

# 24. [Perimeter]

## Skill 24.1 Calculating the perimeter of polygons (1).

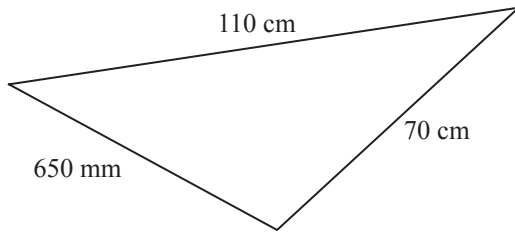
MMauve 1 1 2 3 3 4 4  
MMLime 1 1 2 2 3 3 4 4

- Convert all measurements to the same unit.
- Find and label the length of all sides.
- Add together all side lengths.

Hints: Sides marked with a dash (|) are of equal length.

Sides marked with two dashes (||) are of equal length etc.

**Q.** Find the perimeter of the scalene triangle in centimeters.

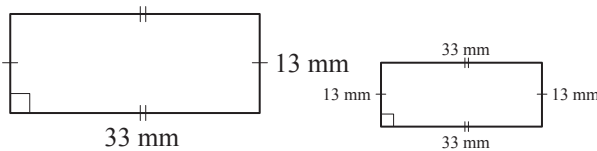


**A.**  $650 \text{ mm} = 650 \div 10 \text{ cm} = 65 \text{ cm}$  Convert mm to cm

$$P = 65 \text{ cm} + 110 \text{ cm} + 70 \text{ cm}$$

$$P = 245 \text{ cm}$$

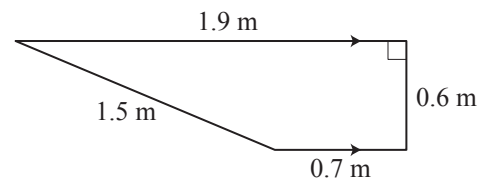
**a)** Find the perimeter of the rectangle.



$$P = 33 + 33 + 13 + 13$$

$$= 66 + 26 = \boxed{92 \text{ mm}}$$

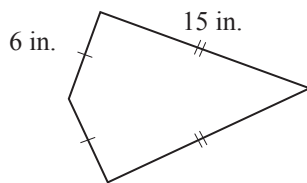
**b)** Find the perimeter of the trapezoid.



$$P = 1.5 +$$

$$= \quad = \boxed{\text{m}}$$

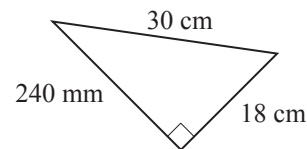
**c)** Find the perimeter of the kite.



$$P =$$

$$= \quad = \boxed{\text{in.}}$$

**d)** Find the perimeter of the right triangle in millimeters.



$$P =$$

$$= \boxed{\quad}$$

**e)** What is the perimeter of a regular heptagon with sides measuring 14 ft?

$$P =$$

$$= \quad = \boxed{\text{ft}}$$

**f)** What is the perimeter in centimeters of a rhombus with a side length measuring 125 mm?

$$P =$$

$$= \boxed{\quad}$$

**Skill 24.1** Calculating the perimeter of polygons (2).

- g)** What is the perimeter in feet and inches of an isosceles triangle with congruent sides measuring 11 in. and the other side measuring 8 in.?

.....  
 $P =$  ..... =

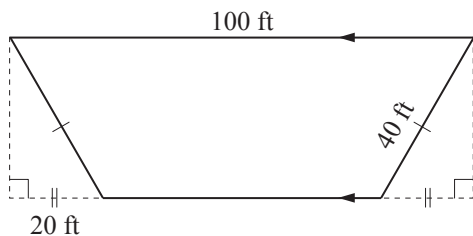
- i)** The smallest ever postage stamp came from Columbia. Rectangular, it measured 7.85 mm by 9.4 mm. What was its perimeter in cm?

$P =$   
 .....  
 = ..... =

- k)** Lisa's backyard is a rectangle measuring 28 yd in length and 12 yd in width. What is the perimeter of the backyard?

$P =$   
 .....  
 = ..... =  yd

- m)** Find the perimeter of the trapezoid.



$P =$   
 .....  
 = ..... =  ft

- h)** Find the perimeter in feet of a parallelogram with side lengths measuring 15 ft and 14 yd.

.....  
 $P =$  ..... =

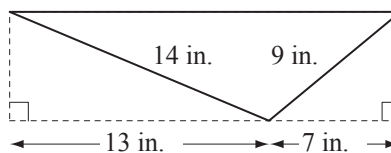
- j)** An Australian \$20 note measures 14.4 cm by 6.5 cm. What is its perimeter in millimeters?

$P =$   
 .....  
 = ..... =

- l)** Find the perimeter in centimeters of a kite with side lengths measuring 180 cm and 750 mm.

$P =$  ..... yd =

- n)** Find the perimeter of the triangle.



$P =$   
 .....  
 = ..... =  in.

- Find and label the length of all sides.
- Add together all side lengths.

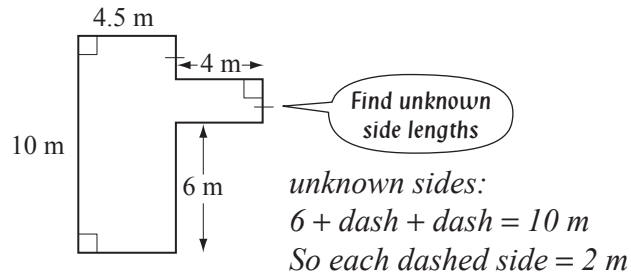
Hints: Sides marked with a dash (|) are of equal length.

Sides marked with two dashes (||) are of equal length etc.

OR

- Manipulate shapes to become rectangles by pushing out inverted corners.

Q. Find the perimeter of the shape.

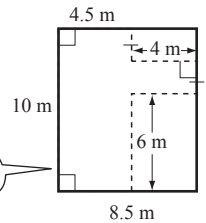


A.  $P = 10 + 4.5 + 2 + 4 + 2 + 4 + 6 + 4.5$   
 $= 14.5 + 8 + 10 + 4.5$   
 $= 37 \text{ m}$

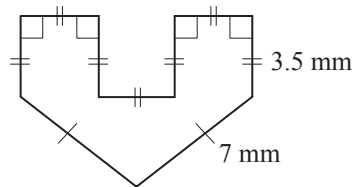
OR

$P = 10 + 10 + 8.5 + 8.5$   
 $= 20 + 17$   
 $= 37 \text{ m}$

shape becomes a rectangle



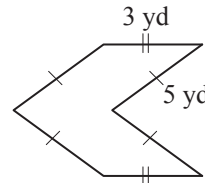
a) Find the perimeter of the shape.



$P = 3.5 + 7 + 7 + 3.5 + 3.5 + 3.5 + 3.5 + 3.5 + 3.5$

$= 14 + 24.5 = \boxed{\text{mm}}$

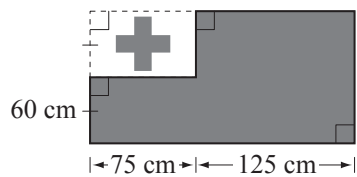
b) Find the perimeter of the shape.



$P =$

$= \boxed{\text{yd}}$

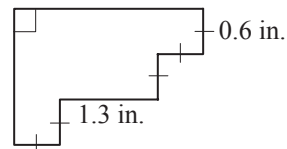
c) Find the perimeter around the colored background of this Tongan flag.



$P =$

$= \boxed{\text{cm}}$

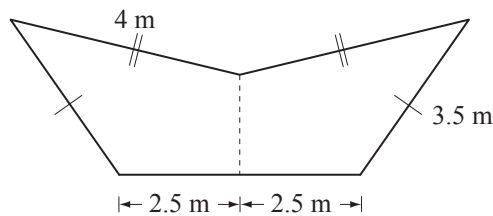
d) Find the perimeter of the shape.



$P =$

$= \boxed{\text{in.}}$

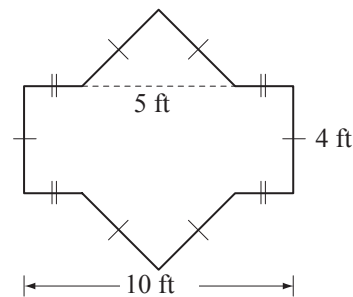
e) Find the perimeter of the shape.



$P =$

$= \boxed{\text{m}}$

f) Find the perimeter of the shape.



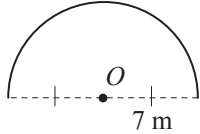
$P =$

$= \boxed{\text{ft}}$

- Substitute known values into the formula.  
Hints: The diameter of a circle is equal to twice the radius.  
Pi ( $\pi$ ) gets its value because the diameter of any circle fits approximately 3.14 times around the circumference.

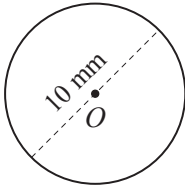
Circumference =  $2 \times \pi \times$  radius  
 $C = 2\pi r$   
 OR  $C = \pi \times$  diameter  
 $C = \pi d$   
 where  $\pi \approx 3.14\dots$  or  $\frac{22}{7}$

- Q.** Using  $C = 2\pi r$  where  $\pi \approx \frac{22}{7}$ , find the length of the semicircle.



**A.**  $C = 2\pi r$  where  $r = 7$   
 $= 2 \times \frac{22}{7} \times 7$  *Simplify:  $\div 7$*   
 $= 44$   
 $\frac{1}{2} C = \frac{1}{2} \times 44 = 22 \text{ m}$

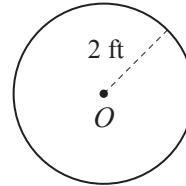
- a)** Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the circumference of the circle.



$C = \pi d$  where  $d = 10$

$= 10 \times 3.14 = \boxed{\text{mm}}$

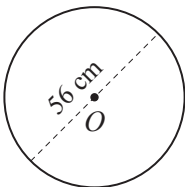
- b)** Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the circumference of the circle.



$C = 2\pi r$

$= \dots = \boxed{\text{ft}}$

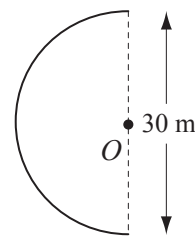
- c)** Using  $C = 2\pi r$  where  $\pi \approx \frac{22}{7}$ , find the circumference of the circle.



$C =$

$= \dots = \boxed{\text{cm}}$

- d)** Using  $\pi \approx 3.14$ , find the length of the semicircle.



$C =$

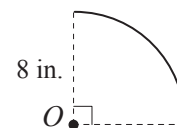
$\frac{1}{2} C = \dots = \boxed{\text{m}}$

- e)** The diameter of a circular discus is 2.5 m. Using  $\pi \approx 3.14$  what is the circumference?

$C =$

$= \dots = \boxed{\text{m}}$

- f)** Using  $\pi \approx 3.14$ , find the length of the quarter circle.



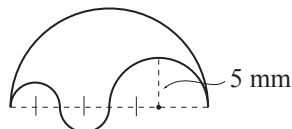
$C =$

$\frac{1}{4} C = \dots = \boxed{\text{in.}}$

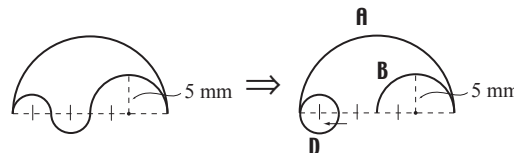
**Skill 24.4** Calculating the perimeter of composite circular shapes (1).

- Find and label the length of all sides.
- Break the shape into workable parts.
- For circular shapes substitute known values into the formula for the circumference:  $C = 2\pi r = \pi d$   
*Hint: Consider 2 congruent semicircles equal 1 full circle.*
- Add together all side lengths.  
*Hints: Sides marked with a dash (|) are of equal length.  
Sides marked with two dashes (||) are of equal length etc.*

**Q.** Find the perimeter of the shape below.  
(Use  $\pi \approx 3.14$ )



**A.**



$C = 2\pi r$  where  $r = 10$   
 $= 2 \times 3.14 \times 10 = 62.8$   
**A** =  $62.8 \div 2 = 31.4$

semicircle A

$C = 2\pi r$  where  $r = 5$   
 $= 2 \times 3.14 \times 5 = 31.4$   
**B** =  $31.4 \div 2 = 15.7$

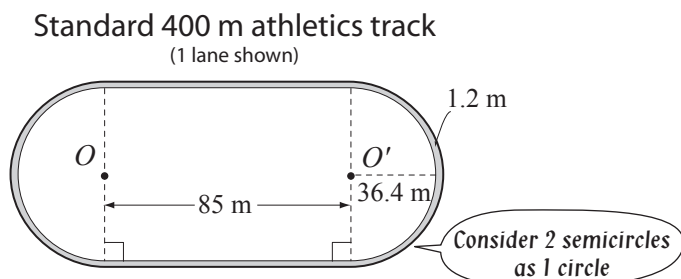
semicircle B

$C = \pi d$  where  $d = 5$   
**D** =  $3.14 \times 5 = 15.7$

circle D

shape =  $31.4 + 15.7 + 15.7$   
 = **62.8 mm**

**a)** Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter around the outside of the first lane of an athletics track.



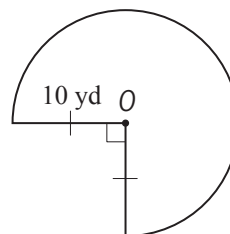
$C = 2\pi r$  where  $r = 36.4 + 1.2 = 37.6$

$C = 2 \times 3.14 \times 37.6 = 236.128$

$85 + 85 = 170$

$P = 236.128 + 170 =$  m

**b)** Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter of the shape.

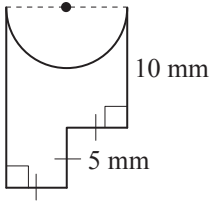


.....  
 .....  
 .....  
 $P =$  yd

**Skill 24.4** Calculating the perimeter of composite circular shapes (2).

MMMaue 11 22 3 4 4  
 MMLime 11 22 3 3 4 4

- c) Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter of the shape.



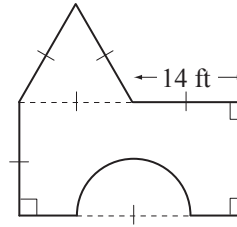
$C = 2\pi r$  where  $r =$  .....

$C =$  .....

$P =$  .....

$=$  ..... = mm

- d) Find the perimeter of the shape.  
 (Use  $\pi \approx \frac{22}{7}$ )



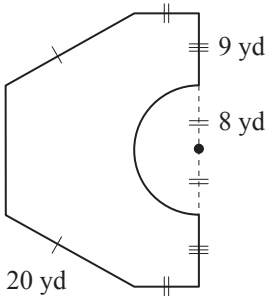
$C = 2\pi r$  .....

.....

$P =$  .....

$=$  ..... = ft

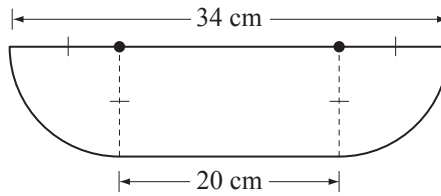
- e) Using  $C = 2\pi r$  where  $\pi \approx 3.14$ , find the perimeter of this composite shape.



$P =$  .....

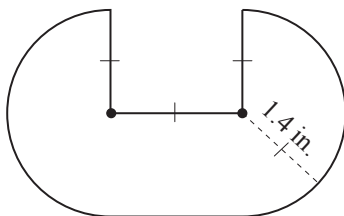
$=$  ..... = yd

- f) Find the perimeter of the shape.  
 (Use  $\pi \approx \frac{22}{7}$ )



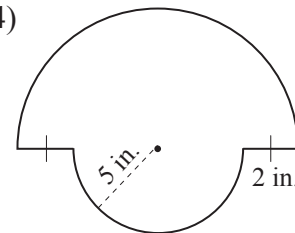
$P =$  ..... = cm

- g) Find the perimeter of the shape.  
 (Use  $\pi \approx \frac{22}{7}$ )



$P =$  ..... = in.

- h) Find the perimeter of the shape.  
 (Use  $\pi \approx 3.14$ )

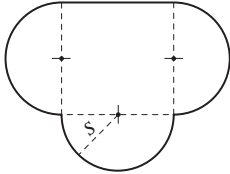


$P =$  ..... = in.

**Skill 24.5** Expressing the perimeter of two-dimensional shapes in algebraic form.

- Find and label the length of all sides where appropriate.
- Break the shape up into workable parts.
- Write the formula for each part separately.
- Add the parts.

**Q.** Write a formula for the perimeter  $P$  of the shape.



**A.**

$$P_1 = s + s$$

$$= 2s$$

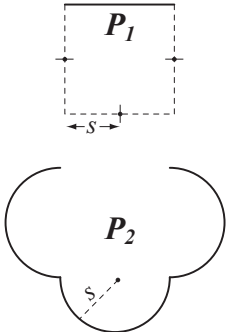
$$P_2 = \frac{3}{2} \cdot 2\pi r \text{ where } r = s$$

$$= \frac{3}{2} \cdot 2\pi s$$

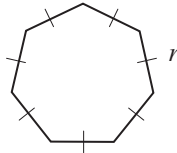
$$= 3\pi s$$

$$P = P_1 + P_2$$

$$= 2s + 3\pi s$$

$$= s(2 + 3\pi)$$


- a)** Write a formula for the perimeter  $P$  of the heptagon.

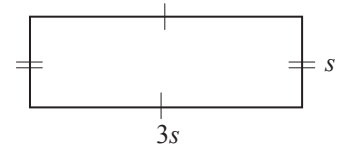


$P =$

.....

$=$   $P =$

- b)** Write a formula for the perimeter  $P$  of the rectangle.

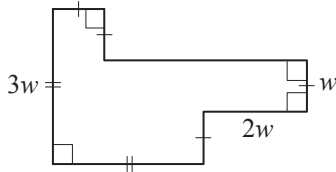


$P =$

.....

$=$   $P =$

- c)** Write a formula for the perimeter  $P$  of the polygon.

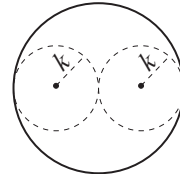


$P =$

.....

$=$   $P =$

- d)** Write a formula for the circumference  $P$  of the outer circle.

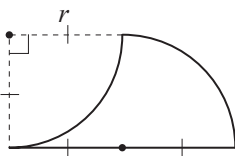


$P =$

.....

$=$   $P =$

- e)** Write a formula for the perimeter  $P$  of the shape.

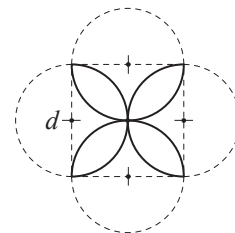


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$P =$   $P =$

- f)** Write a formula for the perimeter  $P$  of the flower shape.



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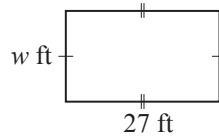
.....

$P =$   $P =$

**Skill 24.6** Finding an unknown side length when the perimeter of a shape is given.

- Draw a diagram if necessary and mark all the information given.
- OR
- Use the appropriate formula to deduce the unknown side length.

**Q.** A rectangular garden bed has a perimeter of 93 ft. If the length is 27 ft, what is the width?



**A.**

$$P = 2l + 2w \text{ where } P = 93 \text{ and } l = 27$$

$$93 = 2 \cdot 27 + 2 \cdot w$$

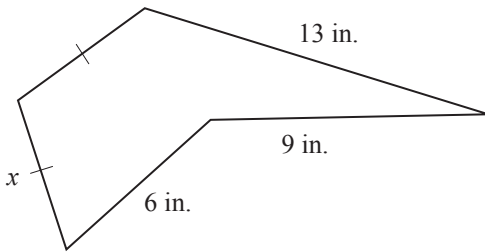
$$93 - 54 = 54 - 54 + 2w$$

$$2w = 39$$

$$\cancel{2}w = \frac{39}{\cancel{2}}$$

$$w = \mathbf{19.5 \text{ ft}}$$

**a)** The perimeter of the pentagon is 39 inches. Find the unknown side length in inches.



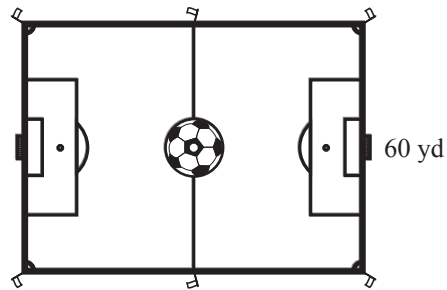
Find  $x$

$$2x + 6 + 9 + 13 = 39$$


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$$x = \frac{39 - 6 - 9 - 13}{2} = \frac{11}{2} = \mathbf{5.5 \text{ in.}}$$

**b)** A rectangular soccer field has a perimeter of 320 yards. Given the width is 60 yards, what is its length?



Use:  $P = 2l + 2w$

$$P =$$


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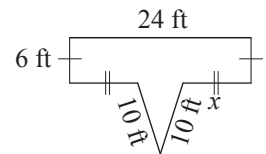

$$= \mathbf{\hspace{2cm}}$$

**c)** The perimeter of a nonagon is 99 mm. What is the side length?

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$$= \mathbf{\hspace{2cm} \text{ mm}}$$

**d)** The perimeter of the shape is 74 feet. Find the unknown side length.



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$$= \mathbf{\hspace{2cm} \text{ ft}}$$

**e)** A rectangular cattle ranch has a perimeter of 80 miles. If the length measures 23 miles, how wide is the fence?

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$$= \mathbf{\hspace{2cm} \text{ mi}}$$

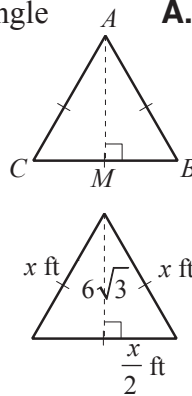
**f)** A rectangular park has a perimeter of 0.9 km. If the park measures 0.2 km in width, how long is the park?

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$$= \mathbf{\hspace{2cm} \text{ km}}$$

- Draw a diagram if necessary and mark all the information given.
- Use the appropriate formula to deduce the perimeter.

**Q.** What is the perimeter of an equilateral triangle with a height of  $6\sqrt{3}$  ft? [Hint: Pythagorean theorem will help.]



**A.**

$$AB^2 = AM^2 + MB^2$$

$$x^2 = (6\sqrt{3})^2 + \left(\frac{x}{2}\right)^2$$

Pythagorean Theorem

$$x^2 = 36 \times 3 + \frac{x^2}{4}$$

Solve for x

$$x^2 - \frac{x^2}{4} = 108$$

$$\frac{3x^2}{4} = 108$$

Simplify:  $\cdot 4$

$$3x^2 = 432$$

Simplify:  $\div 3$

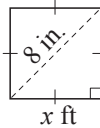
$$x^2 = 144 \text{ so } x = 12$$

$$P = 3x$$

$$= 3 \times 12$$

$$= 36 \text{ ft}$$

**a)** What is the perimeter of a square with a diagonal of 8 inches? [Hint: Pythagorean theorem will help. Reduce the radical to simplest form.]



Pythagorean Theorem

$$x^2 + x^2 = 8^2 \Rightarrow 2x^2 = 64$$

Simplify:  $\div 2$

$$x^2 = 32 \Rightarrow x = \sqrt{32} = \sqrt{16 \times 2} = 4\sqrt{2}$$

$$P = 4x = 4(4\sqrt{2}) \text{ so } P = 16\sqrt{2} \text{ in.}$$

**b)** What is the perimeter of a rectangle with an area of  $90 \text{ mm}^2$  if its length is  $10 \text{ mm}$ ?

.....

.....

..... =

**c)** What is the perimeter of a rectangle with a diagonal of  $26 \text{ mm}$  and a width of  $10 \text{ mm}$ ? [Hint: Pythagorean theorem will help.]

.....

.....

..... =

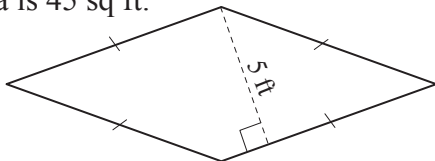
**d)** What is the perimeter of a right triangle with an area of  $6 \text{ in.}^2$  if the longer leg is  $4 \text{ in.}$  long? [Hint: Pythagorean theorem will help.]

.....

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**e)** Find the perimeter of the rhombus given its area is  $45 \text{ sq ft}$ .



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**f)** What is the perimeter of an equilateral triangle with a height of  $9 \text{ in.}$ ? [Hint: Pythagorean theorem will help. Reduce the radical to simplest form.]

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