

GEOMETRY: Rectangles and Squares

Lesson 1 Basic Area and Perimeter

1. PERIMETER OF RECTANGLES AND SQUARES

A **rectangle** is a 4-sided figure with four right angles (90° angles). Opposite sides have the same length.

A **square** is a special kind of rectangle where all four sides have the same length.

The perimeter of a rectangle is the distance around the outside edge of the rectangle. This is calculated as the sum of the lengths of the four sides. (Sum means to add.) Perimeter is measured in linear units such as feet, inches, miles.

The formula is $P = L + L + W + W$.

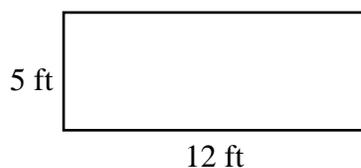
Perimeter is equal to Length + Length + Width + Width.

Example 1 What is the perimeter of a rectangular figure with sides of 5 feet and 12 feet?

- A. 17 ft B. 60 ft C. 29 ft D. 34 ft E. 48 ft

Opposite sides are equal. Add up all four sides. $5 + 5 + 12 + 12 = 34$

Answer: D. 34 ft



Sometimes a question will include a diagram and sometimes it will not. It may help you to draw one if one is not provided.

You will often see the perimeter formula written as $P = 2L + 2W$.

Perimeter is equal to 2 times Length + 2 times Width.

You may also see it written as $P = 2(L + W)$ or $P = 2 \times (L + W)$.

Perimeter is equal to 2 times the sum of Length + Width.

The good news is you don't really need a formula at all. If you understand what perimeter is, you will know that you have to add up the lengths of the four sides.

Example 2 What is the perimeter of a square field that has a length of 100 yards?

- A. 100 yd B. 200 yd C. 300 yd D. 400 yd E. 500 yd

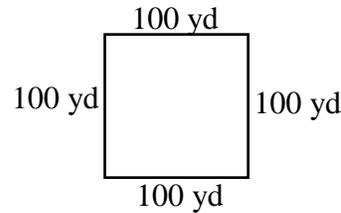
Remember that in a square all four sides have equal lengths. If you are given the length of 1 side, add it up 4 times, or multiply the length $\times 4$ to calculate perimeter.

All four sides of a square have the same length.

$$100 + 100 + 100 + 100 = 400 \text{ yd}$$

OR $4 \times 100 = 400 \text{ yd}$

Answer: D. 400 yd



Example 3 Which expression shows how many feet of framing are needed to make a frame for a picture that measures 8 feet by 3 feet?

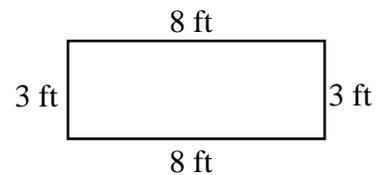
- A. $8 + 3$ B. $(2 \times 8) + (2 \times 3)$ C. 8×3 D. $4 \times (8 + 3)$ E. 11×11

This question asks for an expression, not a numerical answer.

Add up the four sides: $3 + 3 + 8 + 8$

$3 + 3 + 8 + 8$ is not one of the answer choices, but B. $(2 \times 8) + (2 \times 3)$ has the same value.

Answer: B. $(2 \times 8) + (2 \times 3)$



TIP – If you know that the perimeter is $3 + 3 + 8 + 8 = 22$ feet, but aren't sure which of the multiple choice answers is correct, calculate the value of each multiple choice answer until you find one that is equal to 22.

NOTE – Dimensions are sometimes given without the words length and width, like in Example 3, where it says 8 feet by 3 feet.

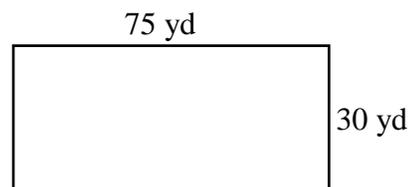
Example 4 A rectangular field measures 30 yards wide and 75 yards long. How many yards will Lina run if she runs around the field 6 times?

- A. 210 B. 1,260 C. 13,500 D. 105 E. 630

First, get the perimeter: $30 + 30 + 75 + 75 = 210 \text{ yd}$. This is the number of yards she runs when she goes around the field one time.

Next, multiply $210 \times 6 = 1,260 \text{ yd}$, because she runs around the field 6 times.

Answer: B. 1,260 yd



Example 5 John needs to put framing around his window. If the window is 12 inches wide and 24 inches long, how many feet of framing should he buy?

- A. 72 ft B. 36 ft C. 288 ft D. 48 ft E. 6 ft

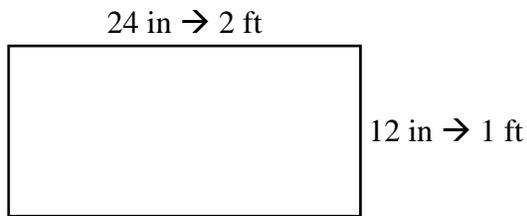
Notice that the problem gives the dimensions in inches, and asks for an answer in feet, so convert the inches to feet and add up the sides. There are 12 inches in a foot, so divide by 12 to get feet.

$$24 \text{ in} \div 12 = 2 \text{ ft}$$

$$12 \text{ in} \div 12 = 1 \text{ ft}$$

$$1 + 1 + 2 + 2 = 6 \text{ ft}$$

Answer E: 6 ft



OR Add up the sides in inches and then convert to feet.

$$12 + 12 + 24 + 24 = 72 \text{ in}$$

$$72 \div 12 = 6 \text{ ft} \quad \textbf{Answer E: 6 ft}$$

Basic Distance Conversions To Memorize:

1 foot = 12 inches

1 yard = 3 feet

1 yard = 36 inches

NOTE: The first 2 conversions will be provided on the HiSET formula sheet. The third conversion will not be provided.

Practice One *Answers – p. 11 It may be helpful to draw a diagram.*

1. Tom wants to fence in his backyard. If the backyard is 30 feet wide and 15 feet long, how many feet of fence will he need to buy?

- A. 45 ft B. 90 ft C. 450 ft D. 75 ft E. 540 ft

2. What is the perimeter, in yards, of a room that is 10 yards wide and 18 yards long?

- A. 180 B. 28 C. 65 D. 112 E. 56

3. Which expression shows how many inches of framing will be needed to frame a picture that is 8 inches wide and 20 inches long?

- A. $2 \times (8 + 20)$ B. $8 + 20$ C. 8×20 D. $2 \times (8 \times 20)$ E. $2 \times 8 + 20$

4. A square tablecloth is to be trimmed with a lace border. If the tablecloth is 3 feet wide, and lace trim costs \$2.99 per foot, how much will the lace trim cost?

- A. \$12.00 B. \$23.92 C. \$8.97 D. \$35.88 E. \$12.99

5. The edge of a bulletin board will be trimmed with ribbon. How many inches of ribbon will be needed if the bulletin board is 5 feet wide and 2 feet long?

- A. 14 in B. 186 in C. 40 in D. 336 in E. 168 in

2. AREA OF RECTANGLES AND SQUARES

The area of a rectangle is the amount of flat space inside the perimeter. It is calculated by multiplying length x width, and is measured in square units such as square inches, square feet, square yards.

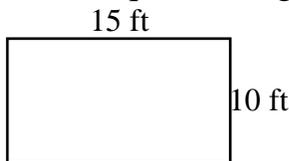
The formula is $A = L \times W$

Area is equal to Length times Width.

Example 1 Tiffany wants to put new tile down in her kitchen, which is 15 feet long and 10 feet wide. How many square feet of tile should she buy?

- A. 150 B. 25 C. 50 D. 60 E. 145

Area is equal to length times width, so multiply $15 \times 10 = 150$ sq ft



Answer: A. 150 sq ft

Don't confuse area and perimeter.

Perimeter is the distance around the outside edge of the rectangle, and is calculated by **adding up the lengths of all four sides.**

Area is the amount of space inside the rectangle, and is calculated by **multiplying two numbers, the length times the width.**

Example 2 What is the area of a square room that has a length of 12 feet?

- A. 48 sq ft B. 24 sq ft C. 50 sq ft D. 144 sq ft E. 441 sq ft

All 4 sides of a square are equal, so length and width are both 12.

Area is equal to length times width, so multiply $12 \times 12 = 144$ sq ft

Answer: D. 144 sq ft

Example 3 Which expression shows how many square inches of glass will be needed to replace a broken window that is 60 inches by 20 inches?

- A. $60 + 20$ B. $60 + 60 + 20 + 20$ C. 60×20
D. $4 \times (60 + 20)$ E. $\frac{60 \times 20}{4}$

Multiply length of 60 x width of 20 to get square inches. **Answer: C. 60 x 20**

Example 4 Goodtimes Daycare is building a new play area, which needs to be 300 square feet. If the width has to be 20 feet, what will the length be?

- A. 30 ft B. 40 ft C. 15 ft D. 600 ft E. 6,000 ft

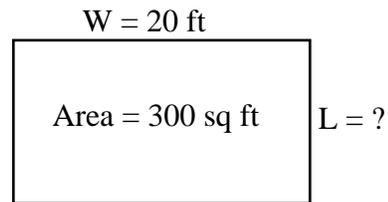
The formula for area is: $\text{Area} = L \times W$.

The problem tells you that area = 300 and width = 20.

Plug those numbers into the formula: $300 = L \times 20$.

Divide to get the length. $300 \div 20 = 15 \text{ ft}$

Answer: C. 15 ft



OR You can use trial and error. The problem tells you that area is 300 sq ft and width is 20 ft. Each multiple choice answer is a possible length.

Test each possible length by multiplying times the 20 ft width, and see if you get the desired 300 sq ft area.

Try A. 30 ft 30×20 does not = 300, so 30 is not the correct length.

Try B. 40 ft 40×20 does not = 300, so 40 is not the correct length.

Try C. 15 ft 15×20 does = 300, so **C. 15 ft is the correct length.**

CAREFUL – Most area problems provide length and width and ask you to calculate area. Example 4 provides area and width, and asks you to calculate length. Read carefully to make sure you are calculating what the question asks for. A very common mistake in this type of problem is to think that 20 and 300 are length and width, and then multiply.

Example 5 It costs \$10 per square yard to have carpeting installed. If an apartment complex is installing new carpet in 12 living rooms that each measure 5 yards by 10 yards, how much will it cost?

- A. \$500 B. \$5,000 C. \$600 D. \$1,200 E. \$6,000

Step 1 – Calculate the area of 1 living room. $5 \times 10 = 50 \text{ sq yd}$

Step 2 – Calculate the cost of 1 living room. $50 \text{ sq yd} \times \$10 \text{ per sq yd} = \$500$

Step 3 – Calculate the cost of 12 living rooms. $12 \times \$500 = \$6,000$

Answer: E. \$6,000

OR

Step 1 – Calculate the area of 1 living room. $5 \times 10 = 50 \text{ sq yd}$

Step 2 – Calculate the area of 12 living rooms. $12 \times 50 \text{ sq yd} = 600 \text{ sq yd}$

Step 3 – Calculate the cost of 600 sq yd. $600 \text{ sq yd} \times \$10 \text{ per yd} = \$6,000$

Answer: E. \$6,000

Example 6 Ebony wants to make a cardboard sign to fit inside a frame that is 36 inches wide and 48 inches tall. How many square feet of cardboard should she buy?

- A. 84 sq ft B. 12 sq ft C. 1,728 sq ft D. 168 sq ft E. 14 sq ft

Notice that the dimensions are given in inches and the answer needs to be in square feet. So, convert the inches to feet, and then get area.

There are 12 inches in 1 foot, so divide by 12 to convert inches to feet.

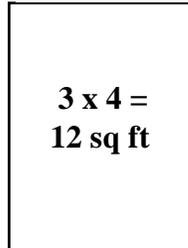
$$36 \text{ in} \div 12 = 3 \text{ ft}$$

$$48 \text{ in} \div 12 = 4 \text{ ft}$$

$$\text{Area} = L \times W = 3 \times 4 = \mathbf{12 \text{ sq ft}}$$

Answer: B. 12 sq ft

$$36 \text{ in} \rightarrow 3 \text{ ft}$$



For area problems, it is usually easier to convert first, then multiply, as just shown, but you could also get the area in square inches first and then convert to square feet.

$$36 \times 48 = 1,728 \text{ square inches.}$$

Divide by 144 to get square feet.

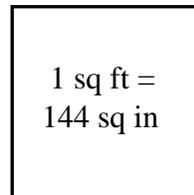
$$1,728 \div 144 = 12 \text{ sq ft}$$

Answer: B. 12 sq ft

NOTE – When you convert an area from square inches to square feet, you divide by 144, because there are 144 square inches in 1 square foot.

$$1 \text{ ft} = 12 \text{ in}$$

A square foot is 12 inches on each side, so the area of 1 square foot is the same as 12 in x 12 in = 144 sq in.



A common mistake is to divide by 12 because we are used to thinking that there are 12 inches in 1 foot. And there are, however, only when referring to linear feet.

The conversion for linear feet, used to measure perimeter or distance, is 1 ft = 12 in.

The conversion for square feet, used to measure area, is 1 sq ft = 144 sq in.

So, dividing by 12 is not correct because there are 144 square inches in 1 square foot, not 12 square inches. The mistake comes from confusing linear inches with square inches.

Practice Two Answers – p. 12 It may be helpful to draw a diagram.

1. What is the area of a rectangular table that is 14 feet long and $2\frac{1}{2}$ feet wide?
A. 33 sq ft B. $49\frac{1}{2}$ sq ft C. 35 sq ft D. 70 sq ft E. $16\frac{1}{2}$ sq ft
2. Which expression shows how many square inches of tile are needed to cover a kitchen backsplash that is 50 inches long and 12 inches wide?
A. $50 + 12$ B. $2 \times (50 + 12)$ C. $\frac{50 \times 12}{4}$ D. 50×12 E. $\frac{2(50+12)}{4}$
3. If the area of a floor is 660 square feet, and the length is 30 feet, what is the width of the floor?
A. 600 ft B. 20 ft C. 22 ft D. 165 ft E. 25 ft
4. How many square yards of material are in a blanket that measures 12 ft by 6 ft?
A. 72 sq yd B. 36 sq yd C. 18 sq yd D. 6 sq yd E. 8 sq yd
5. How much will it cost to carpet a room that measures 28 feet by 20 feet if carpeting costs \$2.75 per square foot?
A. \$560 B. \$1,540 C. \$1,450 D. \$264 E. \$528

3. AREA VS. PERIMETER

REMEMBER: Perimeter is the distance around the edge.

Area is the amount of flat space inside the edge.

Perimeter: add up the lengths of 2 long sides plus 2 short sides. **Add up 4 numbers.**

Area: multiply the long side times the short side. **Multiply 2 numbers.**

It doesn't matter if the sides of a rectangle are called width, height, or length.

A rectangle has 2 short sides and 2 long sides.

For perimeter, add up 2 short sides plus 2 long sides.

For area, multiply 1 long side times 1 short side.

Before you do a problem, decide if you are calculating area or perimeter. It may help to draw a picture.

**If you want length or distance around something, it is a perimeter problem.

**If you want how much of something is needed to cover something else, it is an area problem.

**Look at what the problem is asking for. If a problem asks how many square inches, square feet, or square anything, then you know it is an area problem.

Practice Three Answers – p. 14

1. Label each as area (A) or perimeter (P).

- a) Baseboard around the room____
- b) Amount of sod needed to cover a field____
- c) Crown molding around the ceiling____
- d) Amount of tile to cover a kitchen floor____
- e) Size of glass in a picture frame____
- f) Pathway around a garden____
- g) Distance around the edge of a picture frame____
- h) Wallpaper to cover a whole wall____
- i) Size of carpet to cover the floor of a room____
- j) Lace to trim the edge of a tablecloth____
- k) Length of a fence to go around a garden____
- l) Square feet of paneling to cover a wall____
- m) Distance run around a field____
- n) Walkway around a swimming pool____

2. Damon is installing a fence around a square playground that is 20 yards wide. How much fencing will he need?

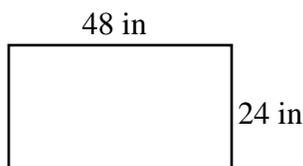
- A. 80 yd B. 400 yd C. 40 yd D. 60 yd E. 75 yd

3. A large living room with a hardwood floor measures 40 feet long and 26 feet wide. How much will it cost to refinish the floor if the charge is \$3 per square foot?

- A. \$1,040 B. \$3,210 C. \$396 D. \$3,120 E. \$198

4. Lara has a fancy frame that she wants to put a mirror in and then hang over her couch. If the frame is 48 inches long and 24 inches wide, how many square feet of mirror should she buy?

- A. 1,152 sq ft B. 144 sq ft C. 96 sq ft D. 12 sq ft E. 8 sq ft



5. The fabric required for one drapery panel measures 5 yards by 14 yards. Which expression shows how much it will cost to buy fabric for 8 panels if the fabric costs \$4.50 per square yard?

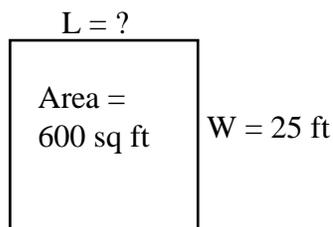
- A. $5 \times 14 \div 8 \times \4.50 B. $5 \times 14 \times 8 \times \4.50 C. $8 \times (5 + 14) \times \4.50
D. $(19 \times 2) \times 8 \times \4.50 E. $5 \times 14 \times 8 \div \4.50

6. A walking path has been built around the outside edge of an athletic field that measures 75 yards by 35 yards. Which expression shows how many yards would be traveled by walking around the pathway one time?

- A. 75×35 B. $75 + 35$ C. $2 \times (75 + 35)$ D. $2 \times 75 + 35$ E. 110×4

7. Jerome wants his new patio to be 600 square feet. If the width has to be 25 feet, what will the length be?

- A. 625 ft B. 575 ft C. 24 ft D. 50 ft E. 75 ft



8. Which expression shows the cost to tile a bathroom floor that measures 10 feet by 7 feet if the tile costs \$6.25 per square foot?

- A. $\frac{10 + 7}{\$6.25}$ B. $(10 + 10 + 7 + 7) \times \6.25 C. $10 \times 7 \times \$6.25$
D. $\frac{2 \times (10 + 7)}{\$6.25}$ E. $10 \times 7 \div \$6.25$

9. Leroy wants to make a vegetable garden in his side yard. It has to be 4 feet wide, and he wants it to cover an area of 60 square feet. How long should the garden be?

- A. 15 ft B. 240 ft C. 64 ft D. 128 ft E. 12 ft

10. Emmanuel is putting anti-slip tape around the edge of his swimming pool. If the pool is 30 yards wide and 75 yards long, how many feet of tape will he need?

- A. 210 ft B. 2,250 ft C. 420 ft D. 630 ft E. 70 ft

11. The Hillside Playground has a path around the outside that people use for jogging. The dimensions of the playground are 100 yards wide and 80 yards long. How many yards does Jerome run if he runs around the playground 5 times?

- A. 360 yd B. 1,800 yd C. 180 yd D. 900 yd E. 8,000 yd

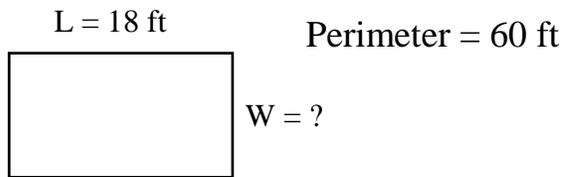
12. Sandria is making a bulletin board with a decorative ribbon border. The board is 20 inches long and 30 inches wide, and she needs to run the ribbon around the edge 3 times to make it look nice. How much ribbon will she need?

- A. 600 in B. 50 in C. 100 in D. 200 in E. 300 in

***** → Multi-Step Challenger ← ***** *Answer – p. 18*

A room has a perimeter of 60 feet and a length of 18 feet. If carpeting costs \$29 per square yard, how much will it cost to carpet the room?

- A. \$31,320 B. \$2,262 C. \$696 D. \$1,944 E. \$12,528



ANSWER KEY Lesson 1 Area & Perimeter

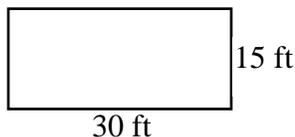
Practice One

1. Tom wants to fence in his backyard. If the backyard is 30 feet wide and 15 feet long, how many feet of fence will he need to buy?

- A. 45 ft **B. 90 ft** C. 450 ft D. 75 ft E. 540 ft

The fence goes around the outside edge of the backyard, so it is the same as perimeter. Opposite sides are equal. Add up all four sides. $15 + 15 + 30 + 30 = 90$ ft

Answer: B. 90 ft



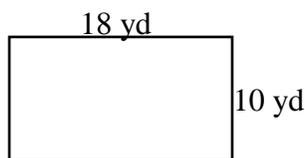
2. What is the perimeter, in yards, of a room that is 10 yards wide and 18 yards long?

- A. 180 B. 28 C. 65 D. 112 **E. 56**

The question asks for perimeter, so make sure you know the meaning of the word perimeter. Perimeter means to calculate the distance around the outside edge.

Opposite sides are equal. Add up all four sides. $10 + 10 + 18 + 18 = 56$ yd

Answer: E. 56 yd



3. Which expression shows how many inches of framing will be needed to frame a picture that is 8 inches wide and 20 inches long?

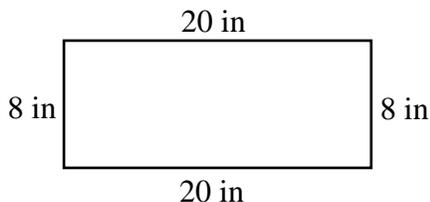
- A. **$2 \times (8 + 20)$** B. $8 + 20$ C. 8×20 D. $2 \times (8 \times 20)$ E. $2 \times 8 + 20$

Framing goes around the edge of a picture, so find an expression for perimeter.

Opposite sides are equal. Add up the four sides. $8 + 8 + 20 + 20$

Remember, this can also be expressed as $(2 \times 8) + (2 \times 20)$ or $2 \times (8 + 20)$.

Answer: A. $2 \times (8 + 20)$



4. A square tablecloth is to be trimmed with a lace border. If the tablecloth is 3 feet wide, and lace trim costs \$2.99 per foot, how much will the lace trim cost?

- A. \$12.00 B. \$23.92 C. \$8.97 **D. \$35.88** E. \$12.99

Trimming goes around the edge, so calculate perimeter.

In a square, all four sides are equal, so perimeter is:

$$3 + 3 + 3 + 3 = 12 \text{ ft.}$$

OR $3 \times 4 = 12 \text{ ft.}$

Multiply x cost per foot. $12 \times \$2.99 = \35.88

Answer: D. \$35.88

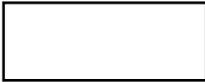
5. The edge of a bulletin board will be trimmed with ribbon. How many inches of ribbon will be needed if the bulletin board is 5 feet wide and 2 feet long?

- A. 14 in B. 186 in C. 40 in D. 336 in **E. 168 in**

The ribbon is going around the edge, so calculate perimeter.

Notice that the dimensions of the bulletin board are given in feet, and the question asks for the amount of ribbon in inches.

Convert the feet to inches, then add up the four sides.

$5 \text{ ft} \times 12 = 60 \text{ in}$ $5 \text{ ft} = 60 \text{ in}$
 $2 \text{ ft} \times 12 = 24 \text{ in}$  $2 \text{ ft} = 24 \text{ in}$

$$60 + 60 + 24 + 24 = 168 \text{ inches}$$

Answer: E. 168 in

OR, Add up the four sides in feet, and then convert to inches.

$$5 + 5 + 2 + 2 = 14 \text{ ft}$$

$$14 \text{ ft} \times 12 = 168 \text{ inches}$$

Answer: E. 168 in

Practice Two

1. What is the area of a rectangular table that is 14 feet long and $2 \frac{1}{2}$ feet wide?

- A. 33 sq ft B. $49 \frac{1}{2}$ sq ft **C. 35 sq ft** D. 70 sq ft E. $16 \frac{1}{2}$ sq ft

Area is asked for. Be sure you know that area of a rectangle means length x width.

$$14 \times 2 \frac{1}{2} = 35 \text{ sq ft}$$

Answer: C. 35 sq ft

TIP – Enter $2 \frac{1}{2}$ as 2.5 on the calculator.

Or, enter as a mixed number using the abc key. 2 abc 1 abc 2

2. Which expression shows how many square inches of tile are needed to cover a kitchen backsplash that is 50 inches long and 12 inches wide?

- A. $50 + 12$ B. $2 \times (50 + 12)$ C. $\frac{50 \times 12}{4}$ **D. 50×12** E. $\frac{2(50+12)}{4}$

Tile to cover a surface means area.

Also note that the question asks for the answer in square inches, not in inches. When an answer is asked for in square anything, it means to calculate area.

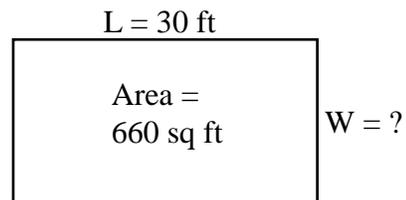
Area = L x W A = 50 x 12 **Answer: D. 50 x 12**

3. If the area of a floor is 660 square feet, and the length is 30 feet, what is the width of the floor?

- A. 600 ft B. 20 ft **C. 22 ft** D. 165 ft E. 25 ft

Notice that you are not asked to calculate area. You are given area and length, and asked to calculate width.

A = L x W Write out the formula.
 660 = 30 x W Plug in the area and length given in the problem.
 660 ÷ 30 = 22 ft Divide to get the width.



Answer: C. 22 ft

OR Use trial and error to see which of the 5 possible widths will give you 660 sq ft when multiplied x the 30 ft length.

- Try A. 600 ft 30 x 600 does not = 660, so 600 ft is not the correct width.
 Try B. 20 ft 30 x 20 does not = 660, so 20 ft is not the correct width.
 Try C. 22 ft 30 x 22 does = 660, so **C. 22 ft is the correct width.**

4. How many square yards of material are in a blanket that measures 12 ft by 6 ft?

- A. 72 sq yd B. 36 sq yd C. 18 sq yd D. 6 sq yd **E. 8 sq yd**

The amount of material in a blanket covers a surface, so calculate area.

Note that the blanket dimensions are given in feet, and the answer is asked for in square yards.

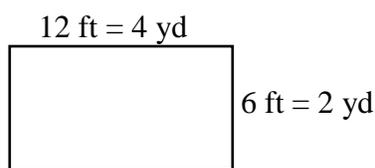
Convert the feet to yards, then multiply length x width to get area.

$12 \text{ ft} \div 3 = 4 \text{ yd}$

$6 \text{ ft} \div 3 = 2 \text{ yd}$

$4 \times 2 = 8 \text{ sq yd}$

Answer: E. 8 sq yd



5. How much will it cost to carpet a room that measures 28 feet by 20 feet if carpeting costs \$2.75 per square foot?

- A. \$560 **B. \$1,540** C. \$1,450 D. \$264 E. \$528

Carpet covers a floor surface, so calculate area.

$$\text{Area} = L \times W \quad A = 28 \times 20 = 560 \text{ sq ft}$$

$$\text{Multiply sq ft} \times \text{cost per sq ft. } 560 \times \$2.75 = \$1,540$$

Answer: B. \$1,540

Practice Three

1. Label each as area (A) or perimeter (P).

- a) Baseboard around the room **P**
- b) Amount of sod needed to cover a field **A**
- c) Crown molding around the ceiling **P**
- d) Amount of tile to cover a kitchen floor **A**
- e) Size of glass in a picture frame **A**
- f) Pathway around a garden **P**
- g) Distance around the edge of a picture frame **P**
- h) Wallpaper to cover a whole wall **A**
- i) Size of carpet to cover the floor of a room **A**
- j) Lace to trim the edge of a tablecloth **P**
- k) Length of a fence to go around a garden **P**
- l) Square feet of paneling to cover a wall **A**
- m) Distance run around a field **P**
- n) Walkway around a swimming pool **P**

2. Damon is installing a fence around a square playground that is 20 yards wide. How much fencing will he need?

- A. 80 yd** B. 400 yd C. 40 yd D. 60 yd E. 75 yd

The fence goes around the edge of the playground, so calculate perimeter.

A square is the same length on all four sides. Add up the four sides.

$$20 + 20 + 20 + 20 = 80 \quad \text{OR} \quad 4 \times 20 = 80 \quad \text{Answer: A. 80 yards}$$

3. A large living room with a hardwood floor measures 40 feet long and 26 feet wide. How much will it cost to refinish the floor if the charge is \$3 per square foot?
 A. \$1,040 B. \$3,210 C. \$396 **D. \$3,120** E. \$198

The surface of a floor is area.

First calculate the number of square feet, then multiply x the cost per square foot.

$$\text{Area} = L \times W \quad 40 \times 26 = 1,040 \text{ sq ft}$$

$$1,040 \text{ sq ft} \times \$3 = \$3,120 \quad \text{Answer: D. } \$3,120$$

4. Lara has a fancy frame that she wants to put a mirror in and then hang over her couch. If the frame is 48 inches long and 24 inches wide, how many square feet of mirror should she buy?

- A. 1,152 sq ft B. 144 sq ft C. 96 sq ft D. 12 sq ft **E. 8 sq ft**

The mirror covers the space inside the frame, so calculate area.

Note that the dimensions are given in inches, and the answer is asked for in square feet.

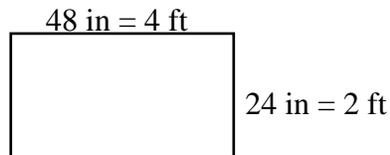
Convert inches to feet, then multiply to get area in square feet.

$$48 \text{ in} \div 12 = 4 \text{ ft}$$

$$24 \text{ in} \div 12 = 2 \text{ ft}$$

$$\text{Area} = L \times W \quad A = 4 \times 2 = 8 \text{ sq ft}$$

Answer: E. 8 sq ft



5. The fabric required for one drapery panel measures 5 yards by 14 yards. Which expression shows how much it will cost to buy fabric for 8 panels if the fabric costs \$4.50 per square yard?

- A. $5 \times 14 \div 8 \times \4.50 **B. $5 \times 14 \times 8 \times \4.50** C. $8 \times (5 + 14) \times \4.50
 D. $(19 \times 2) \times 8 \times \4.50 E. $5 \times 14 \times 8 \div \4.50

An amount of fabric is area.

Determine area in sq yd of one panel: 5×14

Multiply x 8 panels to get total sq yd needed: $5 \times 14 \times 8$

Multiply x \$4.50 per sq yd to get total cost: $5 \times 14 \times 8 \times \4.50

Answer: B. $5 \times 14 \times 8 \times \4.50

6. A walking path has been built around the outside edge of an athletic field that measures 75 yards by 35 yards. Which expression shows how many yards would be traveled by walking around the pathway one time?

- A. 75×35 B. $75 + 35$ C. **$2 \times (75 + 35)$** D. $2 \times 75 + 35$ E. 110×4

The pathway is around the edge of the field, so calculate perimeter.

Add up the four sides: $75 + 75 + 35 + 35$

This can also be written as: $2 \times (75 + 35)$ or $(2 \times 75) + (2 \times 35)$

Answer: C. $2 \times (75 + 35)$

TIP – What if you know that the perimeter is $75 + 75 + 35 + 35$, but aren't sure which of the answer choices is the same as that? Calculate the value of your answer, then calculate the value of each answer choice until you get one that matches.

Calculate the value of your answer: $75 + 75 + 35 + 35 = 220$

Try Answer A. $75 \times 35 = 2,625$ No Match.

Try Answer B. $75 + 35 = 110$ No Match.

Try Answer C. $2 \times (75 + 35) = 220$ Matches 220, the value of your answer.

Answer: C. $2 \times (75 + 35)$

NOTE – Answer D is not correct because Order of Operations rules tell you to multiply 2×75 first, and then add 35, to get 185.

Answer C is correct because Order of Operations rules tell you to first do what is inside the parentheses, and then multiply $\times 2$, to get 220.

7. Jerome wants his new patio to be 600 square feet. If the width has to be 25 feet, what will the length be?

- A. 625 ft B. 575 ft C. **24 ft** D. 50 ft E. 75 ft

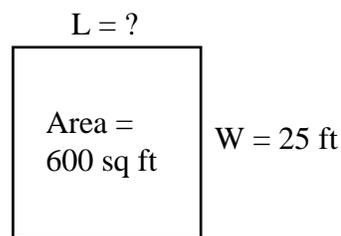
This is an area problem where you are given area and width, and asked to calculate length.

Area = $L \times W$

$600 = L \times 25$

Divide to get L. $600 \div 25 = 24$

Answer: C. 24 ft



OR You can use trial and error to see which of the 5 possible answers will give you 600 sq ft when multiplied \times the 25 ft width.

Try A. 625×25 does not = 600, so 625 ft is not the correct length.

Try B. 575×25 does not = 600, so 575 ft is not the correct length.

Try C. 24×25 does = 600, so **C. 24 ft is the correct length.**

8. Which expression shows the cost to tile a bathroom floor that measures 10 feet by 7 feet if the tile costs \$6.25 per square foot?

- A. $\frac{10 + 7}{\$6.25}$ B. $(10 + 10 + 7 + 7) \times \6.25 C. **$10 \times 7 \times \$6.25$**
D. $\frac{2 \times (10 + 7)}{\$6.25}$ E. $10 \times 7 \div \$6.25$

The amount of tile to cover a floor is area.

Calculate the number of square feet, which is L x W: 10×7

Multiply x \$6.25 per square foot to get cost: $10 \times 7 \times \$6.25$

Answer: C. $10 \times 7 \times \$6.25$

9. Leroy wants to make a vegetable garden in his side yard. It has to be 4 feet wide, and he wants it to cover an area of 60 square feet. How long should the garden be?

- A. **15 ft** B. 240 ft C. 64 ft D. 128 ft E. 12 ft

This is an area problem where you are given the area and the width, and asked to calculate the length.

Area = L x W $60 = L \times 4$

Divide to get L. $60 \div 4 = 15$ **Answer: A. 15 ft**

OR Use trial and error as shown in problem #8 above.

10. Emmanuel is putting anti-slip tape around the edge of his swimming pool. If the pool is 30 yards wide and 75 yards long, how many feet of tape will he need?

- A. 210 ft B. 2,250 ft C. 420 ft D. **630 ft** E. 70 ft

Tape goes around the edge, so calculate perimeter.

Notice that the dimensions are given in yards, and the answer is asked for in feet.

Convert yards to feet, then calculate perimeter.

There are 3 feet in each yard so multiply yards x 3 to get feet.

$30 \text{ yards} \times 3 = 90 \text{ ft}$

$75 \text{ yards} \times 3 = 225 \text{ ft}$

Perimeter is $90 + 90 + 225 + 225 = 630 \text{ ft}$ **Answer: D. 630 ft**

OR Calculate perimeter in yards, then convert answer to feet:

Perimeter is $30 + 30 + 75 + 75 = 210 \text{ yards}$

There are 3 feet in each yard so multiply yards x 3 to get feet. $210 \times 3 = 630 \text{ ft}$

Answer: D. 630 ft

11. The Hillside Playground has a path around the outside that people use for jogging. The dimensions of the playground are 100 yards wide and 80 yards long. How many yards does Jerome run if he runs around the playground 5 times?

- A. 360 yd **B. 1,800 yd** C. 180 yd D. 900 yd E. 8,000 yd

This is the distance around something, so calculate perimeter.

$$100 + 100 + 80 + 80 = 360$$

360 yards is once around the playground.

Multiply x 5 because he runs around 5 times. $5 \times 360 = 1,800$

Answer: B. 1,800 yd

12. Sandria is making a bulletin board with a decorative ribbon border. The board is 20 inches long and 30 inches wide, and she needs to run the ribbon around the edge 3 times to make it look nice. How much ribbon will she need?

- A. 600 in B. 50 in C. 100 in D. 200 in **E. 300 in**

The ribbon goes around the edge, so this is perimeter.

Perimeter is $20 + 20 + 30 + 30 = 100$ inches.

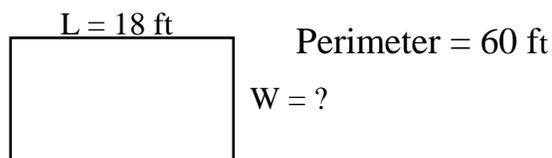
100 inches goes around the perimeter once. Multiply x 3 to go around 3 times.

$3 \times 100 = 300$ **Answer: E. 300 in**

***** → Multi-Step Challenger ← *****

A room has a perimeter of 60 feet and a length of 18 feet. If carpeting costs \$29 per square yard, how much will it cost to carpet the room?

- A. \$31,320 B. \$2,262 **C. \$696** D. \$1,944 E. \$12,528



To solve this problem, you must first get area of the room in square yards, and then multiply x cost per square yard.

Step 1 – Figure out the Width (so you can calculate area)

You have to use the perimeter and length that are given to get the width you need.

$$P = L + L + W + W$$

$$60 = 18 + 18 + W + W$$

Subtract to get the size of both widths: $60 - 18 - 18 = 24 \text{ ft}$

(If you subtract both lengths from the total perimeter, you are left with both widths.)

24 ft is for both widths, so divide by 2 to get one width: $24 \div 2 = 12 \text{ ft} = W$

Step 2 – Convert Feet to Yards

Now you know $L = 18$ ft and $W = 12$ ft. But, you need sq yd, not sq ft, because the cost is given in sq yd. So, convert L and W to yards before calculating the area.

$$18 \text{ ft} \div 3 = 6 \text{ yd} \quad \text{and} \quad 12 \text{ ft} \div 3 = 4 \text{ yd}$$

Step 3 – Calculate Number of Square Yards

Calculate area in sq yd. $6 \times 4 = 24$ sq yd

Step 4 – Calculate Cost

Calculate cost by multiplying total sq yd x cost per sq yd. $24 \times \$29 = \696

Answer: C. \$696

NOTE – In Step 1, if you're not sure what to do once you get to

$$60 = 18 + 18 + W + W, \text{ try the "guess and check" method.}$$

Take a guess at what width might be, and see if it works.

Guess that width is 8.

Does $18 + 18 + 8 + 8 = 60$? No, it equals 52. Too small, try a bigger number.

Guess that width is 14.

Does $18 + 18 + 14 + 14 = 60$? No it equals 64. Too big, try a smaller number.

Guess that width is 12.

Does $18 + 18 + 12 + 12 = 60$? Yes, it equals 60, so 12 is the correct width.