down 5% per share from Tuesday's closing value.

Determine the value of the stock at closing on Tuesday and Wednesday. Show all work necessary to justify your answer.

(a) \$ 21.00 & \$17.10

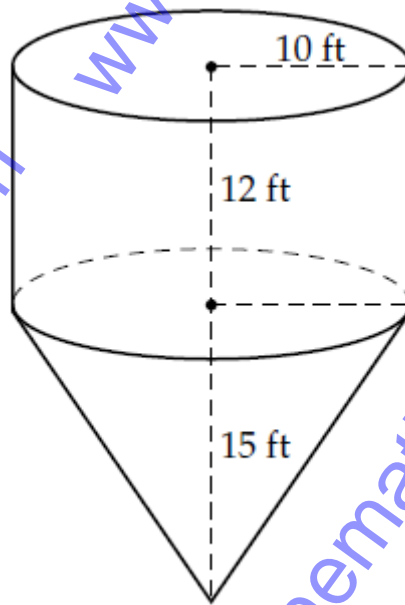
(c) \$ 20.00 & \$16.10

(b) \$ 19.00 & \$16.10

(d) \$ 18.00 & \$17.10

43. The drawing below shows an empty sand hopper at a construction site. The upper part is in the shape of a right circular cylinder with a height of 12 feet (ft) and radius of 10 feet. The lower part is in the shape of a right circular cone with a height of 15 feet.

Determine the volume of sand, in cubic feet, that will completely fill the sand hopper.



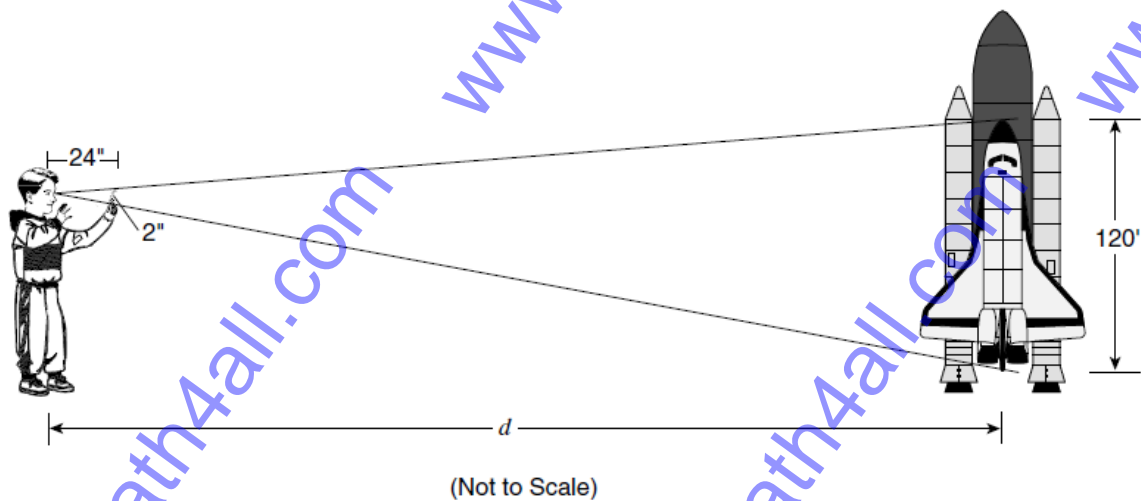
(a) 1900π cu.ft

(c) 1800π cu.ft

(b) 1700π cu.ft

(d) 1600π cu.ft

44. Raul was taking a tour of the Kennedy Space Center. He could see a space shuttle being prepared for launch a distance, d , away. He held one of his keys out at arm's length and noticed that, at this distance, the shuttle appeared to be about the same size as his key.



Raul knows that the shuttle is really about 120 feet in length and that his key is about 2 inches long. He is holding the key 24 inches away from his eyes. Using this information, which is closest to the distance, d , between Raul and the space shuttle?

(a) 240 feet

(c) 2880 feet

(b) 1440 feet

(d) 5760 feet

45. A rectangular piece of window screen has a width of 1.75 feet. The packaging label says the screen is 42 square feet. What is the length of the screen?

(a) 24.0 feet

(c) 73.5 feet

(b) 43.75 feet

(d) 101.0 feet

46. The table below contains a modification of *Pascal's triangle*, in which each number is the sum of the two adjacent numbers in the previous row.

MODIFIED PASCAL'S TRIANGLE

Row	Numbers in a Row	Sum of the Numbers in the Row
1	2	2
2	2 2	4
3	2 4 2	8
4	2 6 6 2	16
5	2 8 12 8 2	32
6		

In the table, the sum of the numbers in each row is shown. According to the table, what is the sum of the numbers in the tenth row of the modified *Pascal's triangle*?

- (a) 1023
- (b) 1024
- (c) 1025
- (d) 1026

47. Krista has decided to enter a local marathon. As part of her training, she is going to increase the number of miles she runs every week by 3 miles. If Krista runs 12 miles in the first week, how many miles will she run during the ninth week?

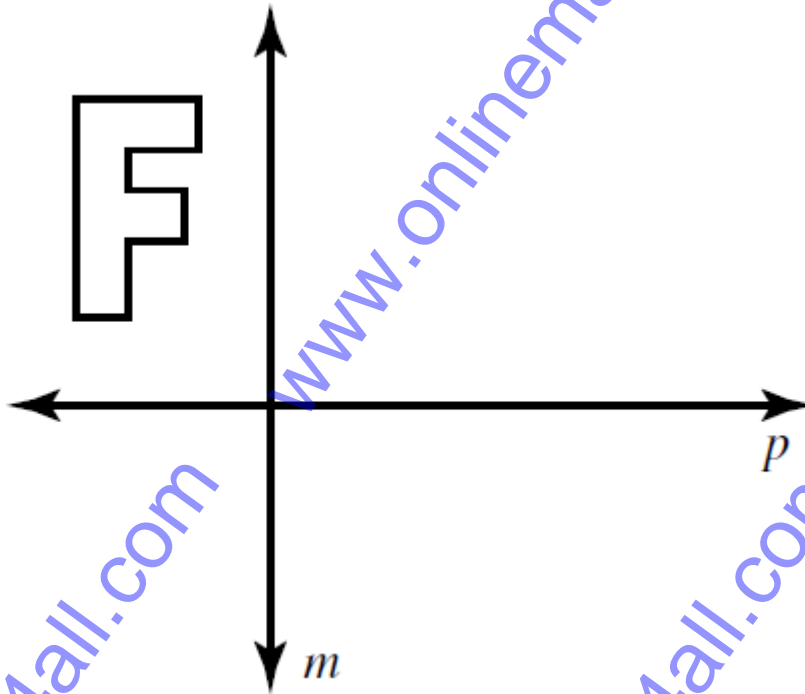
(a) 25

(c) 36

(b) 42

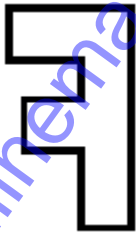
(d) 53

48. In the figure, the letter "F" is to be first reflected over the vertical line m and then again reflected over the horizontal line p .



Which of these figures would be the correct orientation of the letter "F" after the two transformations described?

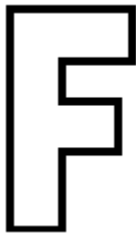
(a)



(c)



(b)



(d)



49. Tanisha and some friends from her bicycle club went on a training ride from West Palm Beach to Miami. They planned to ride 45 miles from West Palm Beach to Fort Lauderdale, another 10 miles to Hollywood, and finally 15 miles to Miami. Tanisha's bicycle got a flat tire north of Miami, and she was unable to complete the training ride. Her odometer showed she had traveled 60 miles. Approximately what percent of the training ride did Tanisha complete?

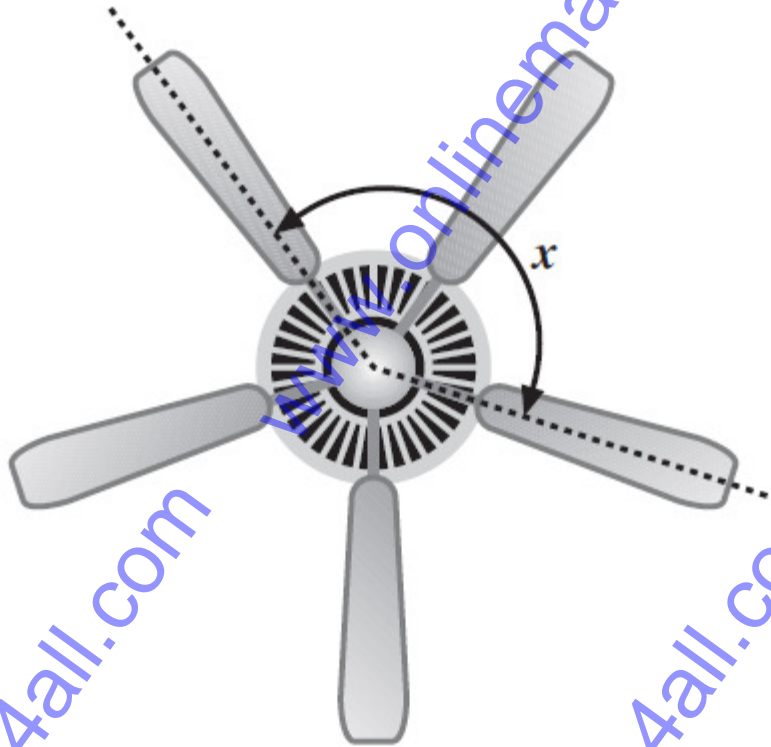
(a) 14%

(c) 86%

(b) 75%

(d) 116%

50. A ceiling fan with five equally-spaced blades is shown below.



What is the degree measure of angle x ?

(a) 36°

(c) 108°

(b) 72°

(d) 144°

Answers:

- | | | | | | |
|-------|-------|-------|-------|-------|-------|
| 1. a | 2. b | 3. d | 4. b | 5. b | 6. b |
| 7. c | 8. c | 9. a | 10. b | 11. d | 12. d |
| 13. a | 14. b | 15. a | 16. c | 17. c | 18. a |
| 19. c | 20. a | 21. b | 22. d | 23. a | 24. c |
| 25. c | 26. a | 27. a | 28. d | 29. c | 30. a |
| 31. a | 32. c | 33. c | 34. b | 35. d | 36. a |
| 37. d | 38. a | 39. c | 40. a | 41. b | 42. d |
| 43. b | 44. b | 45. a | 46. b | 47. c | 48. d |
| 49. c | 50. d | | | | |