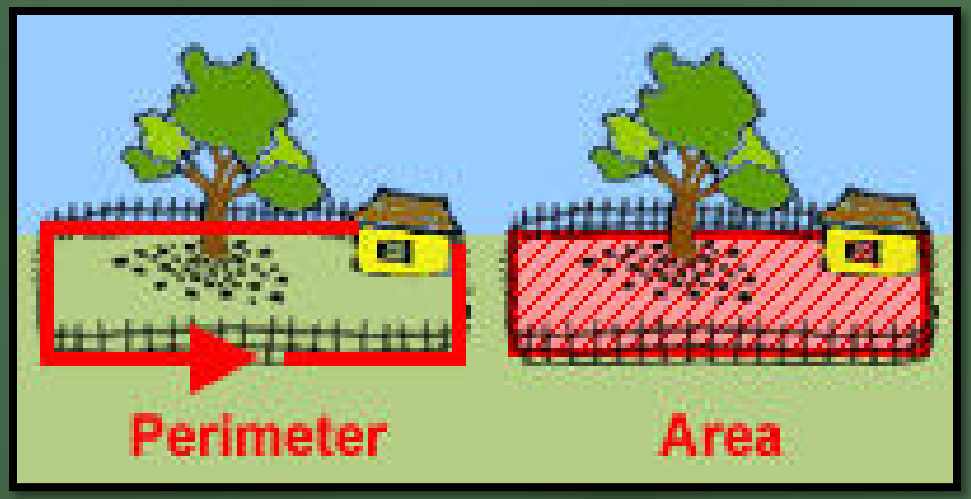
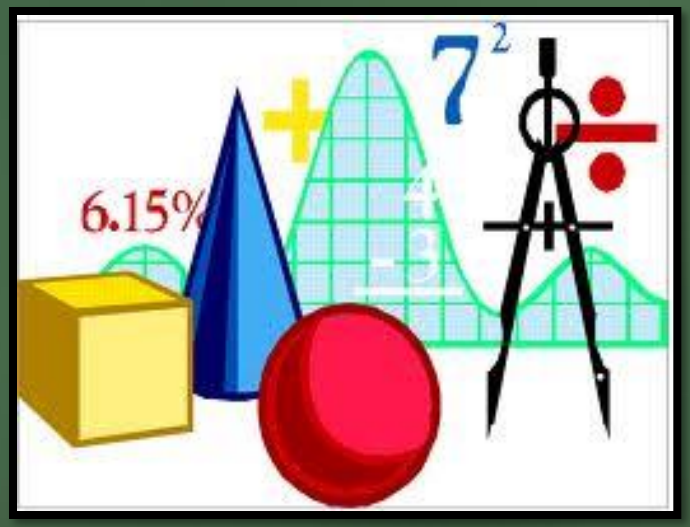
Area &





Perimeter

sanil jose

department of mathematics
sacred heart college, thevara

Without mathematics,
there's nothing you can do.

Everything around you
is mathematics.

Everything around you
is numbers.

-Shakuntala Devi

Area & Perimeter

Objectives:

7.5.04 Develop fluency in the use of formulas to solve problems.

Essential Question:

How can I use formulas to find the perimeter and area of simple geometric figures?

Area & Perimeter

Vocabulary:

Polygon: a closed plane figure bounded by three or more line segments.

Quadrilateral: any four sided polygon.

Parallelogram: a quadrilateral whose opposite sides are parallel.

Square: a four sided polygon characterized by four right angles and four sides of equal length.

Rectangle: a four sided polygon characterized by four right angles and opposite sides of equal measure.

Triangle: a three sided polygon.

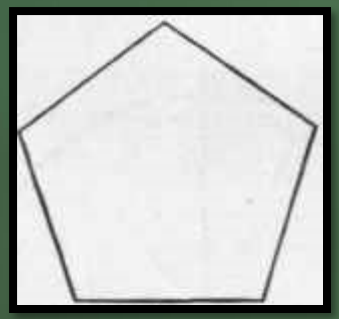
Circle: a closed plane curve consisting of all points at a given distance from a point within it called the center.

Area & Perimeter

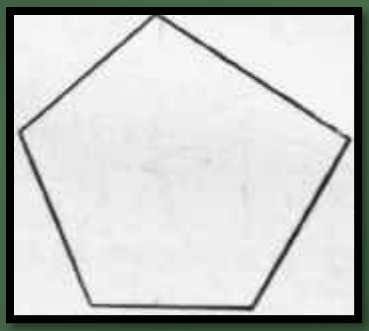
Polygons:

What do they look like…

A ***regular polygon*** is a any polygon in which all sides and angles are congruent (equal).



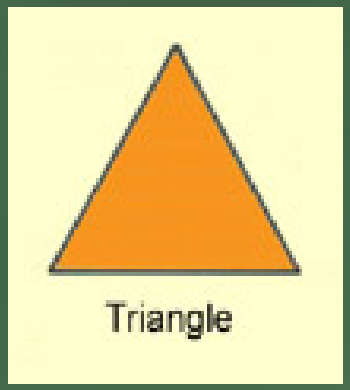
An ***irregular polygon*** is a polygon whose sides are not all the same length and/or whose interior angles do not all have the same measure.



Area & Perimeter

Polygons:

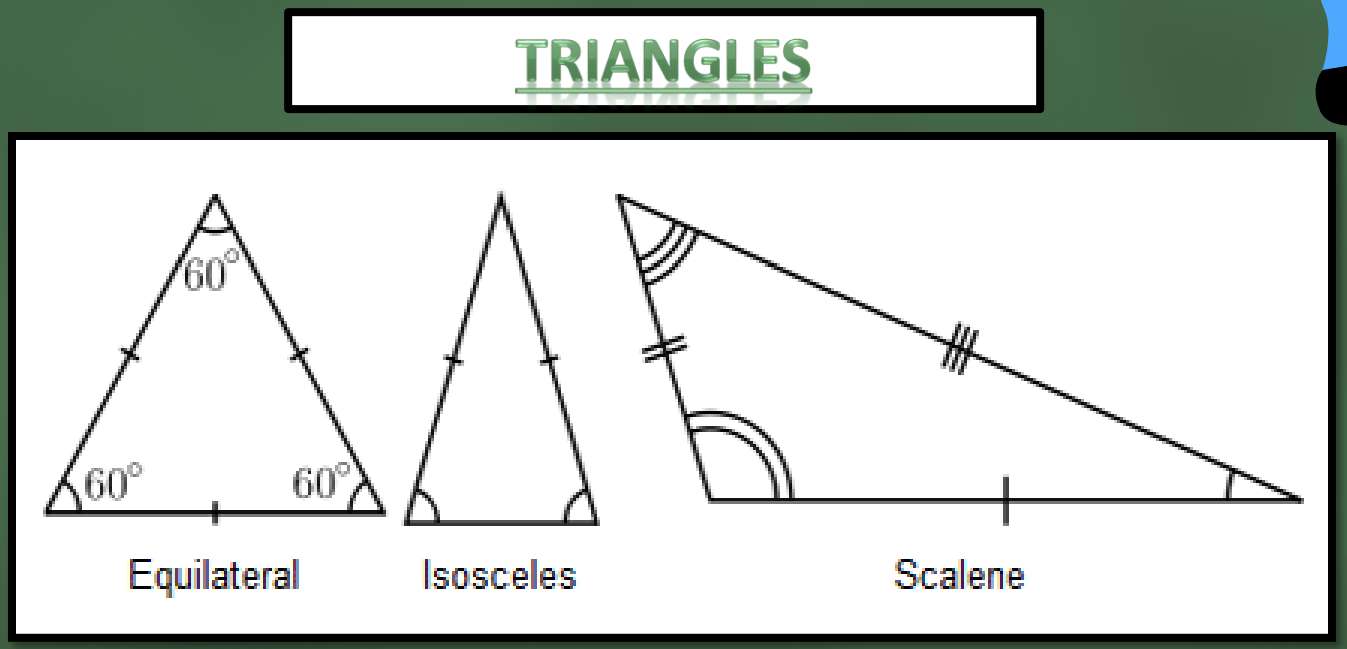
The following are some examples of regular polygons:



Area & Perimeter

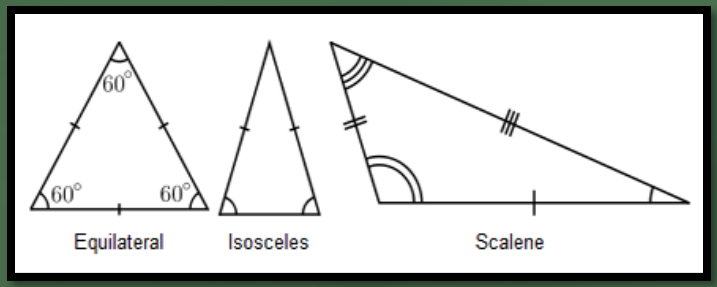
Triangles:

First lets focus on Triangles since they represent the smallest polygon:

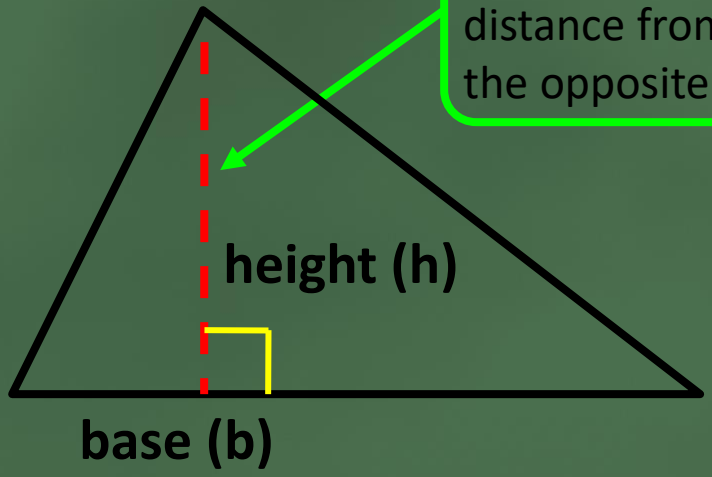


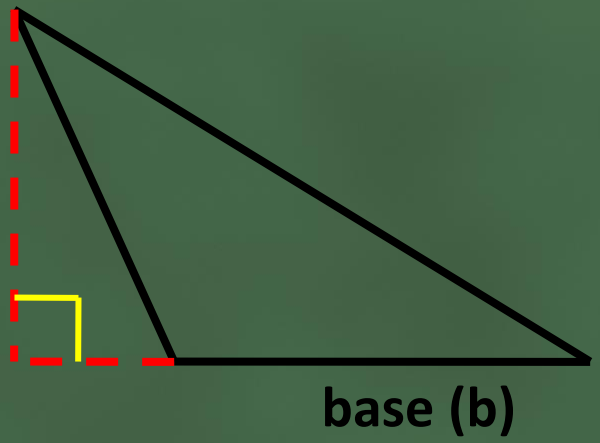
Area & Perimeter

Triangles:



The height is the shortest distance from a base to the opposite vertex





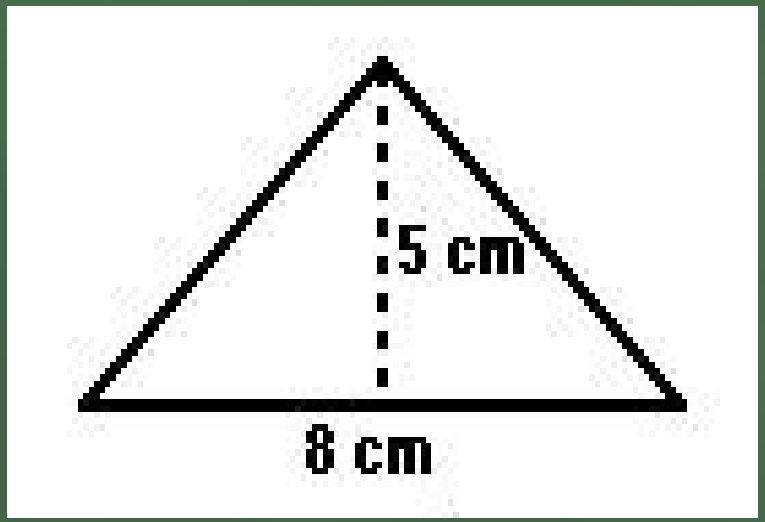
The base of a triangle can be any one of its sides

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

Area & Perimeter

Example 1: *Triangles*

Find the area of the triangle.



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

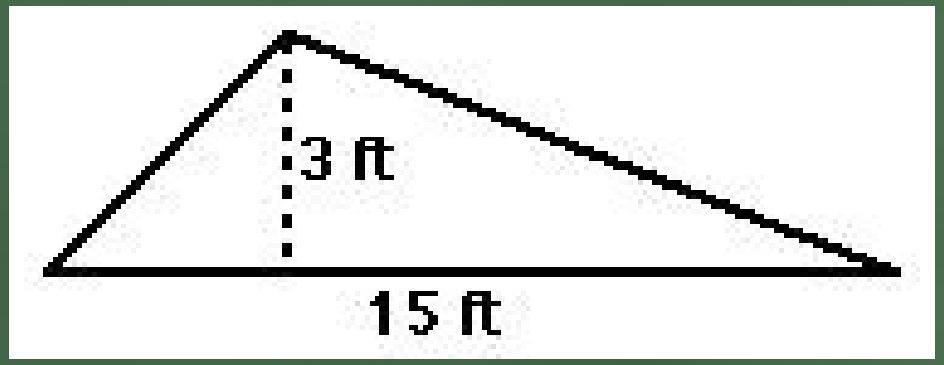
$A = \frac{1}{2}(8)(5)$

$A = 20$ sq cm

Area & Perimeter

Example 2: *Triangles*

Find the area of the triangle.



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

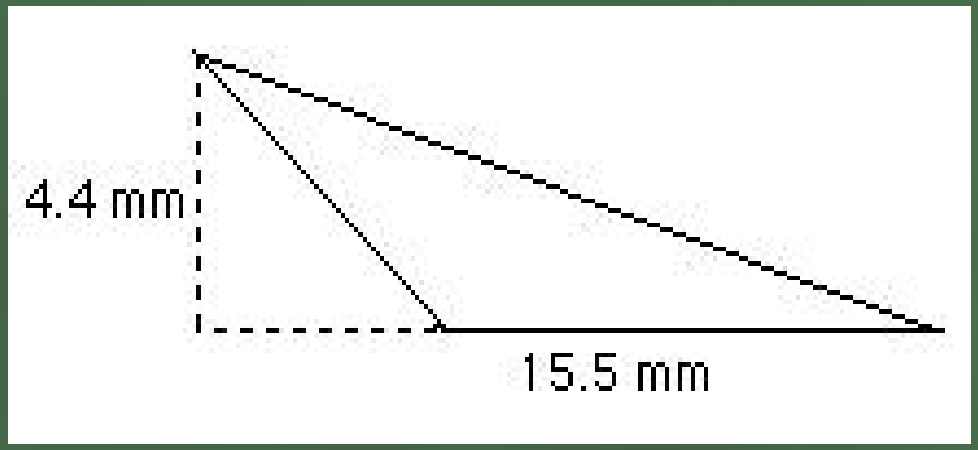
$A = \frac{1}{2}(15)(3)$

$A = 42.5$ sq ft

Area & Perimeter

Example 3: *Triangles*

Find the area of the triangle.



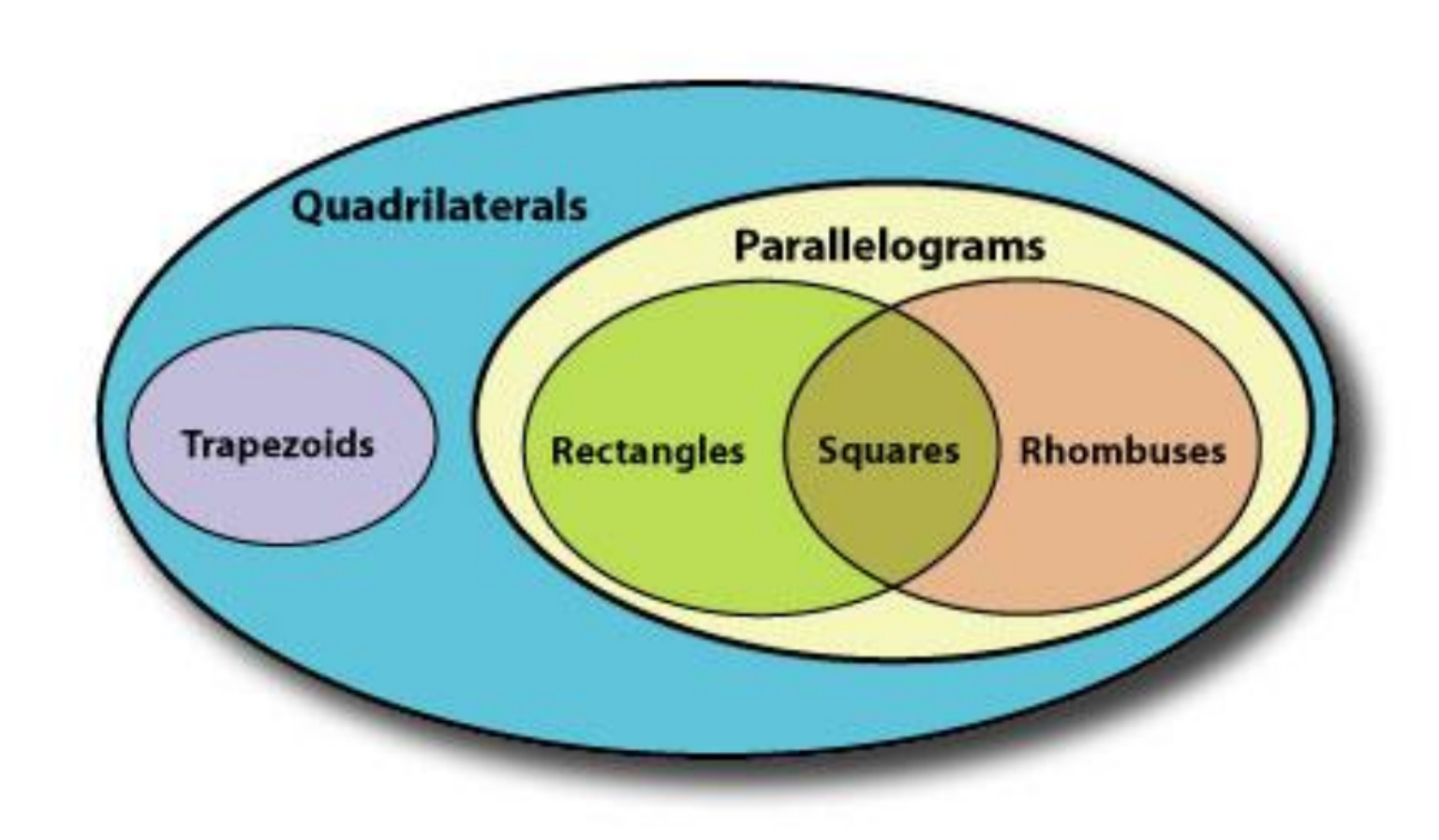
$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(15.5)(4.4)$$

$$A = 31.4 \text{ sq mm}$$

Area & Perimeter

Analyzing Quadrilaterals:

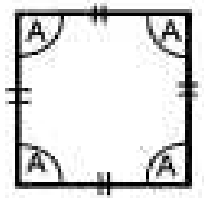


Area & Perimeter

Quadrilaterals:

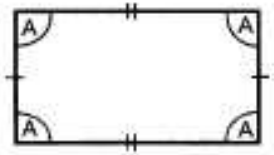
Now lets focus on some important kinds of Quadrilaterals:

SQUARE



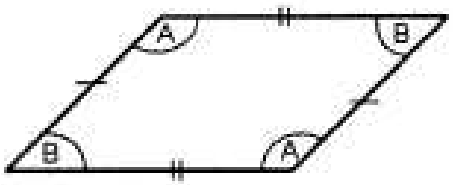
EQUAL SIDES
EQUAL ANGLES

RECTANGLE



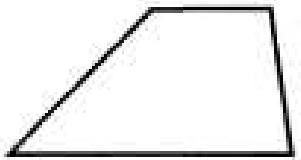
EQUAL OPPOSING SIDES
EQUAL ANGLES
RECTANGLE

PARALLELOGRAM



EQUAL OPPOSING SIDES
EQUAL OPPOSING ANGLES

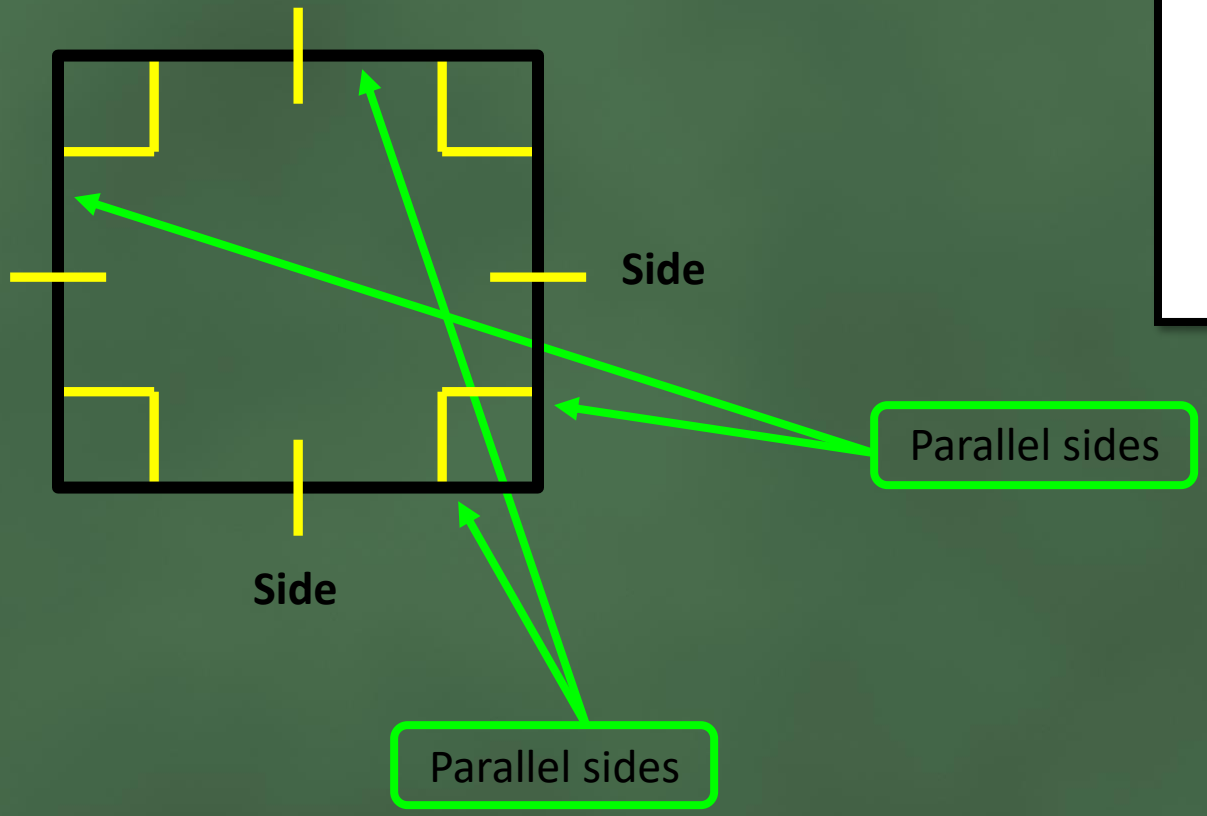
TRAPEZOID

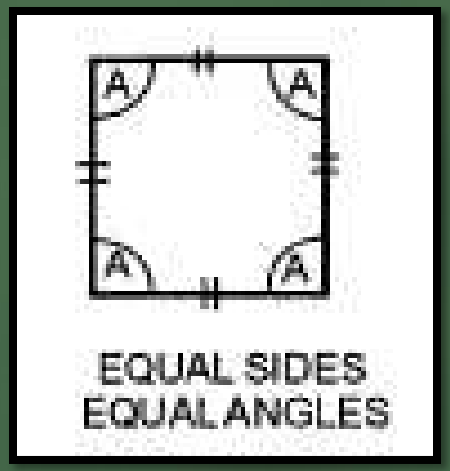


NO EQUAL SIDES
NO EQUAL ANGLES
TWO SIDES PARALLEL

Area & Perimeter

Squares:



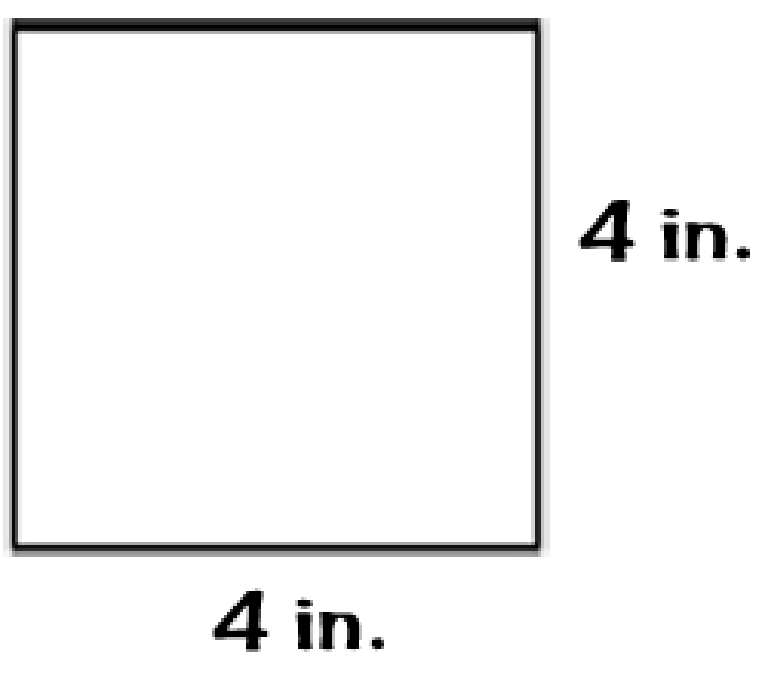


$$A = lw = bh$$

Area & Perimeter

Example 4: *Squares*

Find the perimeter and area of the square.



$P = 4s$ $A = s^2$

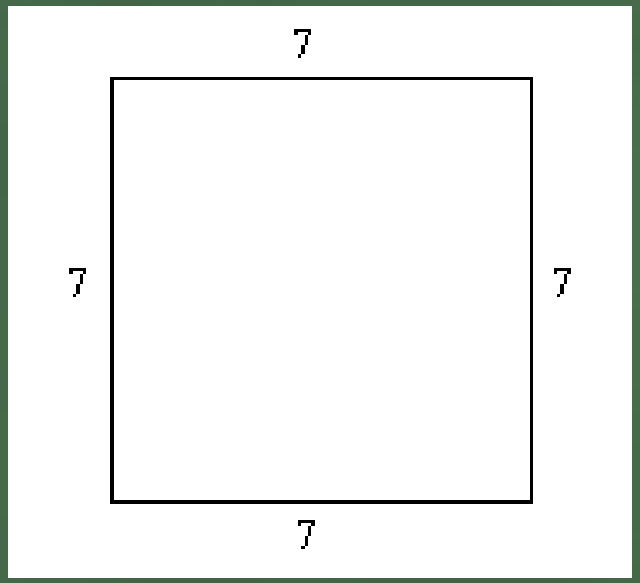
$P = 4 \cdot 4$ $A = 4^2$

P = 16 sq in **A = 16 sq in**

Area & Perimeter

Example 5: *Squares*

Find the perimeter and area of a square whose sides measure 7 inches.



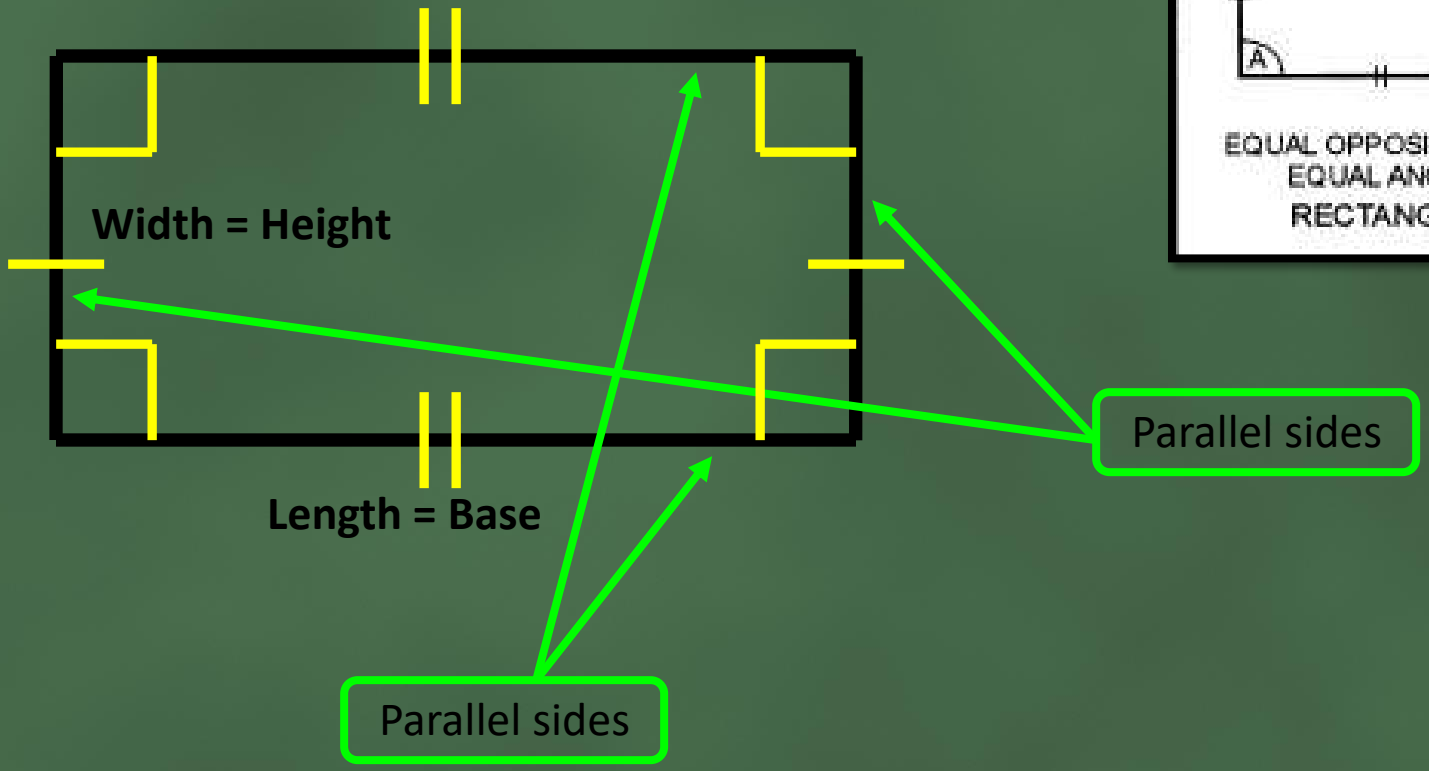
$P = 4s$ $\qquad A = s^2$

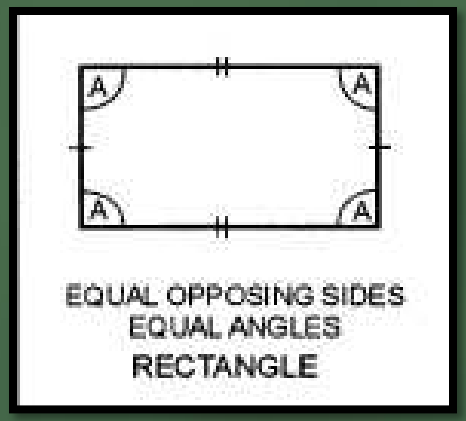
$P = 4 \cdot 7$ $\qquad A = 7^2$

$P = 28$ sq in $\qquad A = 49$ sq in

Area & Perimeter

Rectangles:



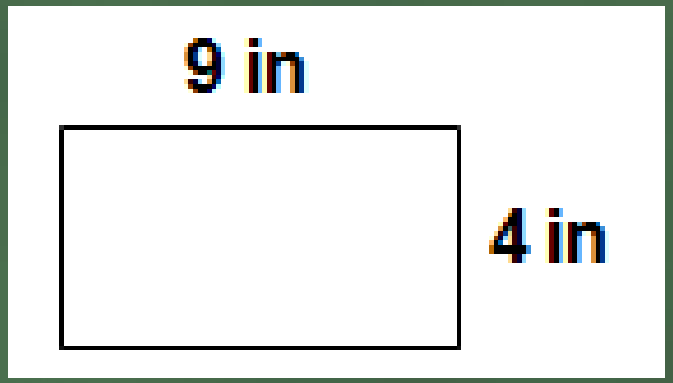


$$A = lw = bh$$

Area & Perimeter

Example 6: *Rectangles*

Find the perimeter and area of the rectangle.



$P = 2l + 2w$

$P = 2(9) + 2(4)$

$P = 22$ in

$A = lw$

$A = (9)(4)$

$A = 36$ sq in

Area & Perimeter

Example 7: *Rectangles*

Find the perimeter and area of a rectangle whose length and width measure 7cm and 4cm.

$P = 2l + 2w$

$P = 2(7) + 2(4)$

$P = 22$ sq cm

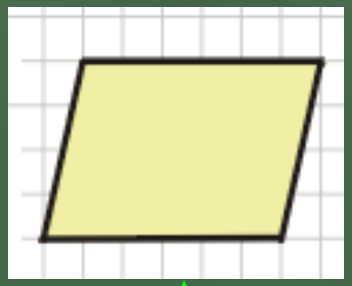
$A = lw$

$A = (7)(4)$

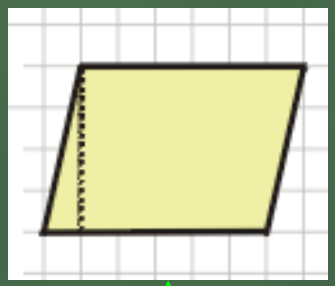
$A = 28$ sq cm

Area & Perimeter

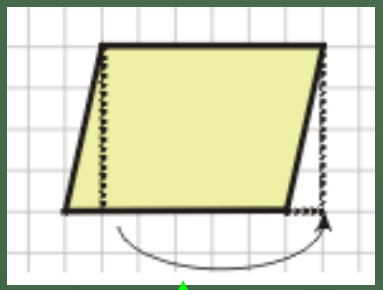
Parallelograms:



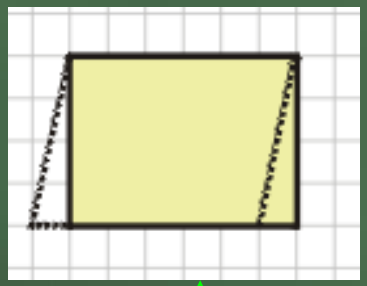
Original figure



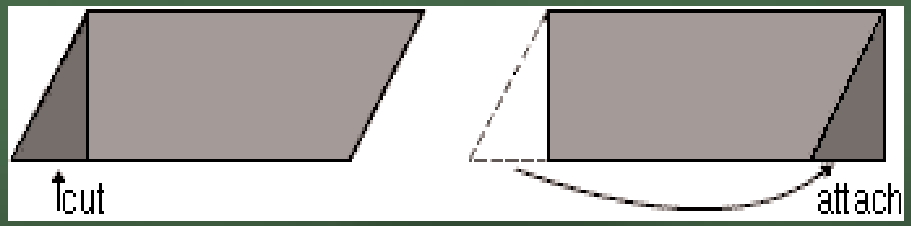
Draw a vertical line from top left vertex to the base of the figure



Remove the piece to the left of the vertical line and translate it to the other side of the figure

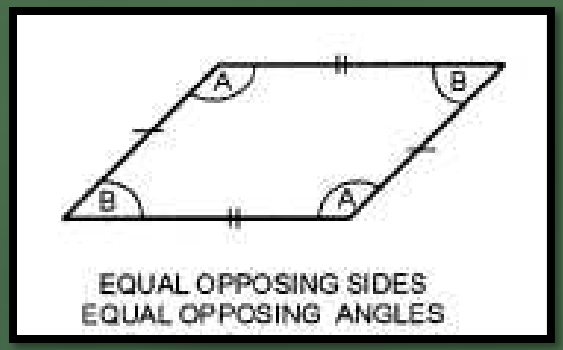


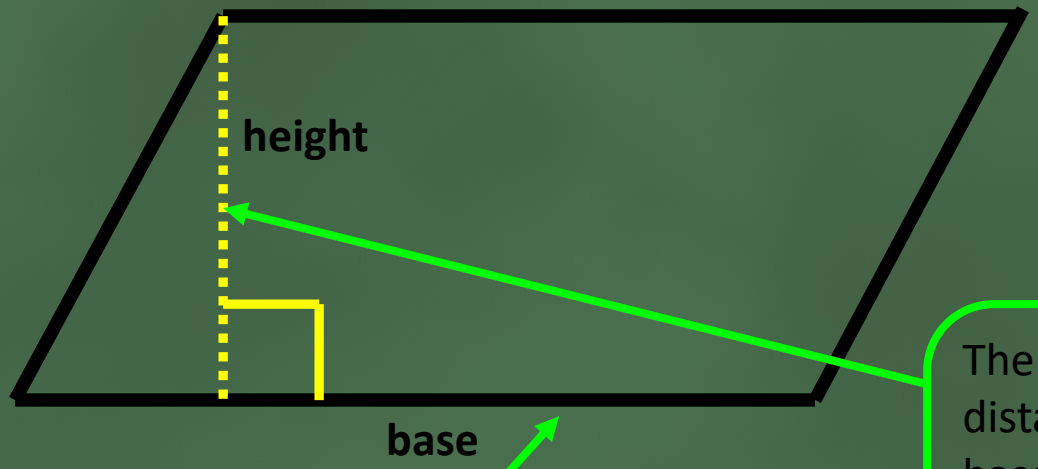
The new figure is a rectangle or square



Area & Perimeter

Parallelograms:





The shortest distance from the base to the opposite side is the height of the parallelogram

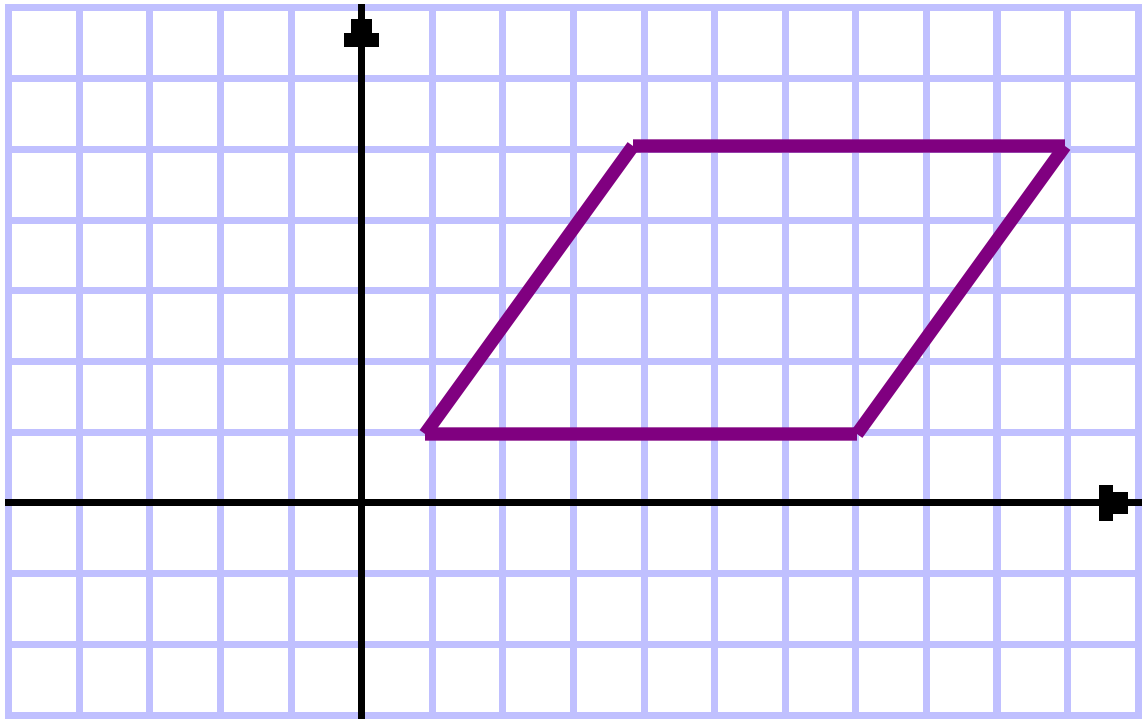
The base of a parallelogram can be any one of its sides

$$A = bh$$

Area & Perimeter

Example 8: *Parallelograms*

Find the area of the parallelogram.



The base is 6 and the height is 4.

$$A = b \cdot h$$

$$A = 6 \cdot 4$$

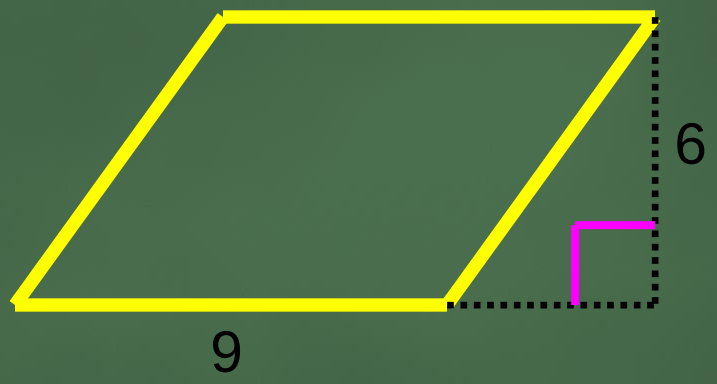
A = 24 sq un

Area & Perimeter

Example 9: *Parallelograms*

Find the area of the parallelogram.

The base is 9 and the height is 6.



$$A = b \cdot h$$

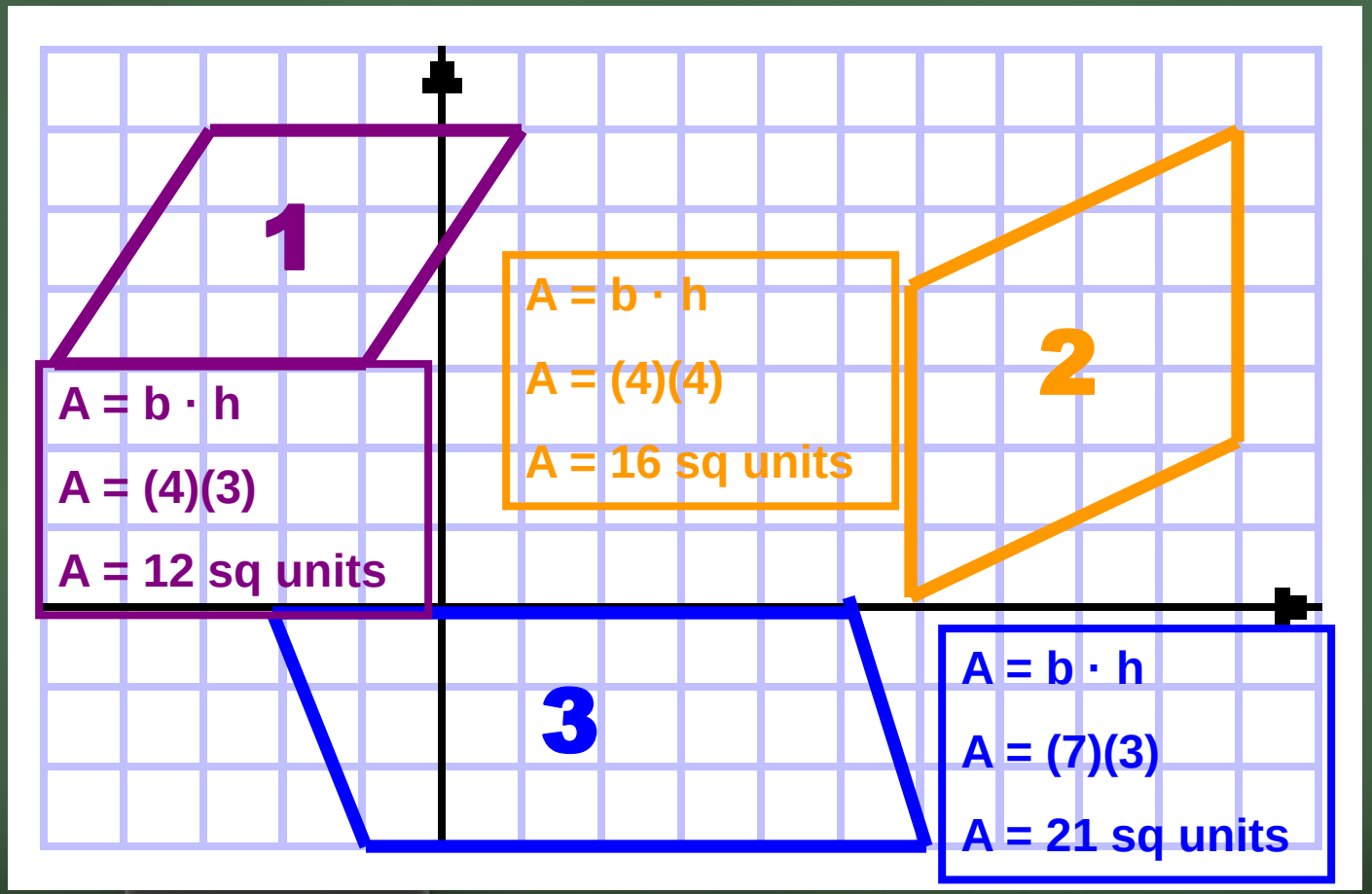
$$A = 6 \cdot 4$$

A = 24 sq un

Area & Perimeter

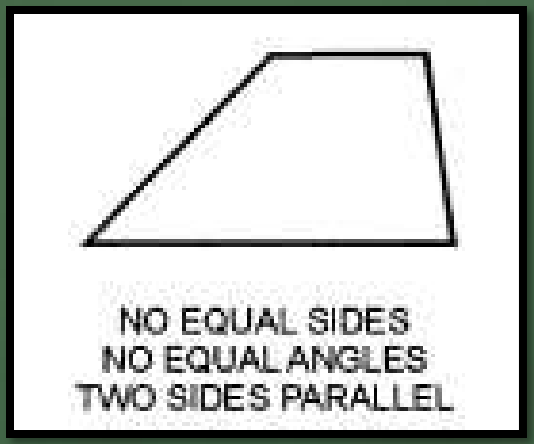
Example 10: *Parallelograms*

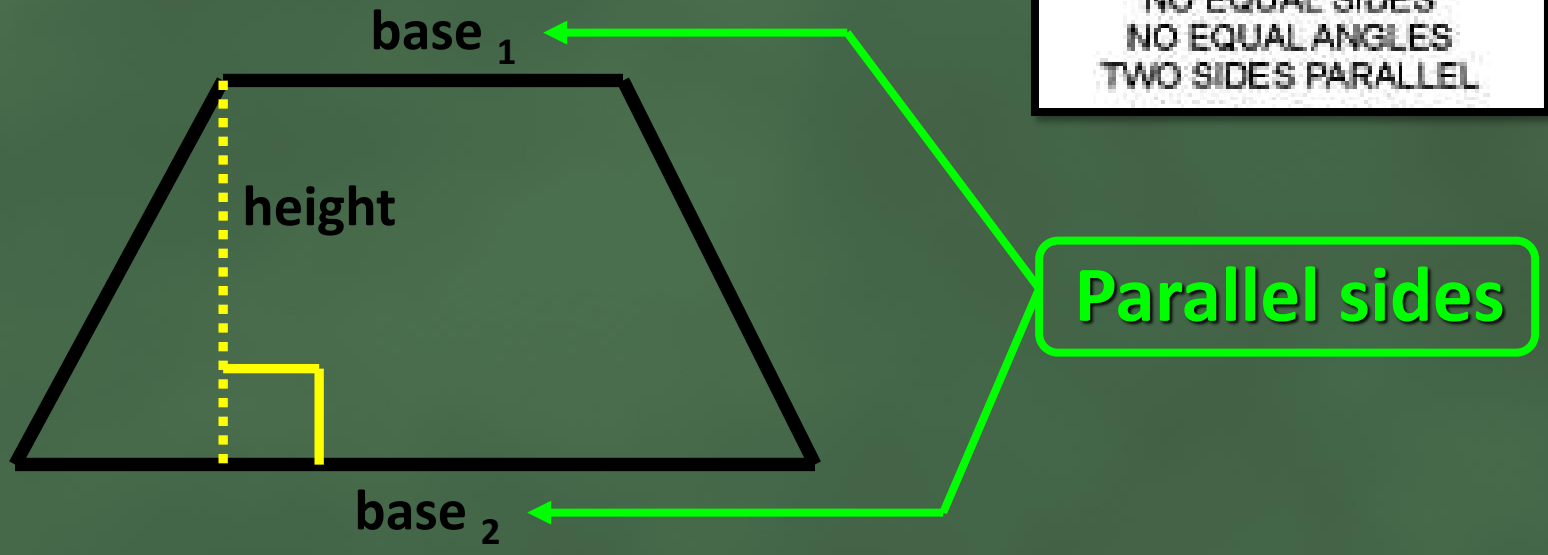
Find the area of each parallelogram.



Area & Perimeter

Trapezoids:



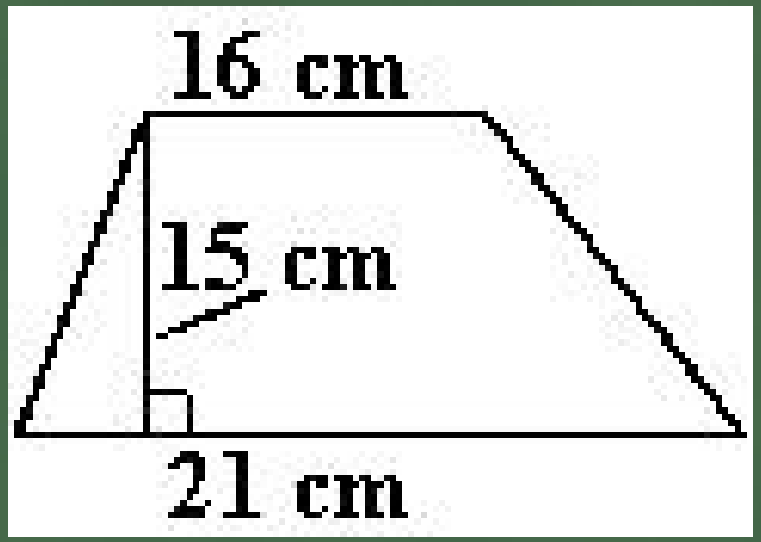


$$A = \tfrac{1}{2}h(b_1 + b_2)$$

Area & Perimeter

Example 11: *Trapezoids*

Find the area of the trapezoid.



$A = \frac{1}{2}h(b_1 + b_2)$

$A = \frac{1}{2}(15)(16 + 21)$

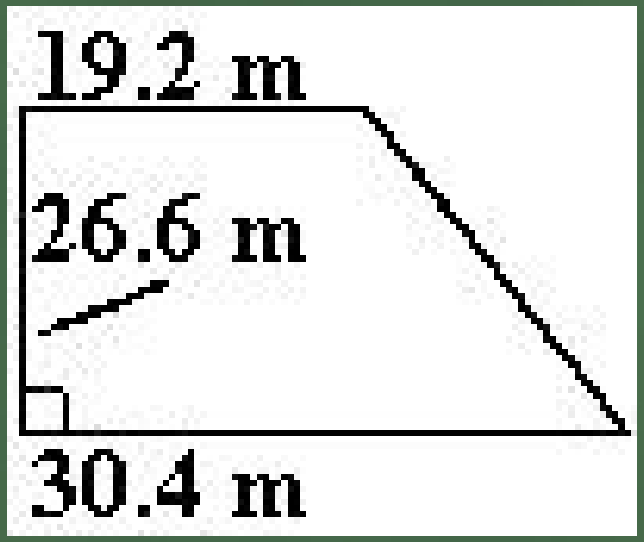
$A = (7.5)(37)$

$A = 277.5$ sq cm

Area & Perimeter

Example 12: *Trapezoids*

Find the area of the trapezoid.



$A = \frac{1}{2}h(b_1 + b_2)$

$A = \frac{1}{2}(26.6)(19.2+30.4)$

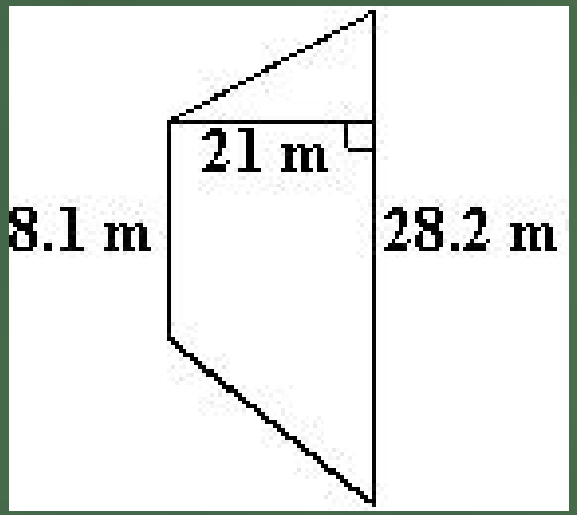
$A = (13.3)(49.6)$

$A = 659.68$ sq m

Area & Perimeter

Example 13: *Trapezoids*

Find the area of the trapezoid.



$$A = \tfrac{1}{2}h(b_1 + b_2)$$

$$A = \tfrac{1}{2}(21)(8.1+28.2)$$

$$A = (10.5)(36.3)$$

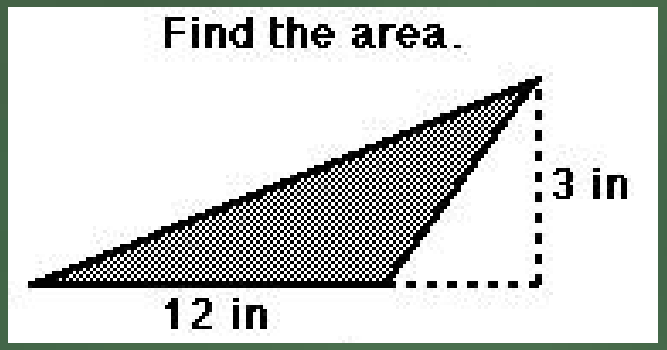
$$A = 381.15 \text{ sq m}$$

Area & Perimeter

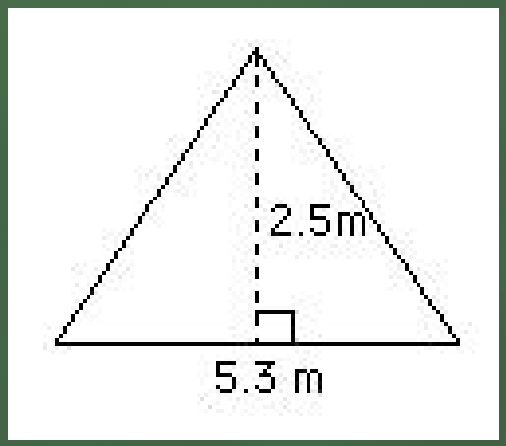
Independent Practice: *Triangles*

Find the area of each triangle.

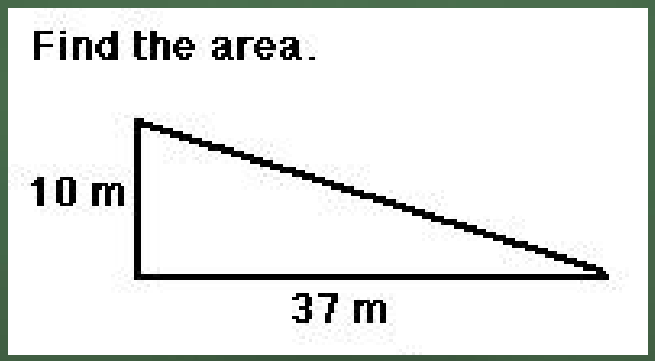
1.



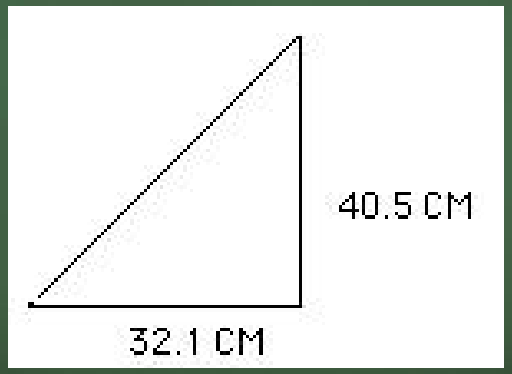
2.



3.



4.



Area & Perimeter

Independent Practice: *Triangles*

Answers.

1. A = 18 sq in

2. A = 6.625 sq m

3. A = 185 sq m

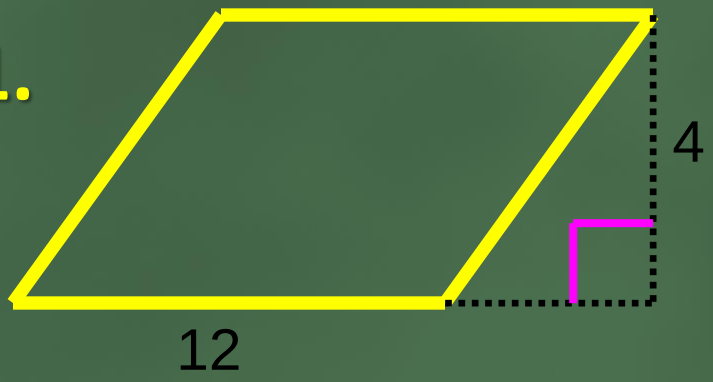
4. A = 650.025 sq cm

Area & Perimeter

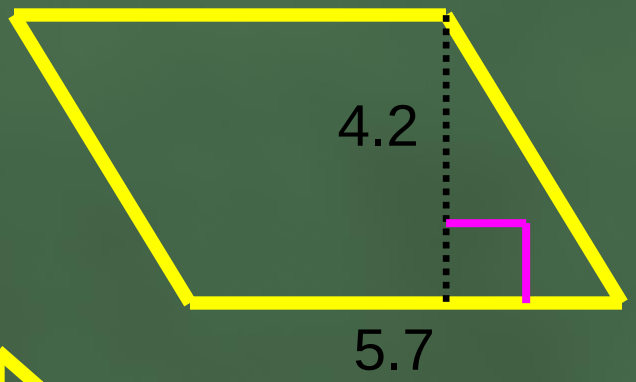
Independent Practice: *Parallelograms*

Answers.

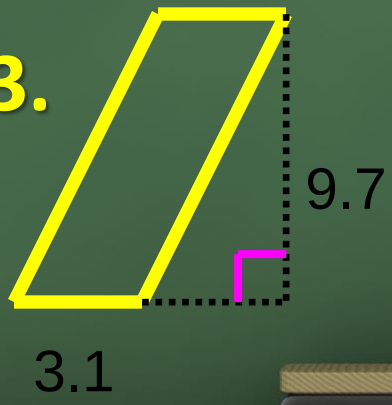
1.



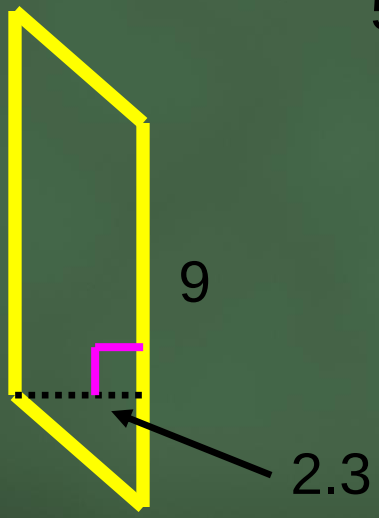
2.



3.



4.



Area & Perimeter

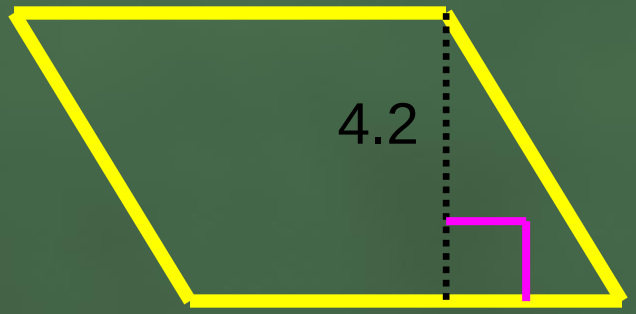
Independent Practice: *Parallelograms*

Find the area of each parallelogram.

1.

A = 48 sq un

2.

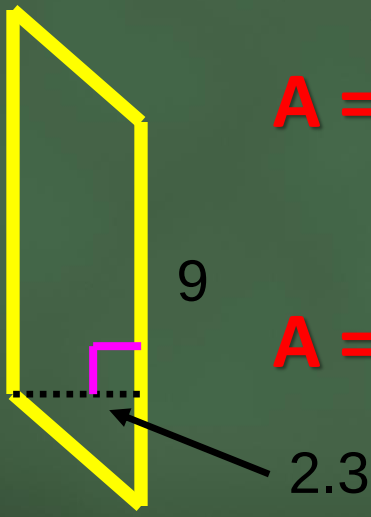


A = 23.94 sq un

3.

A = 30.07 sq un

4.

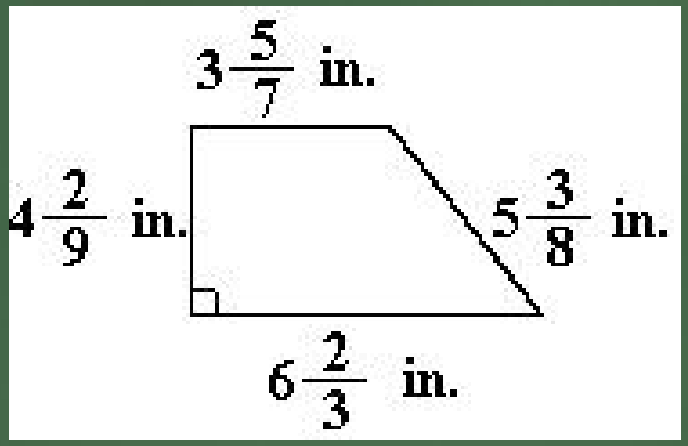


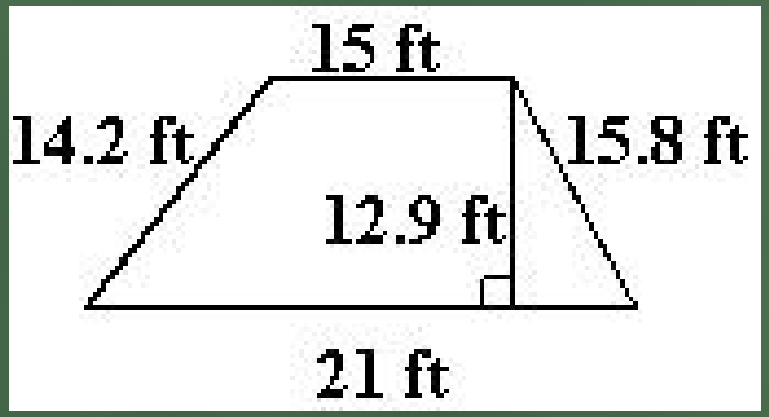
A = 20.7 sq un

Area & Perimeter

Independent Practice: *Trapezoids*

Find the area of each trapezoid.

1. 

2. 

3. $b_1 = 8\frac{1}{2}$ m, $b_2 = 3\frac{1}{4}$ m, $h = 7\frac{3}{4}$ m

4. $b_1 = 16$cm, $b_2 = 9$cm, $h = 12$cm

Area & Perimeter

Independent Practice: *Trapezoids*

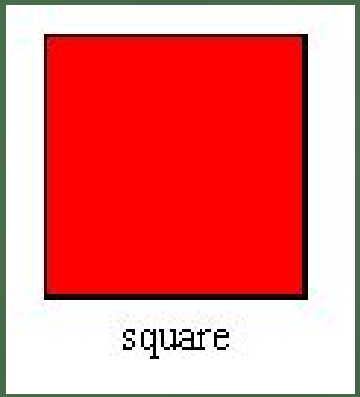
Answers.

1. A = 21 173/189 sq in
2. A = 232.2 sq ft
3. A = 45.53125 sq m
4. A = 150 sq cm

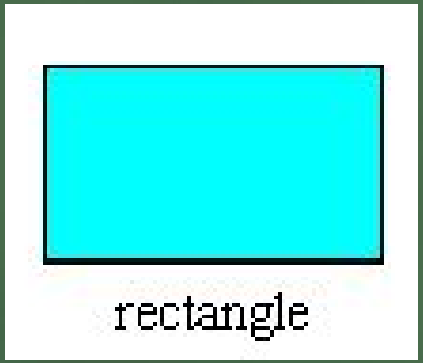
Area & Perimeter

Summary:

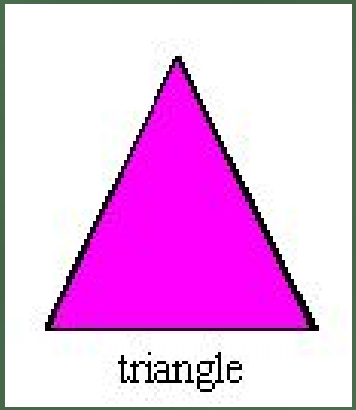
Formula Review:



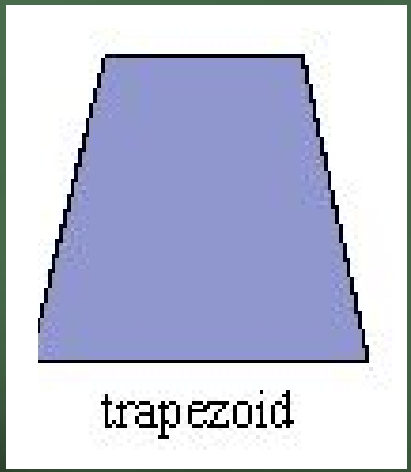
$A = lw = bh$



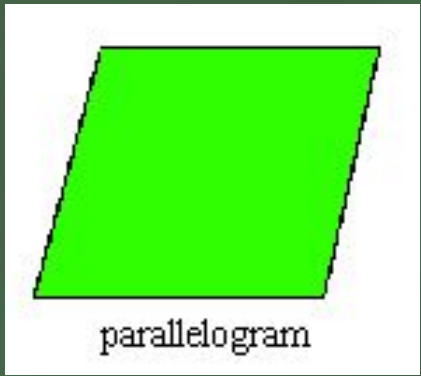
$A = lw = bh$



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



$A = \frac{1}{2}h(b_1 + b_2)$



$A = bh$

Results on Triangles:

i.Sum of the angles of a triangle is 180°.

ii.The sum of any two sides of a triangle is greater than the third side.

iii.Pythagoras Theorem:

iv.In a right-angled triangle, $(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2$.

v.The line joining the mid-point of a side of a triangle to the opposite vertex is called the **median**.

vi.The point where the three medians of a triangle meet, is called **centroid.** The centroid divided each of the medians in the ratio 2 : 1.

vii.In an isosceles triangle, the altitude from the vertex bisects the base.

viii.The median of a triangle divides it into two triangles of the same area.

ix.The area of the triangle formed by joining the mid-points of the sides of a given triangle is one-fourth of the area of the given triangle.

Results on Quadrilaterals:

i.The diagonals of a parallelogram bisect each other.

ii.Each diagonal of a parallelogram divides it into triangles of the same area.

iii.The diagonals of a rectangle are equal and bisect each other.

iv.The diagonals of a square are equal and bisect each other at right angles.

v.The diagonals of a rhombus are unequal and bisect each other at right angles.

vi.A parallelogram and a rectangle on the same base and between the same parallels are equal in area.

vii.Of all the parallelogram of given sides, the parallelogram which is a rectangle has the greatest area.

Questions

1. The ratio between the length and the breadth of a rectangular park is 3 : 2. If a man cycling along the boundary of the park at the speed of 12 km/hr completes one round in 8 minutes, then the area of the park (in sq. m) is:

2. An error 2% in excess is made while measuring the side of a square. The percentage of error in the calculated area of the square is:

3. The ratio between the perimeter and the breadth of a rectangle is 5 : 1. If the area of the rectangle is 216 sq. cm, what is the length of the rectangle?

4. The percentage increase in the area of a rectangle, if each of its sides is increased by 20% is:

5. A rectangular park 60 m long and 40 m wide has two concrete crossroads running in the middle of the park and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq. m, then what is the width of the road?

6. A towel, when bleached, was found to have lost 20% of its length and 10% of its breadth. The percentage of decrease in area is:

7. A man walked diagonally across a square lot. Approximately, what was the percent saved by not walking along the edges?

8. The diagonal of a rectangle is $\sqrt{41}$ cm and its area is 20 sq. cm. The perimeter of the rectangle must be:

9. What is the least number of squares tiles required to pave the floor of a room 15 m 17 cm long and 9 m 2 cm broad?

10. The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m, then its area is:

11. The length of a rectangular plot is 20 metres more than its breadth. If the cost of fencing the plot @ 26.50 per metre is Rs. 5300, what is the length of the plot in metres?

12. A tank is 25 m long, 12 m wide and 6 m deep. The cost of plastering its walls and bottom at 75 paise per sq. m, is:

The only way to learn **mathematics** is to do **mathematics.**

PAUL HALMOS

The detailed answer with audio explanation will be published today evening by 5:00 pm