June 25, 2007

Geometry

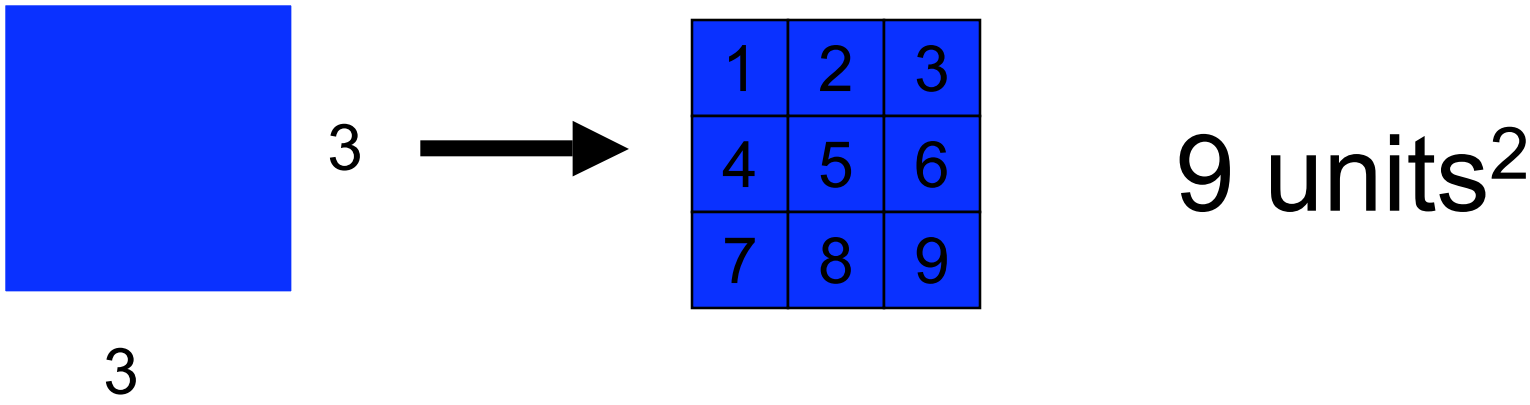
Exploring Area

What You'll Learn
Why You Should Learn It

- How to find the area of a square and rectangle
- You can use areas to solve real-life problems, such as finding the amount of fertilizer to cover a lawn

Area of Squares

- Area of a polygon is the number of square units contained in its interior
- Areas are measured in square units such as m^2 or ft^2

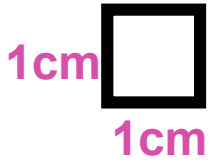


Counting Squares to find Area

Area is the amount of space taken up by a shape

Area can be measured by counting squares

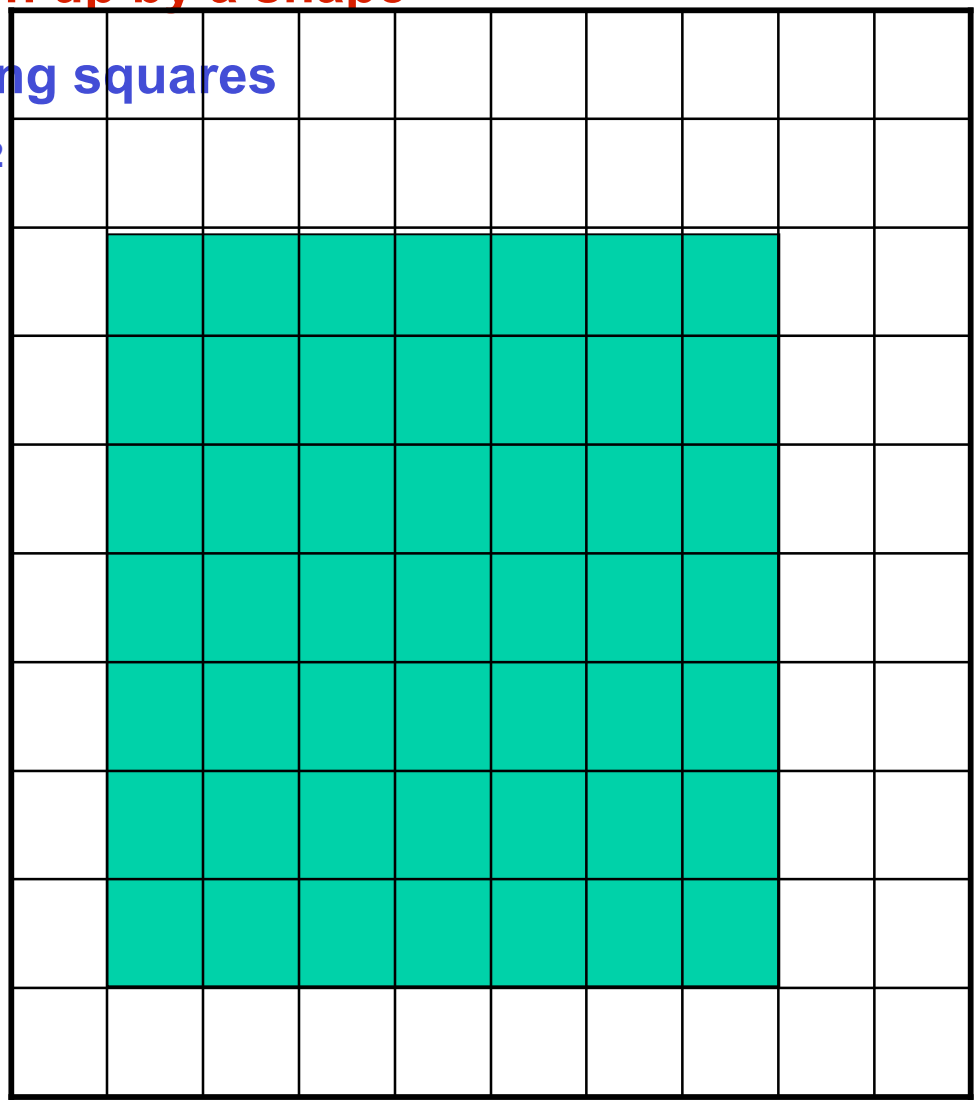
Each square has an area of 1cm²



Find the area of the shape by counting squares

Area equals

49 cm²

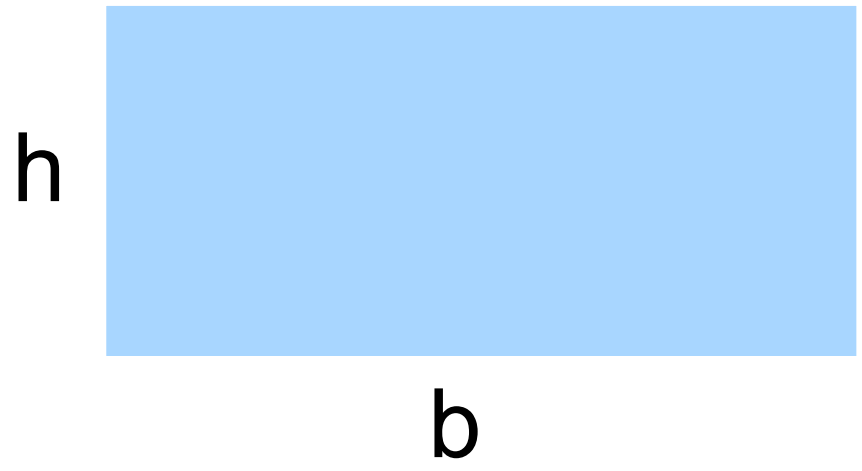


All formulas for areas of polygons is based on these 3 ideas

- The area of a square is the square of the length of its side, or $A = s^2$
- If two polygons are congruent, then they have the same area
- The area of a region is the sum of the areas of all its non-overlapping parts

Area of a Rectangle

- The area of a rectangle is the product of its base and height, or A = bh
  - The base and height meet at right angles

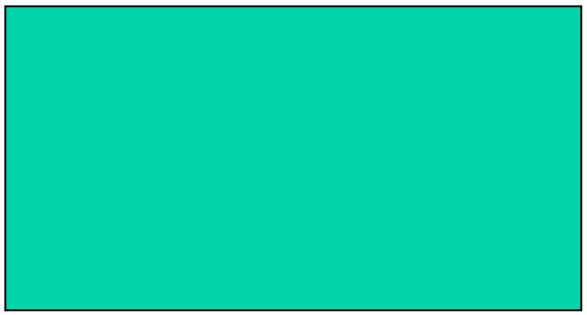


Area of a rectangle

When you are asked about the area of a rectangle you want to find out how much space there is inside the rectangle

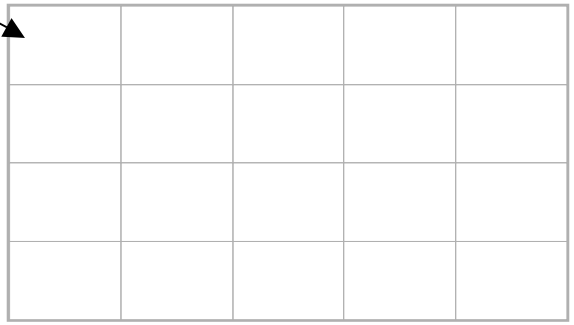
5 cm

4 cm



If you were to divide this into rows and columns

Each one of these boxes is 1 cm^2

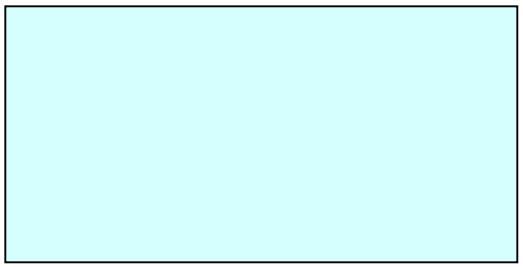


There are 20 boxes. Therefore the area is 20 cm^2

The formula for the area of a rectangle is base × height

Example

Height = 5 cm



Base = 7 cm

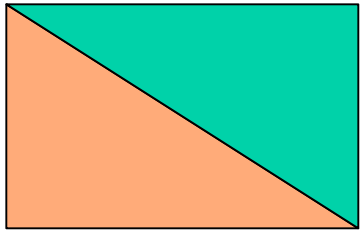
Area = 7 cm × 5 cm

= 35 cm^2

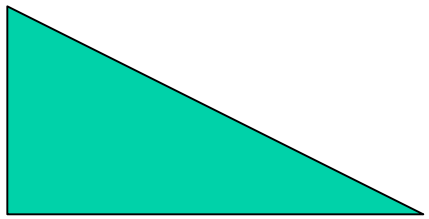
Remember the units are squared when finding the area

AREA OF A TRIANGLE

You can think of a triangle as half of a rectangle



The area of a rectangle is
base × height

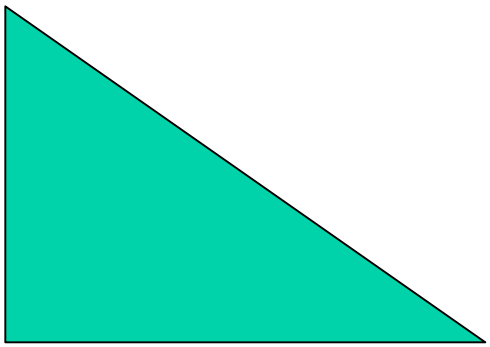


For a triangle it will be half that amount

Area of a triangle = ½ base × height

Example

The area of a triangle is:-



$$\tfrac{1}{2} \text{ base} \times \text{height}$$

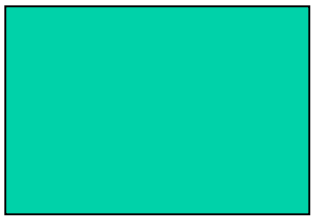
$$= \tfrac{1}{2} \text{ of } 4\text{cm} \times 3 \text{ cm}$$

$$= 2\text{cm} \times 3 \text{ cm}$$

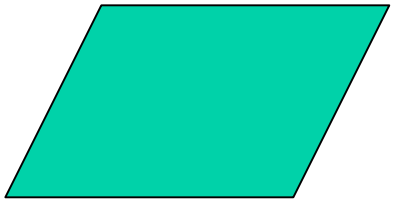
$$= 6 \text{ cm}^2$$

Parallelograms

You could think of a parallelogram as a 'squashed' square



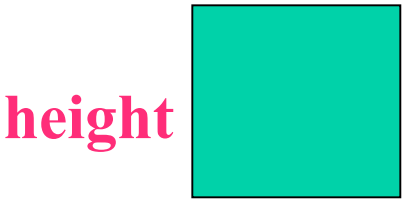
Square

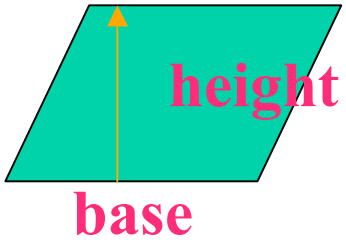


Parallelogram

Therefore we will use the same formula to find the area of a square and a parallelogram

The formula is base × height

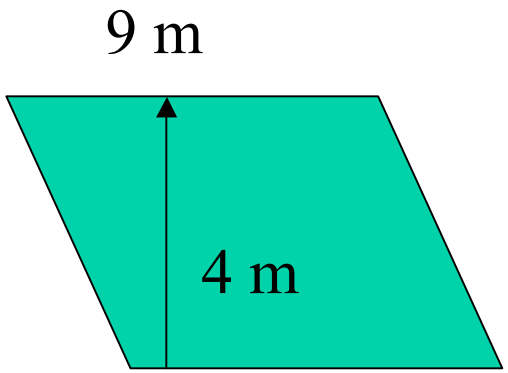




Be careful when finding the height of the parallelogram. You are finding the shortest distance from the bottom to the top

Area of a parallelogram

Example



The formula is
base × height

$= 9\text{ m} \times 4\text{ m}$

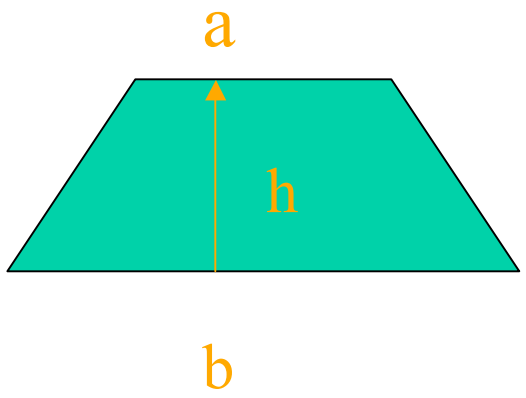
$= 36\text{ m}^2$

Area of a trapezoid

The formula for the area of a trapezoid is:-

$$\tfrac{1}{2}(a + b) \times h$$

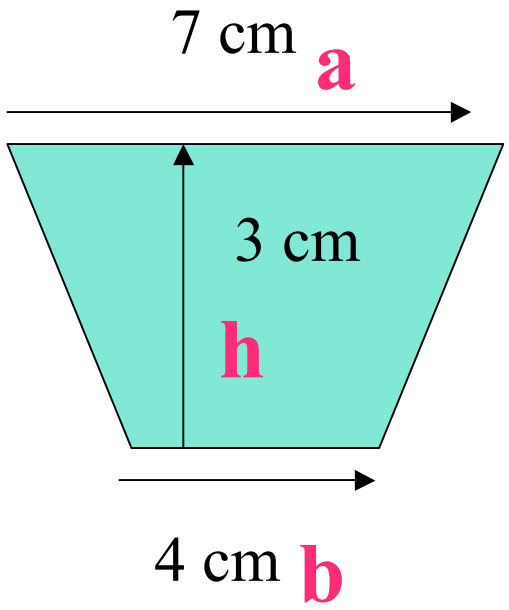
a and b are the parallel lines



It doesn't matter which one you call a and which one you call b, as long as you have used the parallel lines

h is the height of the trapezoid– the shortest 'route' between the parallel lines a and b

Example



The area of a trapezium is:-

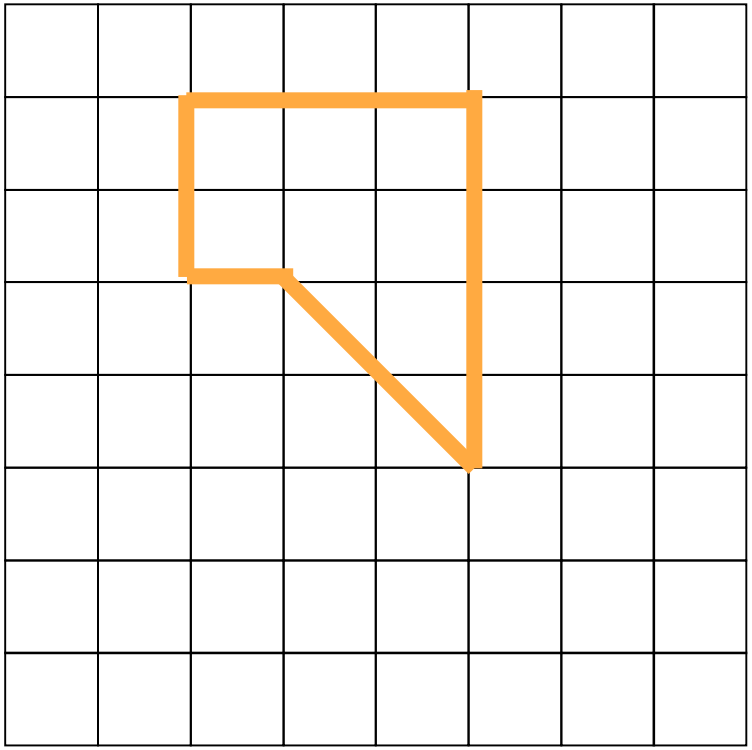
$\frac{1}{2}(a + b) \times h$

$= \frac{1}{2}(7\text{ cm} + 4\text{ cm}) \times 3\text{ cm}$

$= \frac{1}{2} \times (11\text{ cm}) \times 3\text{ cm}$

$= 5.5\text{ cm} \times 3\text{ cm}$

$= 16.5\text{ cm}^2$

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