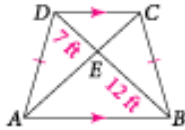


- 1 Find AC for the quadrilateral.



- A 19 cm
- B 10 cm
- C 15 cm
- D 25 cm

- 2 How can you determine that a point lies on the perpendicular bisector of  $\overline{MA}$  with endpoints  $M(-2, 4)$  and  $A(-6, -2)$ ?

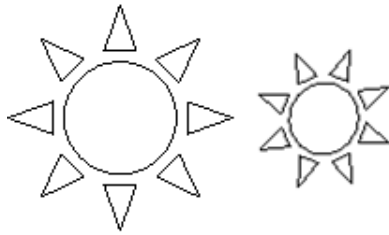
- A The perpendicular line has a slope of 3.
- B The perpendicular line has a slope of  $\frac{3}{2}$ .
- C The point  $(-4, 3)$  is on the line.
- D The point  $(-4, 1)$  is on the line.

- 3 Use the Law of Cosines to find the missing angle.

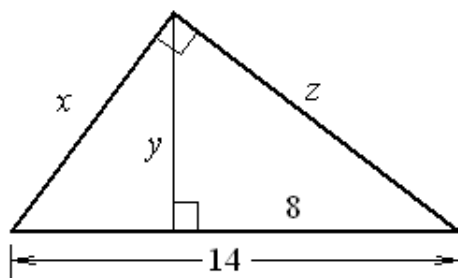
In triangle  $FGH$ ,  $HF = 16$  ft,  $FG = 23$  ft, and  $m\angle F = 52^\circ$ . Find the measure of  $f$ . Round your answer to the nearest whole number.

- A 8
- B 19
- C 18
- D 20

- 4 Judging by appearance, is it reasonable to say that the figures below are similar? How do you know?



- A Yes, the figures are similar because there is a similarity transformation that maps one figure onto the other. The similarity transformation is first a rotation, then a translation, and finally a dilation.
- B No, even though the figures appear to be similar, there is no composition of transformations that will map one figure to the other.
- C Yes, the figures are similar because there is a similarity transformation that maps one figure onto the other. The similarity transformation is a rotation then a dilation.
- D No, the lengths of the figures do not appear to have the same corresponding scale factor.
- 5 In the figure below, which proportion uses the geometric mean to find  $x$ ? Find  $x$ . If necessary, round to the nearest tenth.

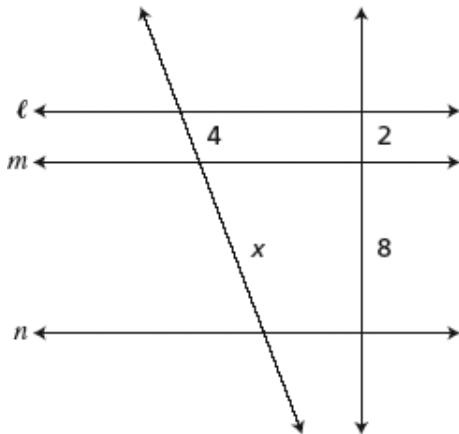


- A  $\frac{x}{8} = \frac{6}{x}$ ;  $x = 6.9$
- B  $\frac{14}{x} = \frac{z}{8}$ ;  $x = \frac{112}{z}$
- C  $\frac{x}{14} = \frac{8}{x}$ ;  $x = 10.6$
- D  $\frac{x}{14} = \frac{6}{x}$ ;  $x = 9.2$

- 6 Use the Law of Cosines to find the missing angle.  
Find  $m\angle B$ , given  $a = 11$ ,  $b = 12$ , and  $c = 17$ .

A  $m\angle B = 49.9^\circ$   
 B  $m\angle B = 40.1^\circ$   
 C  $m\angle B = 45.3^\circ$   
 D  $m\angle B = 44.7^\circ$

- 7 Lines  $\ell$ ,  $m$ , and  $n$  are parallel. Find the value of  $x$ .



A 6  
 B 10  
 C 12  
 D 16

- 8 For circle  $O$ , sector  $AOB$  has radius 12 and  $\angle AOB$  measures  $120^\circ$ . What is the length of arc  $AB$ ?

A  $4\pi$  units  
 B  $8\pi$  units  
 C  $12\pi$  units  
 D  $16\pi$  units

- 9 Is it possible for a triangle to have sides with the given lengths:  
20 m, 22 m, and 24 m?

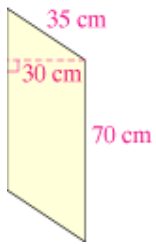
A Yes; the sum of each pair is greater than the third.  
 B No;  $20^2 + 22^2 > 24^2$ .  
 C No;  $22 + 24 > 20$ .  
 D Yes; the sum of each pair is less than the third.

- 10 The percent of each type of book sold yesterday is shown in the table. If this information were organized in a circle graph, what would be the measure of the central angle for romance?

Books Sold Yesterday	
Book Type	Books (%)
Mystery	19
Romance	10
Science Fiction	16
Nonfiction	13
Fiction	42

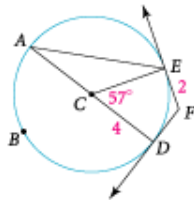
- A 72  
B 36  
C 18  
D 10
- 11 Find the surface area and volume of a sphere with a radius  $r = 0.8$  ft. Round your answer to the nearest tenth.
- A  $7.8 \text{ ft}^2$ ;  $2.6 \text{ ft}^3$   
B  $8.4 \text{ ft}^2$ ;  $1.8 \text{ ft}^3$   
C  $8.0 \text{ ft}^2$ ;  $2.1 \text{ ft}^3$   
D  $8.2 \text{ ft}^2$ ;  $2.3 \text{ ft}^3$
- 12 A rhombus has 10-in. sides, two of which meet to form a  $30^\circ$  angle. Find the area of the rhombus (*Hint*: Use a special right triangle to find the height.).
- A  $58 \text{ in.}^2$   
B  $50 \text{ in.}^2$   
C  $48 \text{ in.}^2$   
D  $40 \text{ in.}^2$

- 13 Find the area of the parallelogram shown.



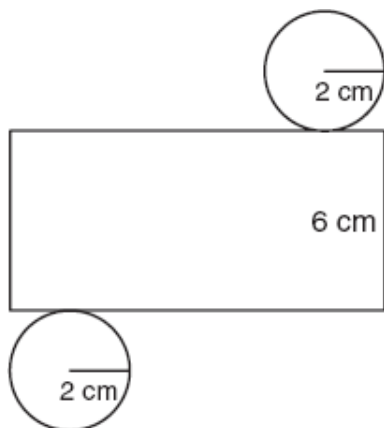
- A  $205 \text{ cm}^2$
- B  $1,050 \text{ cm}^2$
- C  $2,100 \text{ cm}^2$
- D  $4,200 \text{ cm}^2$

- 14 In the diagram,  $\overline{FE}$  and  $\overline{FD}$  are tangents to  $\odot C$ . Find  $m\angle EFD$ .



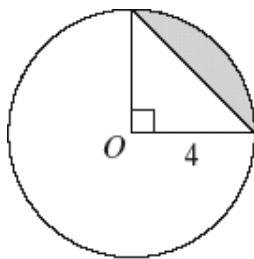
- A 90
- B 123
- C 133
- D 157

- 15 The net of a cylinder and its dimensions in centimeters are shown in the picture.



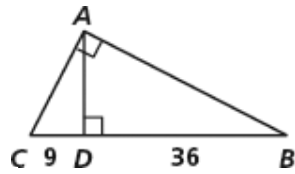
Which is the best estimate of the surface area of the cylinder? Use 3.14 for  $\pi$ .

- A  $75 \text{ cm}^2$
  - B  $88 \text{ cm}^2$
  - C  $100 \text{ cm}^2$
  - D  $113 \text{ cm}^2$
- 16 Find the area of the shaded region.

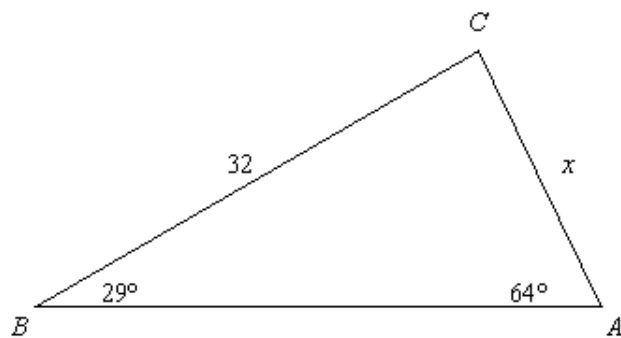


- A  $2\pi - 8$  square units
- B  $2\pi - 12$  square units
- C  $4\pi - 8$  square units
- D  $4\pi - 12$  square units

- 17 What is the length of  $AD$  ?

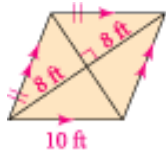


- A 18  
B 22  
C 28  
D 32
- 18 For the triangle shown below, determine whether you would use the Law of Sines or Law of Cosines to find  $x$ . Then find  $x$  to the nearest tenth.



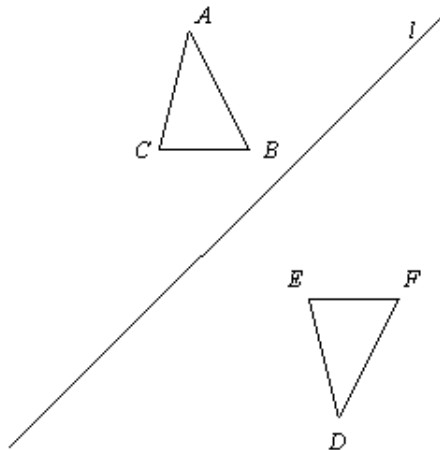
- A 17.3 by the Law of Sines  
B 35.4 by the Law of Cosines  
C 59.3 by the Law of Cosines  
D 13.9 by the Law of Sines

- 19 Find the area of the rhombus shown.



- A 32 ft<sup>2</sup>
- B 48 ft<sup>2</sup>
- C 64 ft<sup>2</sup>
- D 96 ft<sup>2</sup>

- 20 Use the composition  $(R_1 \circ r(-90, C'))(ABC) = DEF$ , shown below.



Which angle has an equal measure to  $m\angle C$ ?

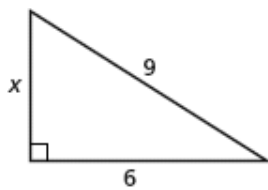
- A  $m\angle D$
- B  $m\angle A$
- C  $m\angle E$
- D  $m\angle F$



- 21 What translation rule can be used to describe the result of the composition of  $T_{\langle 4, -10 \rangle}(x, y)$  and  $T_{\langle -1, -9 \rangle}(x, y)$ ?

A  $T_{\langle -3, -19 \rangle}(x, y)$   
B  $T_{\langle 3, -19 \rangle}(x, y)$   
C  $T_{\langle 5, -1 \rangle}(x, y)$   
D  $T_{\langle -19, 3 \rangle}(x, y)$

- 22 What is the value of  $x$ ?

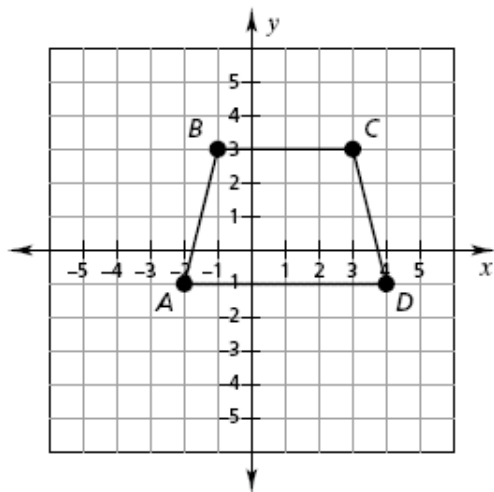


A  $3\sqrt{3}$   
B  $3\sqrt{5}$   
C  $5$   
D  $5\sqrt{3}$

- 23 What is the area of a circle with a radius of 11 meters? Round your answers to the nearest tenth.

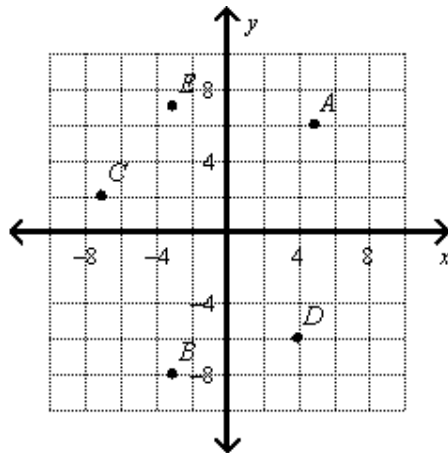
A  $34.6 \text{ m}^2$   
B  $121.0 \text{ m}^2$   
C  $380.1 \text{ m}^2$   
D  $760.3 \text{ m}^2$

- 24 Which of the following would you not use to prove that quadrilateral  $ABCD$  is an isosceles trapezoid?



- A The distance from  $A$  to  $B$  is equal to the distance from  $C$  to  $D$ .
  - B The slope of segment  $BC$  is equal to the slope of segment  $AD$ .
  - C Segments  $\overline{AC}$  and  $\overline{BD}$  bisect each other.
  - D The slope of segment  $AB$  is not equal to the slope of segment  $CD$ .
- 25 What is the area of a rectangle with  $\ell = 6.2$  meters and  $w = 3.9$  meters?
- A  $10.1 \text{ m}^2$
  - B  $1.01 \text{ m}^2$
  - C  $24.18 \text{ m}^2$
  - D  $2.3 \text{ m}^2$
- 26 Jasmine has a cube with an edge length of 5 inches. How would the volume of the cube change if the edge length were doubled?
- A The volume is multiplied by 2.
  - B The volume is multiplied by 4.
  - C The volume is multiplied by 6.
  - D The volume is multiplied by 8.

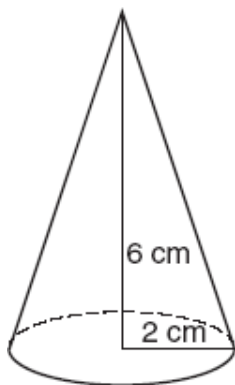
27 Use the graph.



Find the translation rule that describes the translation  $B \rightarrow A$ .

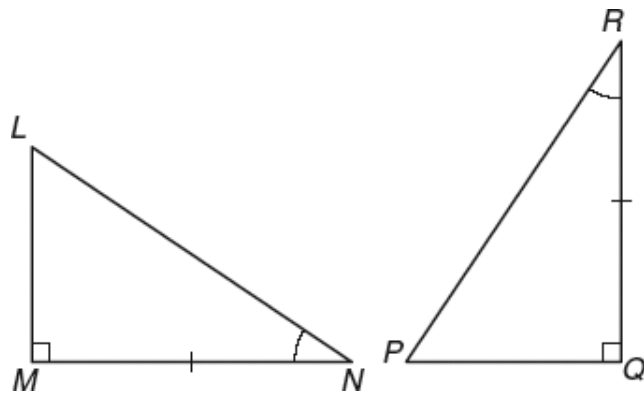
- A  $T_{\langle 7, 2 \rangle}(A)$
- B  $T_{\langle 0, 15 \rangle}(B)$
- C  $T_{\langle -4, 10 \rangle}(B)$
- D  $T_{\langle 8, 14 \rangle}(B)$

28 What is the volume of the cone below? Use 3.14 for  $\pi$ .



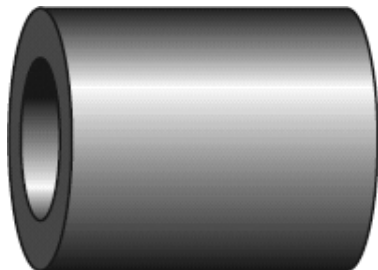
- A  $12.56 \text{ cm}^3$
- B  $25.12 \text{ cm}^3$
- C  $37.68 \text{ cm}^3$
- D  $75.36 \text{ cm}^3$

- 29 Which side is congruent to  $\overline{LM}$ ?



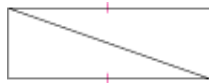
- A  $\overline{LN}$
- B  $\overline{MN}$
- C  $\overline{PQ}$
- D  $\overline{RQ}$

- 30 A roller is made by taking a cylinder of radius 3 inches and height 8 inches and removing a cylinder with radius 2 inches and the same height. The roller is shown on its side in the figure. What is the volume of the roller?



- A  $32\pi$  cubic inches
- B  $40\pi$  cubic inches
- C  $48\pi$  cubic inches
- D  $72\pi$  cubic inches

- 31 Which postulate or theorem, if any, could you use to prove the two triangles congruent? If the triangles *cannot* be proven congruent, explain.

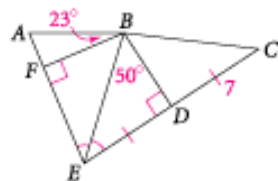


- A ASA
- B SAS
- C SSS
- D Not possible. The object appears to be a rectangle with opposite sides parallel, but that is not given.

- 32 Find a pattern for the sequence. Use the pattern to show the next two terms.  
12, 24, 36, 48, . . .

- A Each term is twelve more than the preceding term; 60, 72
- B Each term is twice the preceding term; 72, 96
- C Each term is five times the preceding term; 60, 70
- D Each term is twelve times the preceding term; 60, 72

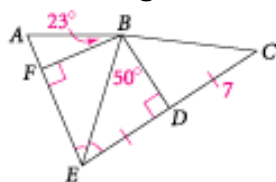
- 33 Use the figure to find the segment length or angle measure.



$m\angle BEF$

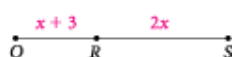
- A 20
- B 10
- C 32
- D 40

- 34 Use the figure to find the segment length or angle measure.



$FE$

- A 7
  - B 3
  - C 4
  - D 14
- 35 If you are a teenager, then you are younger than 20.
- If both the conditional and its converse are true, write a biconditional.
- A not possible
  - B You are younger than 20 if and only if you are a teenager.
  - C You are not a teenager if and only if you are not younger than 20.
- 36 Fill in the reason that justifies the step to solve for  $x$  in the diagram.

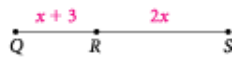


$$3x + 3 = 42$$

- A Division Property of Equality
- B Segment Addition Postulate
- C Simplify.

- 37 Fill in the reason that justifies the step to solve for  $x$  in the diagram.

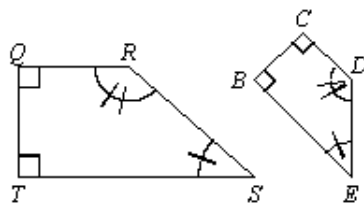
Given:  $QS = 42$



$$3x = 39$$

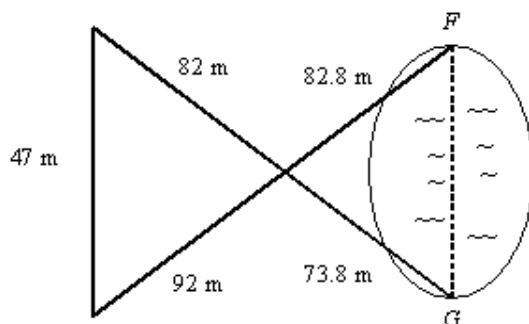
- A Substitution Property
- B Segment Addition Postulate
- C Subtraction Property of Equality

- 38 Figure  $TQRS \sim BCDE$ . Name a pair of corresponding sides?



- A  $\overline{TQ}$  and  $\overline{BE}$
- B  $\overline{TS}$  and  $\overline{CD}$
- C  $\overline{RS}$  and  $\overline{BC}$
- D  $\overline{QR}$  and  $\overline{CD}$

- 39 Campsites  $F$  and  $G$  are on opposite sides of a lake. A survey crew made the measurements shown on the diagram. What is the distance between the two campsites?



- A 42.3 m
- B 47.4 m
- C 73.8 m
- D 82.8 m

- 40 Based on the pattern, make a conjecture about the sum of the first 30 positive even numbers.

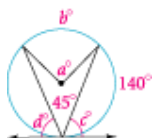
2	=	2	=	$1 \cdot 2$
$2 + 4$	=	6	=	$2 \cdot 3$
$2 + 4 + 6$	=	12	=	$3 \cdot 4$
$2 + 4 + 6 + 8$	=	20	=	$4 \cdot 5$
$2 + 4 + 6 + 8 + 10$	=	30	=	$5 \cdot 6$

- A The sum is  $30 \cdot 31$ .  
 B The sum is  $31 \cdot 32$ .  
 C The sum is  $29 \cdot 30$ .  
 D The sum is  $30 \cdot 30$ .

- 41 Name the ray in the figure.



- A  $\overrightarrow{NM}$   
 B  $\overrightarrow{MN}$   
 C  $\overline{NM}$   
 D  $\overleftrightarrow{MN}$
- 42 Assume that lines that appear tangent are tangent. Find the value of the variables.



- A  $a = 90$ ;  $b = 90$ ;  $c = 70$ ;  $d = 65$   
 B  $a = 90$ ;  $b = 84$ ;  $c = 64$ ;  $d = 60$   
 C  $a = 84$ ;  $b = 90$ ;  $c = 68$ ;  $d = 65$   
 D  $a = 86$ ;  $b = 88$ ;  $c = 70$ ;  $d = 62$

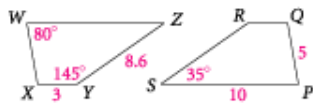


- 43 The measures of the three angles of a triangle are given. Find the value of  $x$  and then classify the triangle by its angles.

$$20x + 10, 30x - 2, 7x + 1$$

- A  $x = 3$ , acute
- B  $x = 3$ , right
- C  $x = 6$ , obtuse
- D  $x = 6$ , right

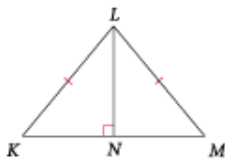
- 44  $WXYZ \cong PQRS$ . Find  $\overline{WX}$ .



- A 5
- B 10
- C 8.6
- D 3

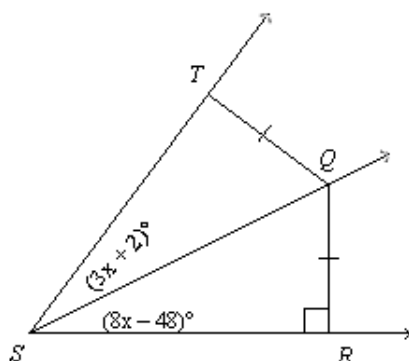
- 45 Given:  $\overline{LN} \perp \overline{KM}$ ,  $\overline{KL} \cong \overline{ML}$

Prove:  $\triangle KLN \cong \triangle MLN$



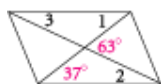
- A Since  $\overline{LN} \perp \overline{KM}$ ,  $\angle LNK$  and  $\angle LNM$  are right angles.  $\overline{KL} \cong \overline{ML}$  and  $\overline{LN} \cong \overline{LN}$ , so  $\triangle KLN \cong \triangle MLN$  by HL.
- B Since  $\overline{LN} \perp \overline{KM}$ ,  $\angle LNK$  and  $\angle LNM$  are right angles, so  $\angle LNK \cong \angle LNM$ .  $\overline{KL} \cong \overline{ML}$  and  $\overline{LN} \cong \overline{LN}$ , so  $\triangle KLN \cong \triangle MLN$  by SSA.
- C Since  $\overline{LN} \perp \overline{KM}$ ,  $m\angle LNK = m\angle LNM = 90$ , so  $\angle LNK \cong \angle LNM$ .  $\overline{KL} \cong \overline{ML}$  and  $\overline{LN} \cong \overline{LN}$ , so  $\triangle KLN \cong \triangle MLN$  by SAS.

- 46 Q is equidistant from the sides of  $\angle TSR$ . Find  $m\angle RST$ .



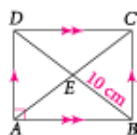
- A 32
- B 10
- C 20
- D 64

- 47 Find the measures of angles 1, 2, and 3 for the parallelogram.



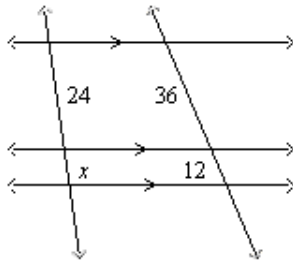
- A 37, 37, 37
- B 37, 26, 26
- C 63, 37, 63
- D 27, 27, 37

- 48 Find AC.

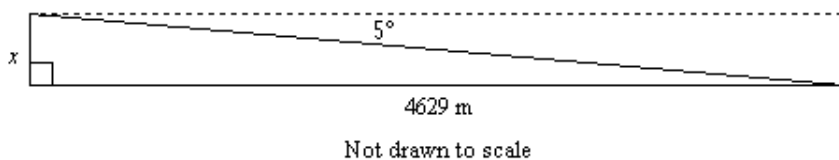


- A 38 cm
- B 7 cm
- C 12 cm
- D 20 cm

- 49 Solve for  $x$ .

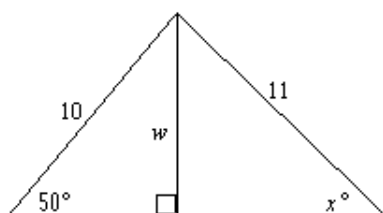


- A 8  
B 12  
C 6  
D 2
- 50 An angle bisector of a triangle divides the opposite side of the triangle into segments 5 cm and 3 cm long. A second side of the triangle is 7.6 cm long. Find the longest and shortest possible lengths of the third side of the triangle. Round answers to the nearest tenth of a centimeter.
- A 12.7 cm, 4.6 cm  
B 15 cm, 4.6 cm  
C 38 cm, 2 cm  
D 38 cm, 12.7 cm
- 51 An airplane over the Pacific sights an atoll at an angle of depression of  $5^\circ$ . At this time, the horizontal distance from the airplane to the atoll is 4629 meters. What is the height of the plane to the nearest meter?



- A 403 m  
B 405 m  
C 4611 m  
D 4647 m

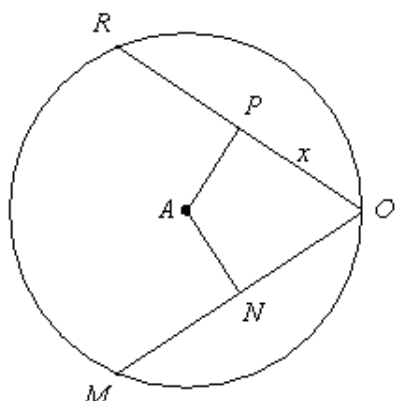
- 52 Find the value of  $w$  and then  $x$ . Round lengths to the nearest tenth and angle measures to the nearest degree.



- A  $w = 7.7, x = 44$
- B  $w = 6.4, x = 54$
- C  $w = 7.7, x = 54$
- D  $w = 6.4, x = 44$

- 53 Find the value of  $x$ . If necessary, round your answer to the nearest tenth.

$\overline{NA} \cong \overline{PA}, \overline{MO} \perp \overline{NA}, \overline{RO} \perp \overline{PA}, MN = 5$  feet



- A 5 ft
- B 2.5 ft
- C 10 ft
- D 25 ft

- 54 Write the standard equation for a circle with center  $(-6, -8)$ , that passes through  $(0, 0)$ .

- A  $(x - 6)^2 + (y - 8)^2 = 10$
- B  $(x - 6)^2 + (y - 8)^2 = 196$
- C  $(x + 6)^2 + (y + 8)^2 = 14$
- D  $(x + 6)^2 + (y + 8)^2 = 100$

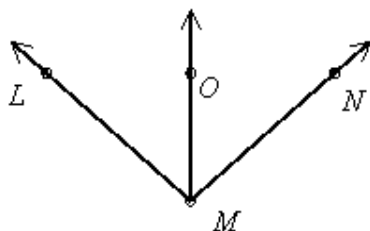
- 55 The vertices of a triangle are  $P(-3, -4)$ ,  $Q(3, 4)$ , and  $R(-6, -3)$ . Name the vertices of  $R_{x=0}(PQR)$ .

A  $P'(3, -4)$ ,  $Q'(-3, 4)$ ,  $R'(6, -3)$   
 B  $P'(-3, -4)$ ,  $Q'(3, 4)$ ,  $R'(-6, -3)$   
 C  $P'(-3, 4)$ ,  $Q'(3, -4)$ ,  $R'(-6, 3)$   
 D  $P'(3, 4)$ ,  $Q'(-3, -4)$ ,  $R'(6, 3)$

- 56 A microscope shows you an image of an object that is 80 times the object's actual size. So the scale factor of the enlargement is 80. An insect has a body length of 9 millimeters. What is the body length of the insect under the microscope?

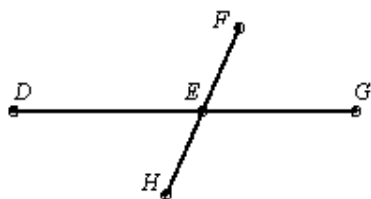
A 720 centimeters  
 B 7,200 millimeters  
 C 720 millimeters  
 D 72 millimeters

- 57  $\overrightarrow{MO}$  bisects  $\angle LMN$ ,  $m\angle LMO = 6x - 29$ , and  $m\angle NMO = 2x + 31$ . Solve for  $x$  and find  $m\angle LMN$ .



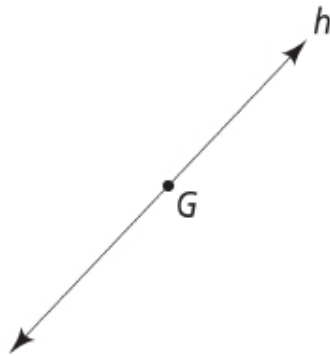
A  $x = 15$ ,  $m\angle LMN = 122$   
 B  $x = 14$ ,  $m\angle LMN = 55$   
 C  $x = 14$ ,  $m\angle LMN = 110$   
 D  $x = 15$ ,  $m\angle LMN = 61$

- 58 If  $m\angle DEF = 118$ , then what are  $m\angle FEG$  and  $m\angle HEG$ ?

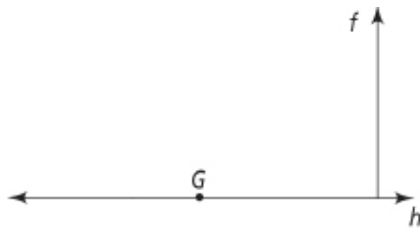


- A  $m\angle FEG = 62$ ,  $m\angle HEG = 128$
- B  $m\angle FEG = 62$ ,  $m\angle HEG = 118$
- C  $m\angle FEG = 72$ ,  $m\angle HEG = 118$
- D  $m\angle FEG = 118$ ,  $m\angle HEG = 62$

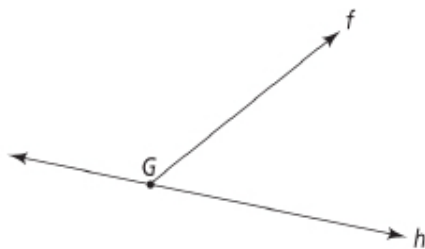
59 Which choice is best illustrates the construction of  $\overline{FG}$  with  $\overline{FG} \perp h$ ?



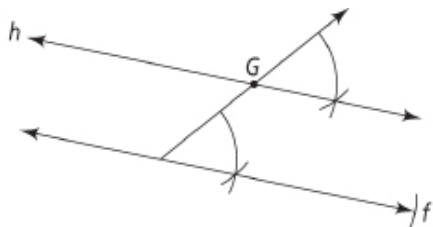
A



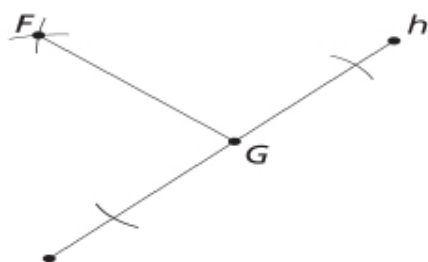
B



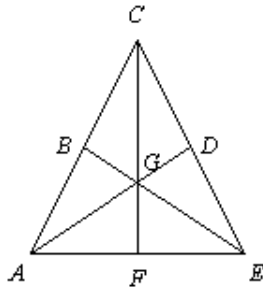
C



D



- 60 In  $\triangle ACE$ ,  $G$  is the centroid and  $BE = 9$ . Find  $BG$  and  $GE$ .



- A  $BG = 2\frac{1}{4}$ ,  $GE = 6\frac{3}{4}$   
 B  $BG = 3$ ,  $GE = 6$   
 C  $BG = 6$ ,  $GE = 3$   
 D  $BG = 4\frac{1}{2}$ ,  $GE = 4\frac{1}{2}$
- 61 You have the numbers 1–24 written on slips of paper. If you choose one slip at random, what is the probability that you will NOT select a number divisible by 3?
- A  $\frac{3}{8}$   
 B  $\frac{1}{3}$   
 C  $\frac{5}{8}$   
 D  $\frac{2}{3}$
- 62 There are 7 people on the ballot for regional judges. Voters can choose to vote for 0, 1, 2, or 3 judges. In how many different ways can a person vote?
- A 64  
 B 21  
 C 35  
 D 5



63 Suppose  $S$  and  $T$  are mutually exclusive events,  $P(S) = 5\%$ , and  $P(T) = 11\%$ . Find  $P(S \text{ or } T)$ .

- A 55%
- B 0.55%
- C 6%
- D 16%

64 The probability distribution shows the results of a survey of people's fear of flying on an airplane. Find the probability that a person who is afraid of flying has never flown before. Round to the nearest thousandth.

History of Flying Survey			
	Have Flown Before	Have Not Flown Before	Totals
Afraid to Fly	0.01	0.14	0.15
Not Afraid to Fly	0.74	0.11	0.85
Totals	0.75	0.25	1

- A 0.560
- B 0.440
- C 0.140
- D 0.933

65 A study of traffic patterns in a large city shows that if the weather is rainy, there is a 50% probability of an automobile accident occurring during the morning commute. If the weather is clear, the probability of an accident is reduced to 25%. Suppose the weather forecast for tomorrow predicts a 75% chance of rain.

Find  $P(\text{it will rain tomorrow and there will be an accident})$ . Then find  $P(\text{there will be an accident tomorrow})$ . Where necessary, round your answer to the nearest percent.

- A 38%, 44%
- B 50%, 44%
- C 75%, 38%
- D 13%, 25%