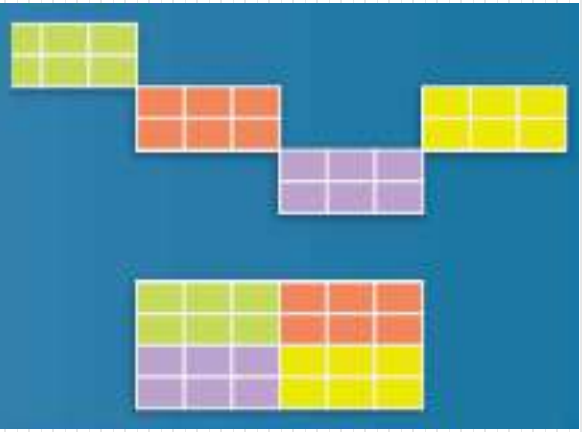
1.7 - Area & Perimeter

You and your friend have two choices for a wall decoration. You say the decoration on the top will use more wall space. Your friend says the two decorations will use the same amount of wall space. Who is correct? Explain.



Pearson Geometry Common Core 2015 ©

Your friend is correct! There is an equal amount of wall space or area taken up by both decorations. The four rectangles at the top can be rearranged to fit exactly inside the bottom picture.

Perimeter or Area?

1. Wallpaper for a bedroom.
2. Crown molding for a ceiling
3. Fencing for a backyard.
4. Paint for a basement floor.

- Area
- Perimeter
- Perimeter
- Area

For your viewing pleasure…

- Perimeter vs. Area
  http://www.schooltube.com/video/596aef63f77e41818f93/Animated%20Math%20Vocabulary:%20Area%20and%20Perimeter (0:48)

- Where does $A = \pi r^2$ come from?
  https://www.youtube.com/watch?v=YokKp3pwVFc (2:47)

Fórmulas son muy importantes!

take note

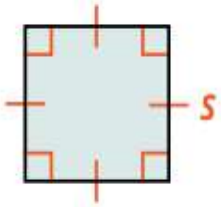
Key Concept Perimeter, Circumference, and Area

Square

side length s

$P =$ _____

$A =$ _____

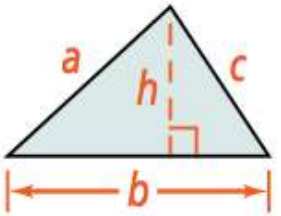


Triangle

side lengths a, b, and c, base b, and height h

$P =$ _____

$A =$ _____

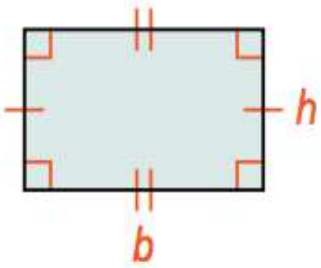


Rectangle

base b and height h

$P = 2b + 2h$, or _____

$A =$ _____

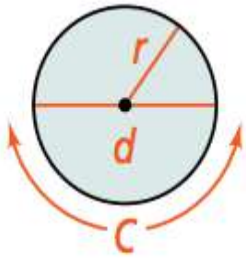


Circle

radius r and diameter d

$C =$ _____

$A =$ _____



Twedledum and Twedledee, around the circle is pi times d.
If the area is declared, remember the formula, pi r squared!

Using Formulas… Examples

1. Find the area of a square whose perimeter is 48 in.

   $P = 4s$

   $\frac{48}{4} = \frac{4s}{4}$

   $12 \text{ in.} = s$

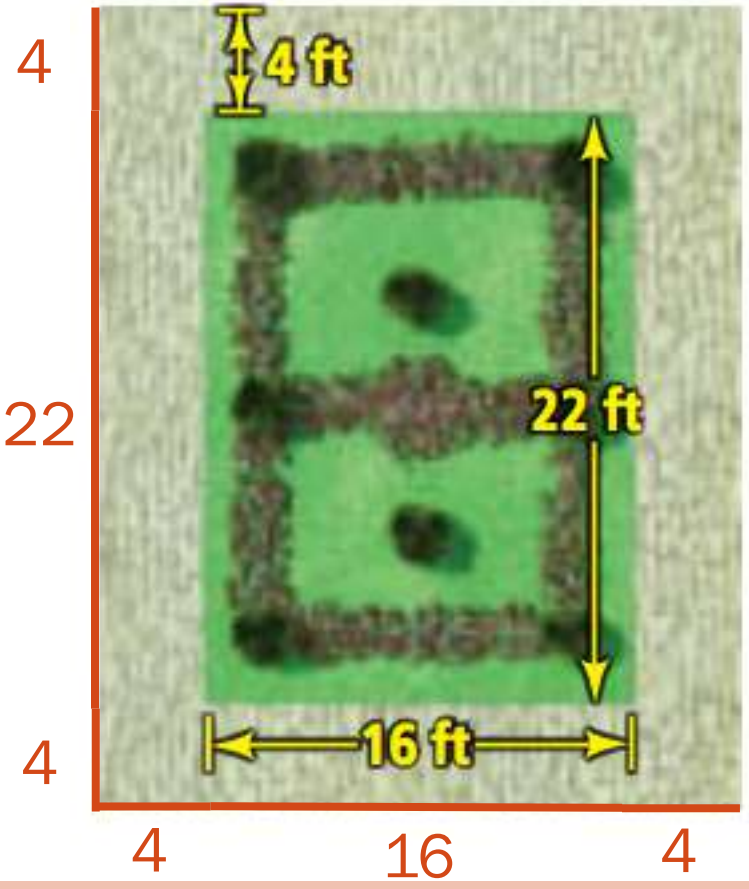
2. Find the width of a rectangle whose length is 8 cm and whose area is 56 cm^2.

   $A = lw$

   $\frac{56}{8} = \frac{8w}{8}$

   $7 \text{ cm.} = w$

Problem Solving – Example 3:



Landscaping The botany club members are designing a rectangular garden for the courtyard of your school. They plan to place edging on the outside of the path. How much edging material will they need?

Pi is the ratio between any circle's Circumference to its Diameter.

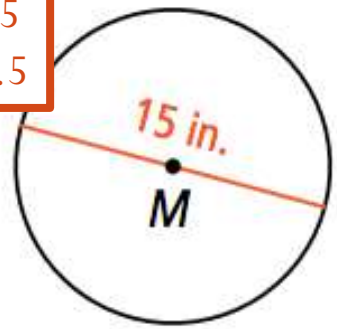
$\pi = 3.1415926\ldots, \quad \approx 3.14 \text{ or } \frac{22}{7} \text{ for } \pi$

Would you get a different answer if you use the pi button on your calculator?

Examples:

4. Find the area and circumference for ⊙M (circle M) in terms of pi.

d = 15
r = 7.5



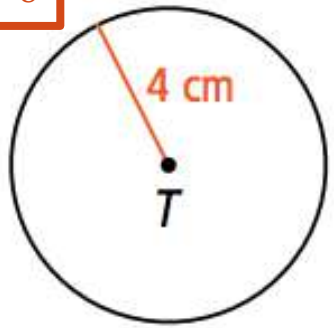
$A = \pi r^2$ $\qquad$ $C = \pi d$ or $2\pi r$

$A = \pi 7.5^2$ $\qquad$ $C = \pi (15)$

$A = 56.25\pi \text{ in}^2$ $\qquad$ $C = 15\pi \text{ in}$

5. Find the area and circumference for ⊙T, using $\pi \approx 3.14$.

r = 4
d = 8



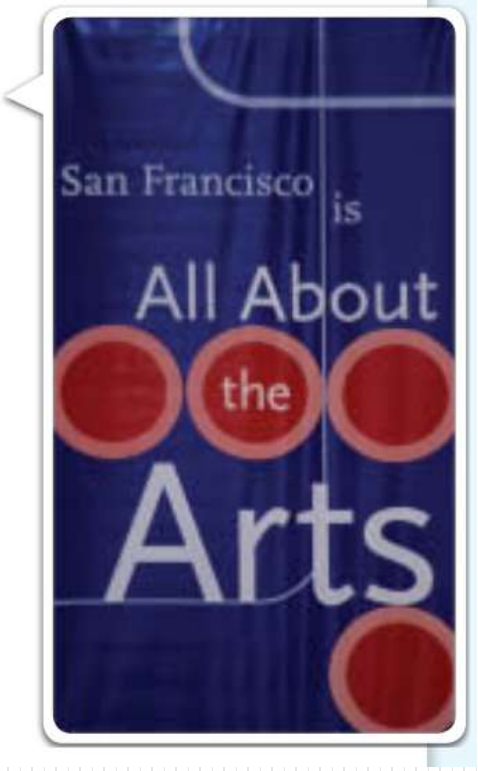
$A = \pi r^2$ $\qquad$ $C = \pi d$ or $2\pi r$

$A = \pi (4)^2$ $\qquad$ $C = \pi (8)$

$A = 16\pi \approx 50.24 \text{ in}^2$ $\qquad$ $C = 8\pi \approx 25.12 \text{ in}$

Example 6:

You want to make a rectangular banner similar to the one at the right. The banner shown is 2 ½ ft. wide and 5 ft. high. To the nearest tenth of a square yard, how much material do you need?



Step 1: Convert 2.5 ft and 5 ft to yards.

Base: 2.5 ft ÷ 3 ft/yd. ≈ .833 yd

Height: 5 ft ÷ 3 ft/yd. ≈ 1.67 yd

Step 2: Find the area of the rectangle.

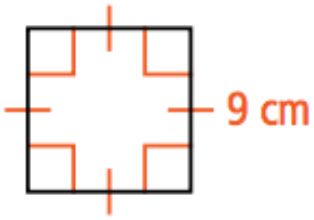
$A = bh$

$A \approx (.833)(1.67) \approx$

$A \approx 1.3911 \approx 1.4 \text{ yd}^2$

You Try!

1. Find the area and perimeter:



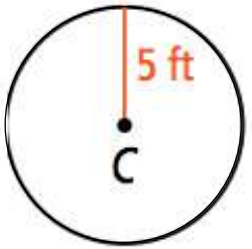
$A = s^2 = 9(9) = 81\ cm^2$

$P = 4s = 4(9) = 36\ cm$

2. Find the circumference and area in terms of pi.

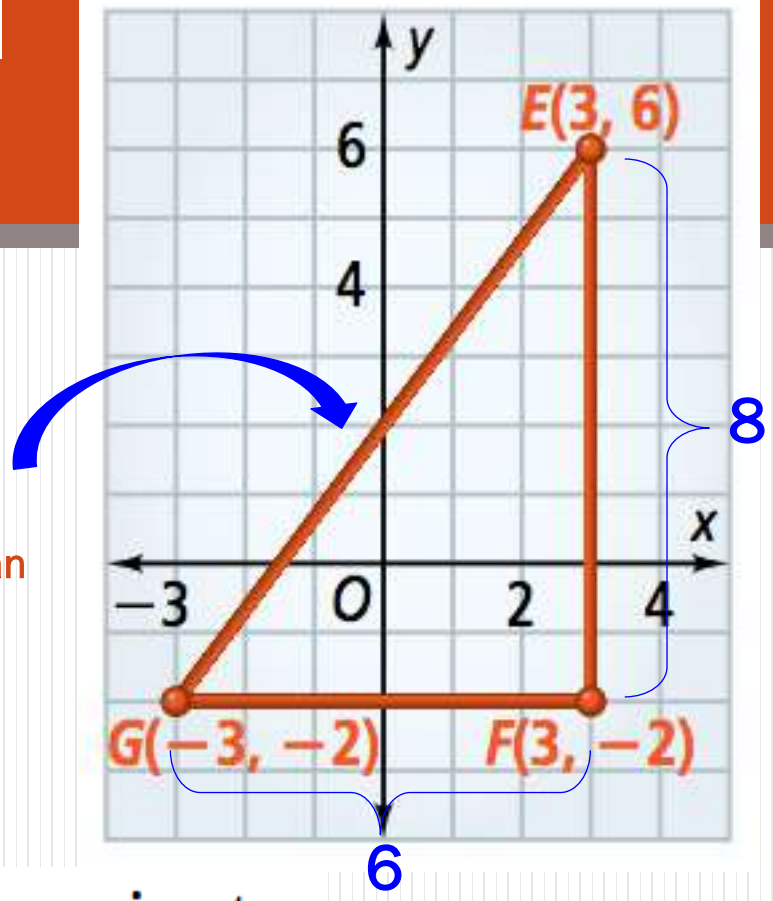
$C = 2\pi r = 2\pi(5) = 10\pi\ ft$

$A = \pi r^2 = \pi(5)^2 = 25\pi\ ft^2$



Example 7:

What is the perimeter of $\triangle EFG$?



Step 1 Find the length of each side.

Height = 8 units

Base = 6 units

Use Distance Formula (or Pythagorean Thm.) to find the diagonal side:

$d = \sqrt{(-3-3)^2+(-2-6)^2} = \sqrt{6^2+8^2}$

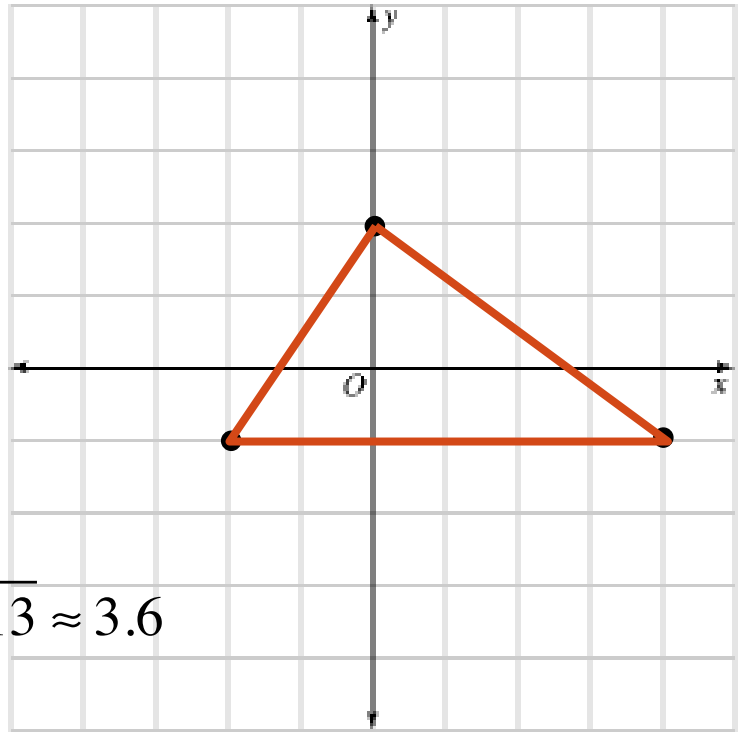
diagonal = 10 units

Step 2 Add the side lengths to find the perimeter.

8 + 6 + 10 = 24 units.

You Try!

3. Graph triangle XYZ on the coordinate plane, and find its perimeter to the nearest tenth.



$X(0, 2), Y(4, -1), Z(-2, -1)$

Base= 6 units

Right Diagonal:

$$\sqrt{(0-4)^2+(2--1)^2}=\sqrt{4^2+3^2}=5$$

Left Diagonal:

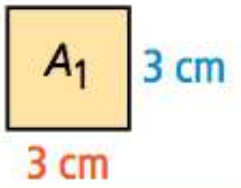
$$\sqrt{(-2-0)^2+(-1-2)^2}=\sqrt{2^2+3^2}=\sqrt{13}\approx 3.6$$

$P \approx 6 + 5 + 3.6 \approx 14.6$ units

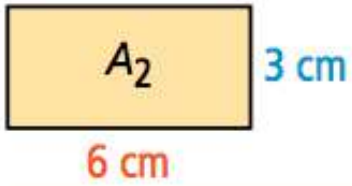
Example 8: Find the area and perimeter of the irregular shape.

Area = sum of all areas
*Split the area into parts

A = bh
3(3) = 9

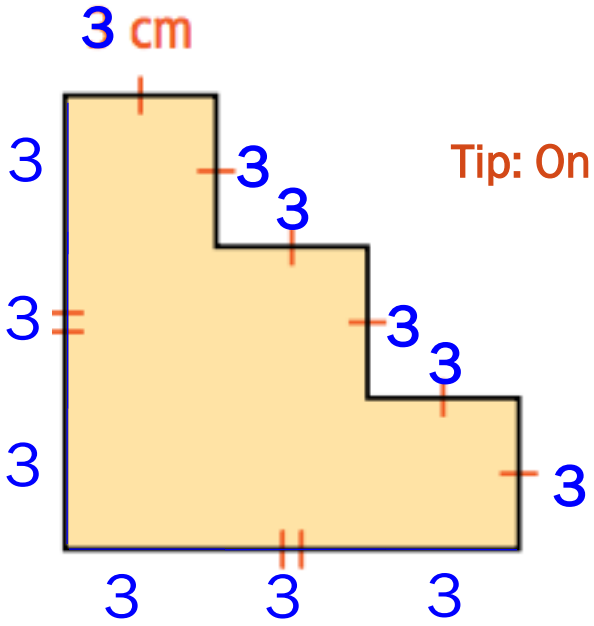


6(3) =18



9(3) = 27

Area = 9 + 18 + 27
= 54 cm²



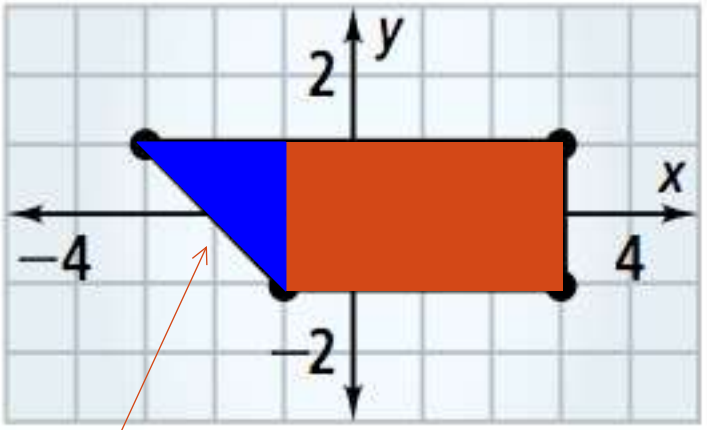
Perimeter

Tip: Only add the sides along the outside of the shape.

P = 3(12) = 36 units

You Try!

4. Find the area and perimeter of the figure below. Round to the nearest tenth if necessary.



$A = A_{\triangle} + A_{\square}$

$= \frac{1}{2}bh + bh$

$= \frac{1}{2}(2)(2) + (4)(2)$

$= 2 + 8$

$= 10 \text{ units}^2$

$P = 6 + 2 + 4 + \ldots$

$\approx 6 + 2 + 4 + 2.83$

$\approx 14.8 \text{ units}$

$= \sqrt{(2^2 + 2^2)}$

$= \sqrt{8} \approx 2.83$

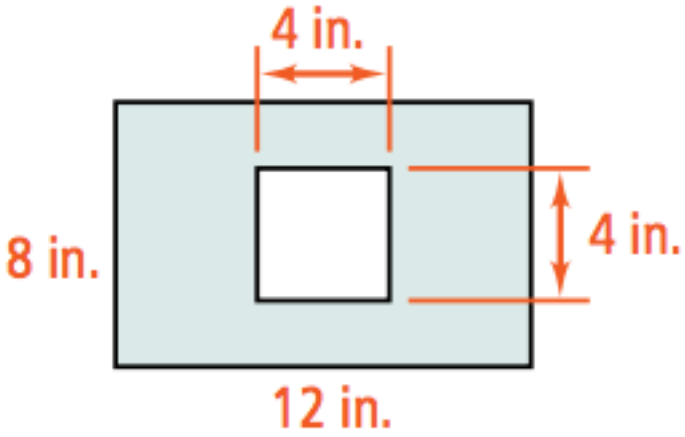
“Hole”-y Guacamole!

We can find the area of the shaded region by subtracting the

The “WHOLE” area minus the “HOLE” area.

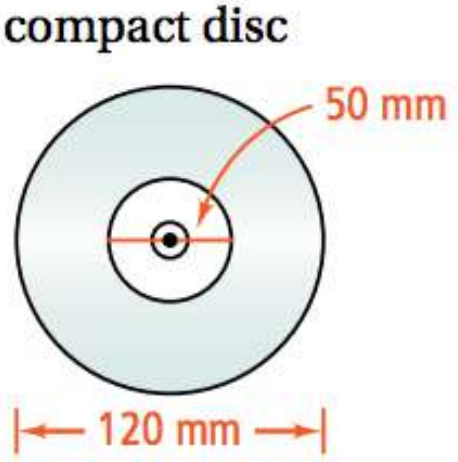
Examples:

9.



$A = bh - bh$
$= 12(8) - 4(4)$
$= 96 - 16$
$= \underline{80 \text{ in}^2}$

10.

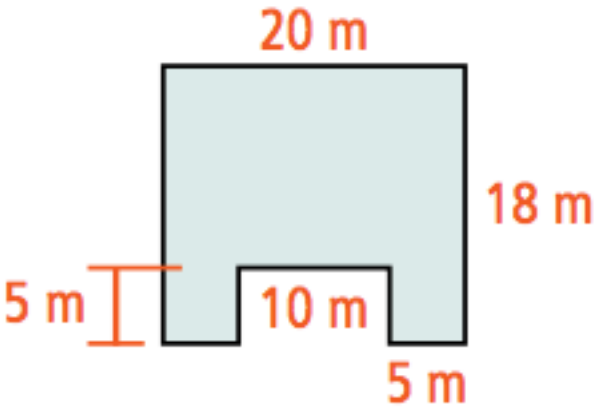


$A = \pi r^2 - \pi r^2$
$= \pi(60)^2 - \pi(25)^2$
$= 2975\pi \text{ mm}^2$
$\approx \underline{9342 \text{ mm}^2}$

You Try!

Find the area of the shaded region.

5.



$A = bh - bh$

$= 20(18) - 10(5)$

$= 360 - 50$

$= \underline{310\ m^2}$