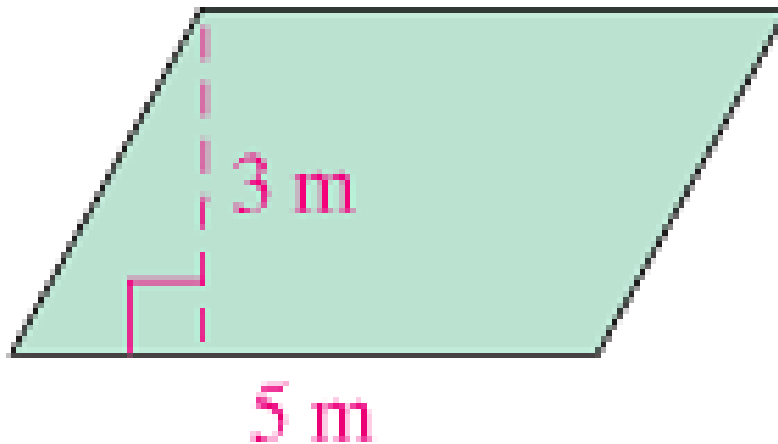# Areas of Parallelograms, Triangles and Trapezoids

Parallelogram

- A parallelogram is a quadrilateral where the opposite sides are congruent and parallel.

- A rectangle is a type of parallelogram, but we often see parallelograms that are not rectangles (parallelograms without right angles).

3 m

5 m

Area of a Parallelogram

- Any side of a parallelogram can be considered a **base**. The **height** of a parallelogram is the perpendicular distance between opposite bases.

- The area formula is A=bh

3 m

5 m
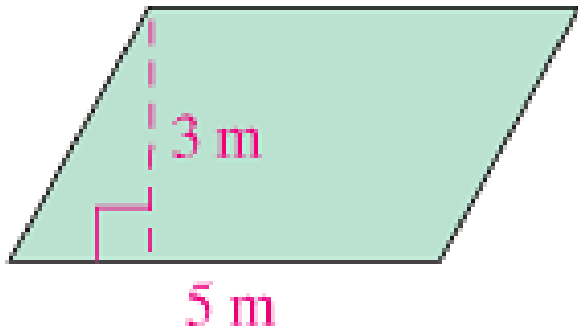
$$A=bh$$
$$A=5(3)$$
$$A=15m^2$$

Area of a Parallelogram

- If a parallelogram has an area of
  A square units, a base of b units, and a height of h units, then
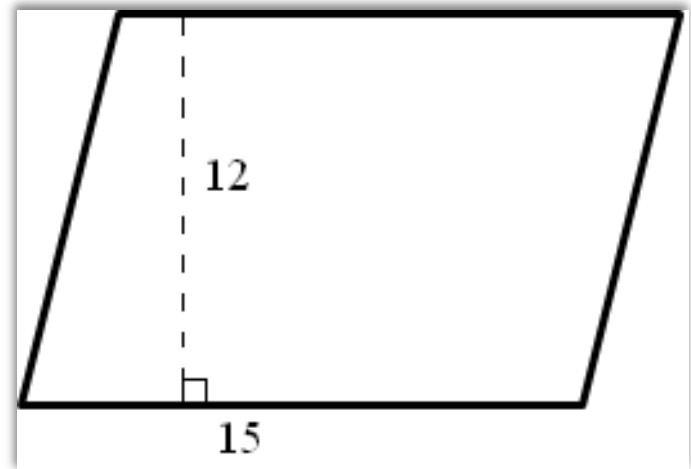 $A = bh$.

Example 2

Base = 15 units

Height = 12 units

Area = 15 units x 12 units

Area = 180 sq. units

Ex. 3 Find the missing unit

- Area= <u>56 inches squared</u>
- Base= _____
- Height= <u>8inches</u>

A= base x Height

Area of
Rectangles and Triangles

- **_AF 3.1 Use variables in expressions describing geometric quantities._**

Objective: Students will use variables in expressions describing geometric quantities
for Areas by using formulas and scoring an 80% proficiency on an exit slip.

Formula for Area of Rectangle

- Area =   Length X Width

A=L x W

6cm

W

A=L x W

A=10cm x 6cm
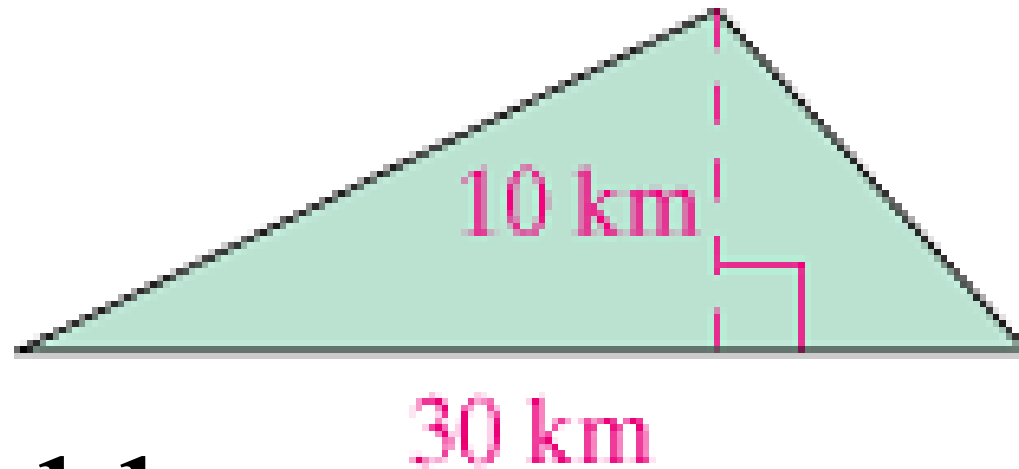
$A=60cm^2$

10cm

L

Area of a Triangle

- A triangle is a three sided polygon. Any side can be the **base** of the triangle. The **height** of the triangle is the perpendicular length from a vertex to the opposite base.

- A triangle (which can be formed by splitting a parallelogram in half) has a similar area formula: A = ½ bh.
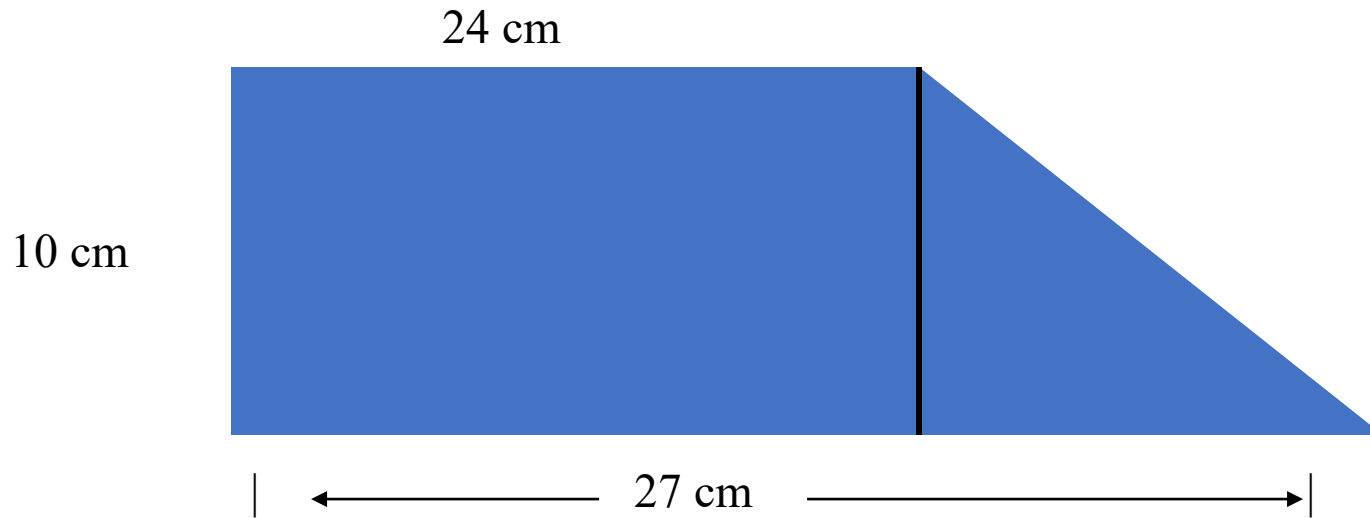
Example1

A= ½ bh
A= ½ (30)(10)
A= ½ (300)
A= 150 km^2

Complex Figures

- Use the appropriate formula to find the area of each piece.
- Add the areas together for the total area.

Example

24 cm

10 cm

27 cm

Split the shape into a rectangle and triangle.

The rectangle is 24cm long and 10 cm wide.

The triangle has a base of 3 cm and a height of 10 cm.

Solution

Rectangle
A = lw
A = 24(10)
A = 240 cm^2

Triangle
A = ½ bh
A = ½ (3)(10)
A = ½ (30)
A = 15 cm^2

Total Figure
$A = A_1 + A_2$
A = 240 + 15 = 255 cm^2

Example

20 cm

5 cm

26 cm
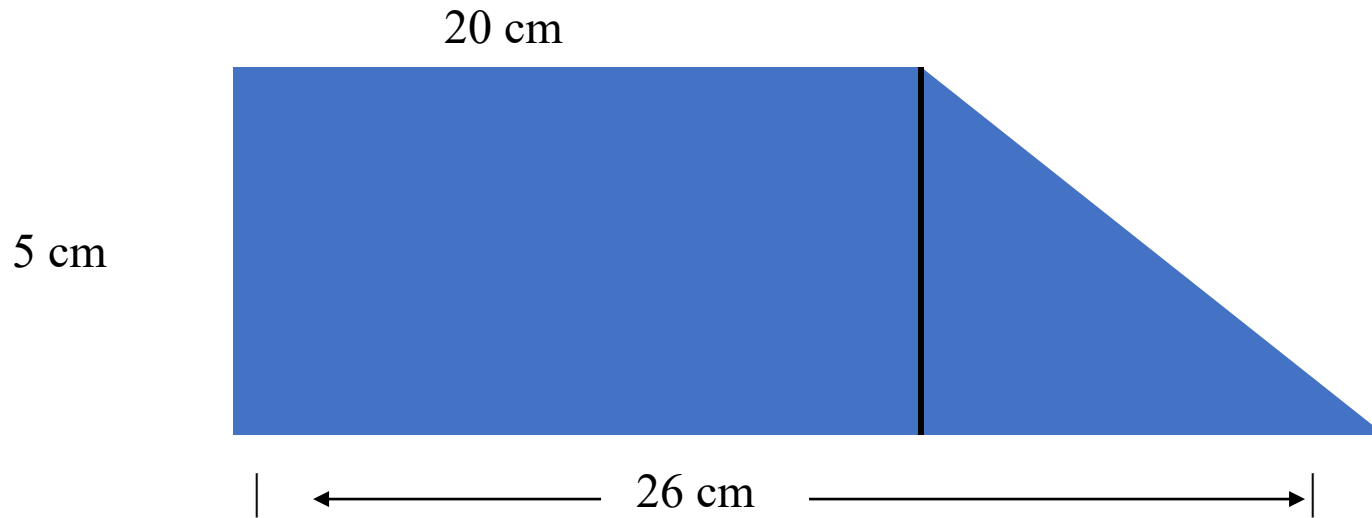
Split the shape into a rectangle and triangle.

The rectangle is 20cm long and 5 cm wide.

The triangle has a base of 6 cm and a height of 5cm.

Solution

Rectangle
$A = lw$

Triangle
$A = \frac{1}{2} bh$

Total Figure
$A = A_1 + A_2$

$A =$