

Logical Thinking Measurement Comparison Conversion 1

School Grade: K7/K9

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**Calculating Area**

Area is a measure of how much space there is inside a shape. Calculating the area of a shape or surface can be useful in everyday life – for example you may need to know how much paint to buy to cover a wall or how much grass seed you need to sow a lawn.

Obrázok, na ktorom je námestie

Automaticky generovaný popis

Area of a two-dimensional shape is the space occupied by it. In the given square, the space shaded in blue is the area of the square.



The space occupied by the swimming pool above can be found by finding the area of the pool.

Or we can calculate the area of a square field to find the number of saplings to be planted. We measure the area in square units.

**Calculating Area Using the Grid Method**

When a shape is drawn on a scaled grid you can find the area by counting the number of grid squares inside the shape.

Obrázok, na ktorom je šodži, krížovka

Automaticky generovaný popis

In this example there are 10 grid squares inside the rectangle.

In order to find an area value using the grid method, we need to know the size that a grid square represents.

This example uses centimetres, but the same method applies for any unit of length or distance. You could, for example be using inches, metres, miles, feet etc.

Obrázok, na ktorom je text, šodži, krížovka, ClipArt

Automaticky generovaný popis

In this example each grid square has a width of 1cm and a height of 1cm. In other words each grid square is one 'square centimeter'.

Count the grid squares inside the large square to find its area.

There are 16 small squares so the area of the large square is 16 square centimetres.

In mathematics we abbreviate 'square centimetres' to cm2. The 2 means ‘squared’.

Each grid square is 1 cm2.

The area of the large square is 16 cm2.

**Calculating area of square**

The area of a square is defined as the number of square units needed to fill a square. In other words, when we want to find the area of a square, we consider the length of its side. Since all the sides of a square are equal, its area is the product of its two sides. The common units used to measure the area of the square are square meters or square cm.

Observe the square shown below. It has occupied 25 squares. Therefore, the area of the square is 25 square units. From the figure, we can observe that the length of each side is 5 units. Therefore, the area of the square is the product of its sides. Area of square = side × side = 5 × 5 = 25 square units.

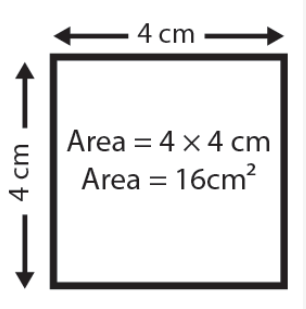
Obrázok, na ktorom je text, šodži, krížovka

Automaticky generovaný popis

The formula for the area of a square when the sides are given is:

Area of a square = Side × Side = S2

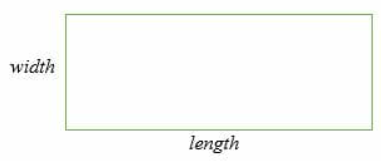
Algebraically, the area of a square can be found by squaring the number representing the measure of the side of the square. Now, let us use this formula to find the area of a square of side 7 cm. We know that the area of a square = Side × Side. Substituting the length of side 7 cm, 7 × 7 = 49. Therefore, the area of the given square is 49 cm2.

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**Calculating area of rectangle**

By definition, the area of a rectangle is the region covered by the rectangle in a two-dimensional plane. A rectangle is a 2-dimensional polygon with four sides, four angles, and four vertices.

A rectangle is composed of two sides: length (L) and width (W). The length of a rectangle is the longest side, whereas the width is the shortest side. The width of a rectangle is sometimes referred to as the breadth (b).



For instance, let us make a rectangle with length = 2 cm and breadth = 3 cm. Let us now try to fit squares of length 1 unit inside this rectangle.

So squares of unit length mean that the length of each side of the square is one. As we can see in the figure below, 6 squares of unit length can easily fit inside this rectangle therefore, we can say that the area of the rectangle is 6 units. Also, we know that the sides of the rectangle are in cm; therefore, the area of the rectangle changes from 6 units to 6 cm.

Obrázok, na ktorom je stôl

Automaticky generovaný popis

The formula for calculating the area of a rectangle can be derived with the help of the below-mentioned steps:

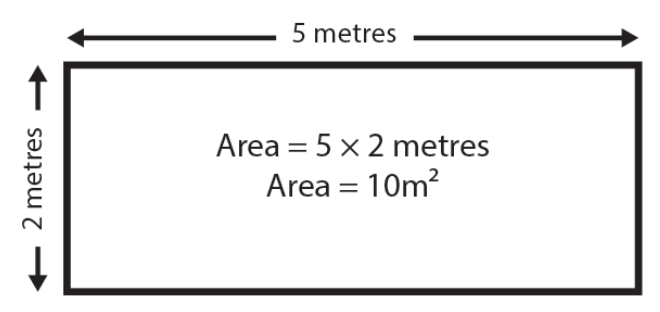
The length and breadth (Width) of the rectangle should be known in advance.

Length and breadth are multiplied and the result obtained is the required area.

The unit of area is square of the unit of its length and breadth

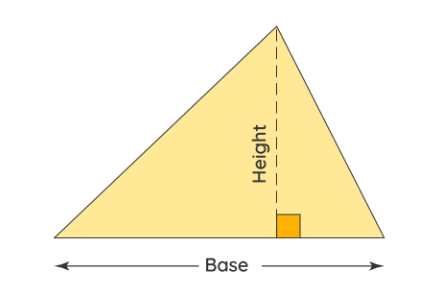
From the above steps, the formula of a rectangle can be written like this.

Area of a rectangle (A) = Length(L) × Breadth(B), where L is the length of the rectangle and B is the breadth of the rectangle.

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**Calculating area of triangle**

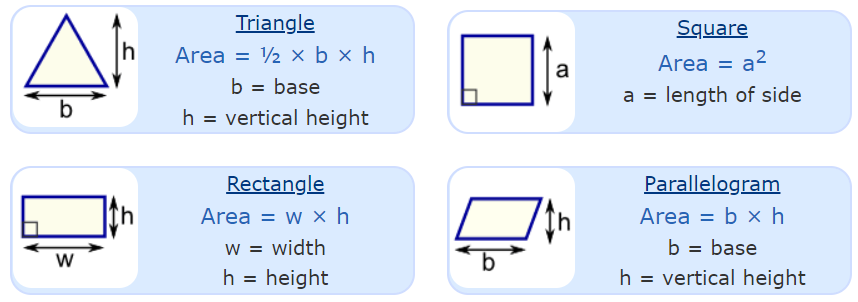
The basic formula for the area of a triangle is equal to half the product of its base and height, i.e., A = 1/2 × b × h. This formula is applicable to all types of triangles, whether it is a scalene triangle, an isosceles triangle, or an equilateral triangle. It should be remembered that the base and the height of a triangle are perpendicular to each other.



The area of a triangle can be calculated using various formulas. For example, Heron’s formula is used to calculate the triangle’s area, when we know the length of all three sides. Trigonometric functions are also used to find the area of a triangle when we know two sides and the angle formed between them. However, the basic formula that is used to find the area of a triangle is:

Area of triangle = 1/2 × base × height

**Formulas**

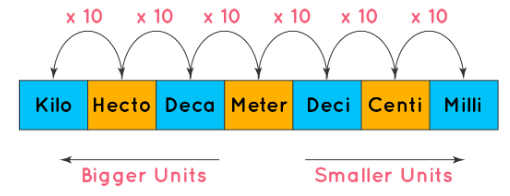


**Units of length**

In math when we use length, we know that the standard unit of length is ‘Meter’ which is written in short as ‘m’.

A meter length is divided into 100 equal parts. Each part is named centimeter and written in short as ‘cm’. Thus, 1 m = 100 cm and 100 cm = 1 m.

The unit is denoted by the alphabet (m). Look at the chart below. The base unit is "m" and we add "Deca," "Hecto," and "Kilo" to measure large units by successively multiplying by 10 and "deci," "centi," and "milli" successively dividing by 10, to measure smaller length.



The different units of length conversion charts and their equivalents are given here:

1 kilometre (km) = 10 Hectometres (hm) = 1000 m

1 Hectometre (hm) = 10 Decametres (dcm) = 100 m

1 Decametre (dcm) = 10 Metres (m)

1 Metre (m) = 10 Decimetres (dm) = 100 cm = 1000 mm

1 Decimetre (dm) = 10 Centimetres (cm)

1 decimeter = 0.1 meter

1 Centimetre (cm) = 10 Millimetres (mm)

1 centimeter = 0.01 meter

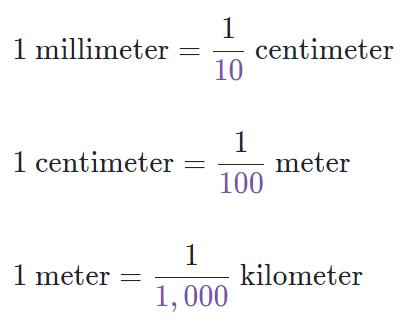
1 millimeter = 0.001 meter

To convert larger units to smaller units we multiply the number of larger units by the green conversion factor for the appropriate smaller units.

Obrázok, na ktorom je text

Automaticky generovaný popis

To convert smaller units to larger units we divide the number of smaller units by the purple conversion factor for the appropriate larger units.



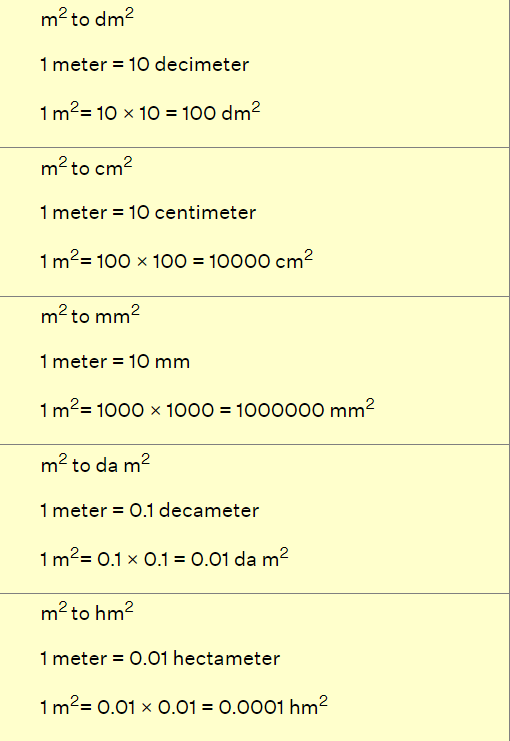
**Units of area**

The area is measured in square units. A square of side 1 cm or 1 m is used as standard units. Smaller unit of area is square cm or sq. cm. Bigger areas are measured in meters and kilometers.

We measure a given region by a unit region and find how many such unit regions are contained in the given region.

The area of a square with side 1 cm each is 1 cm × 1 cm = 1 square centimeter. In short, it is expressed as cm2 or sq. cm.

Conversion table:

Obrázok, na ktorom je stôl

Automaticky generovaný popis

**Examples**

1) Find the area of a square park whose perimeter is 360 m.

2) If the perimeter of a rectangle is 60 cm and its length is 5 times the width, find the area of the rectangle.

3) Find the area of a triangle with a base of 10 meters and a height of 5 meters.

4) a) 16 m= \_\_\_\_\_mm

b) 45 deci meter = \_\_\_ m

c) 68 millimeter = \_\_\_\_\_m

5) a) Convert 3 m2 to  cm2

b) Convert 45 000 cm2 to m2

c) Convert 7800 mm2 to cm2

**Answer key**

1) Given: Perimeter of the square park = 360m  
We know that,  
Perimeter of a square = 4 × side  
⇒ 4 × side = 360  
⇒ side = 360/4  
⇒ side = 90m  
Area of a square = side2  
Hence, Area of the square park = 902 = 90 × 90 = 8100 m2  
Thus, the area of a square park whose perimeter is 360 m is 8100 m2.

2) Let the width be x.

Length is 5 times its width, length = 5x.

But the perimeter of a rectangle =2(l + w) = 60 cm

Substitute 5x for l and x for w.

60 = 2(5x + x)

60 = 12x

Divide both sides by 12 to get.

x = 5

Now substitute x = 5 for the equation of length and width.

Therefore, width = 5 cm and length = 25 cm.

But the area of a rectangle = l x w

= (25 x 5) cm2

= 125 cm2

3) Let us find the area using the area of triangle formula:

Area of triangle = (1/2) × b × h

A = 1/2 × 10 × 5

A = 1/2 × 50

Therefore, the area of the triangle (A) = 25 m2

4) a)  1 meter = 1000 milli meter

    16 meter = 16 × 1000

       = 16000 mm

b) 1 deci meter = 0.1 m

45 deci meter = 45 × 0.1

= 4.5 m

c) 1 millimeter = 0.001 meter

68 millimeter = 68 × 0.001

= 0.068 m

5)

a) The units involve metres and centimetres

1 m=100 cm

The question involves square units, so we need to square the unit conversion.

1002 = 10000

As we are going from larger units to smaller units we multiply.

3 x 1002 = 3 x 10 000=30 000

So, 3 m2  is 30 000 cm2

b) The units involve metres and centimetres

1 m=100 cm

The question involves square units, so we need to square the unit conversion.

1002 = 10000  
As we are going from smaller units to larger units we divide.

45 000 / 1002 =45 000 / 10 000 =4.5

So, 45 000 cm2  is  4.5 m2

c) The units involve centimetres and millimetres

1 cm= 10 mm

The question involves square units, so we need to square the unit conversion.

102 = 100

As we are going from smaller units to larger units we divide.

7800 / 102 =7800 / 100 =78

So, 7800 mm2  is  78 cm2

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