Area and Perimeter - GCSE Maths

Contents

1.Introduction

AREA

- The amount of space inside of any 2-Dimensional shape is Area
- Calculation of area for every shape is done in different way
- The Area is measured in square units.

PERIMETER

- The sum of sides of any shape it is made up of is known as Perimeter (the distance around a shape)
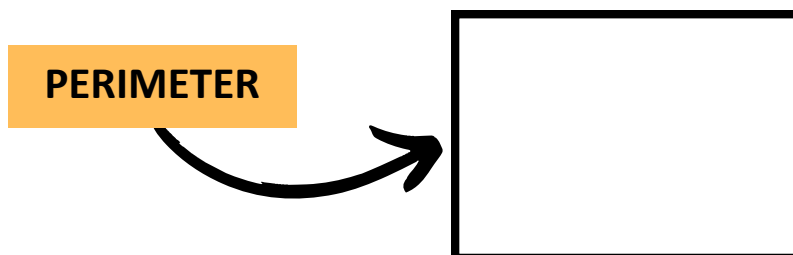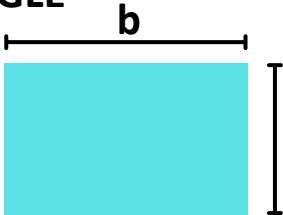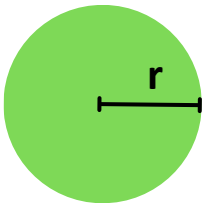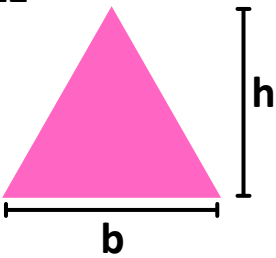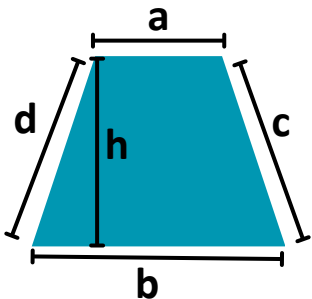- Calculation of Perimeter for almost every shape is common.
- The Perimeter is measured in linear units.

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2. Area and Perimeter of different shapes -

SHAPE	AREA	PERIMETER
SQUARE	a X a (side)^2	a + a + a + a = 4a (4 X sides)
RECTANGLE	l X b	2 X (l + b)
CIRCLE	π X radius^2	2 X π X radius
TRIANGLE	(1/2) X base X height	sum of all three sides
TRAPEZIUM	A = 1/2 X (a + b) X h	P = a + b + c + d

3. Real life Examples of Area and Perimeter

65m

AREA

50m
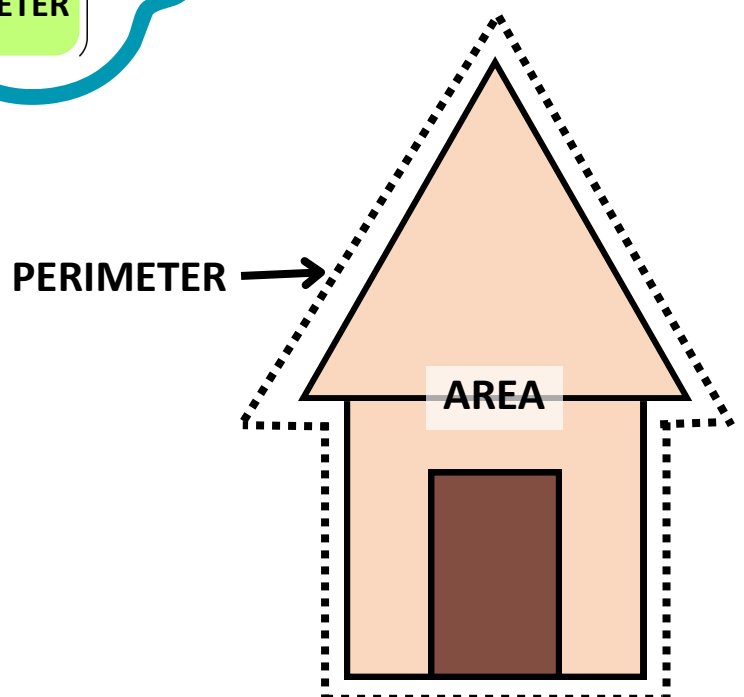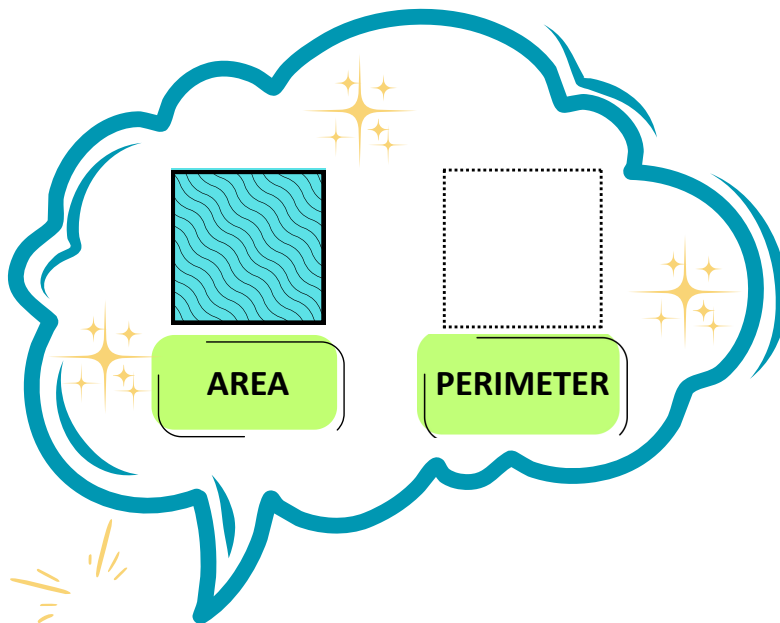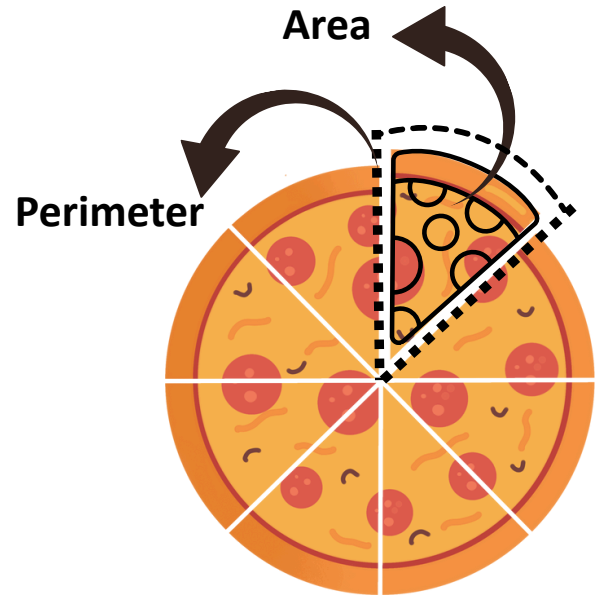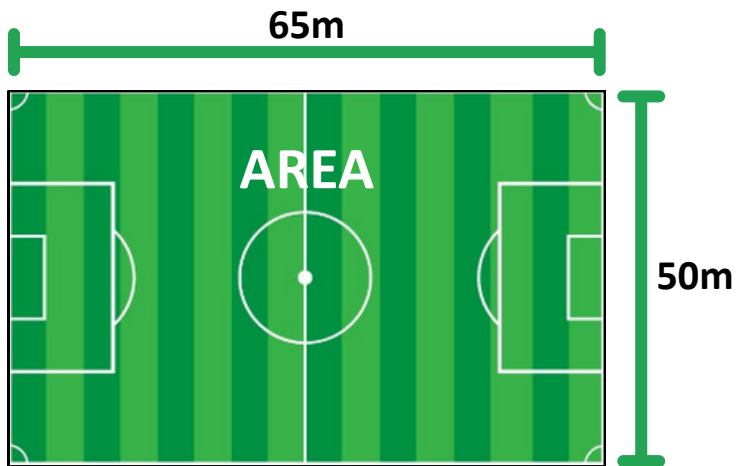
Area

Perimeter

AREA

PERIMETER

PERIMETER →

AREA

4. Solved Examples

Example: Find the area and perimeter of circles with radius equal to -

   1) r = 5cm

   2) r = 7cm

Solution: (1) The Area and Perimeter of circle with radius 5cm -

$$\text{Area} = \pi \times \text{radius}^2$$
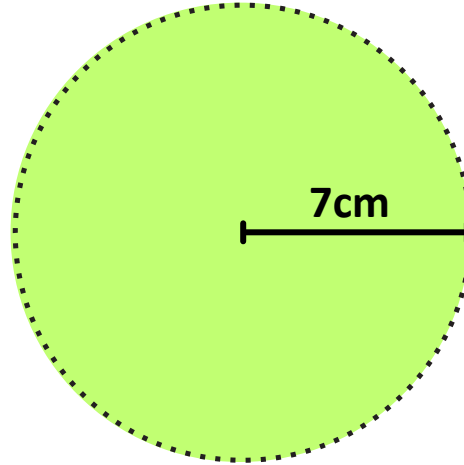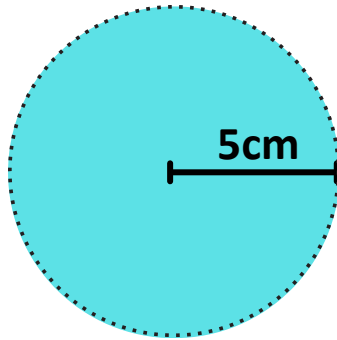
$$= \pi \times (5)^2 \qquad \text{(using } \pi = 3.14)$$

$$= (3.14 \times 25) \text{ cm}^2$$

$$= 78.5 \text{ cm}^2$$

$$\text{Perimeter} = 2 \times \pi \times \text{radius}$$

$$= (2 \times 3.14 \times 5) \text{ cm}$$

$$= 31.4 \text{ cm}$$

(2) The Area and Perimeter of circle with radius 7cm -

$$\text{Area} = \pi \times \text{radius}^2$$

$$= \pi \times (7)^2$$

$$= (3.14 \times 49) \text{ cm}^2$$

$$= 153.86 \text{ cm}^2$$

$$\text{Perimeter} = 2 \times \pi \times \text{radius}$$

$$= (2 \times 3.14 \times 7) \text{ cm}$$

$$= 43.96 \text{ cm}$$

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Example: If a rectangular field is of of following dimensions find the its area and length of required fence for the field -

Length = **20cm,** Breadth = **15cm**

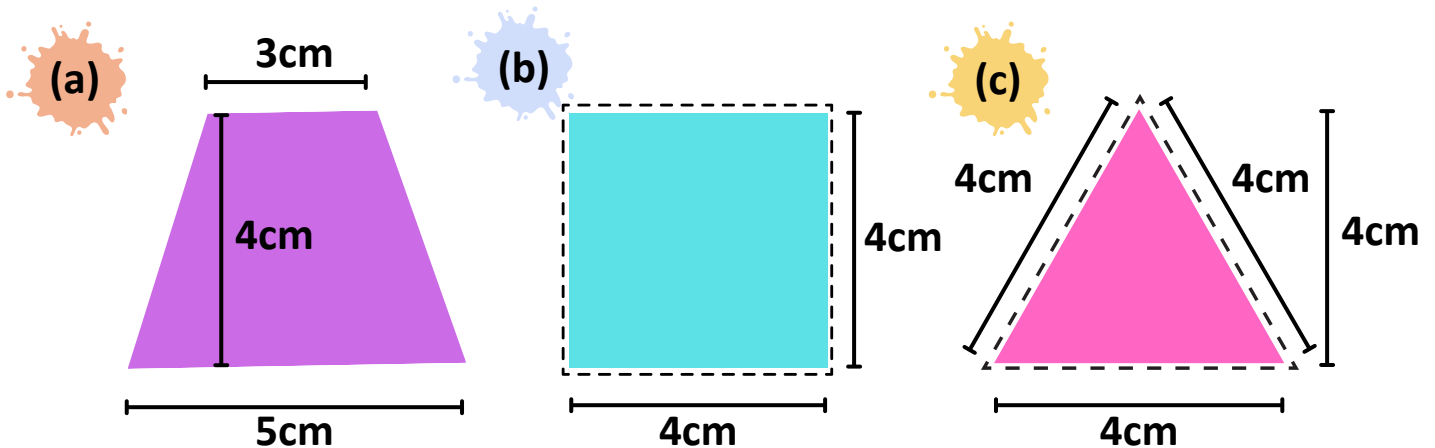**Solution:** To find the length of required fence for the field we will find out the perimeter -

Perimeter = 2 X (Length + Breadth)

$= 2 \times (20 + 15)$ cm

$= 2 \times 35$ cm

$= 70$ cm

Area = Length X Breadth

$= (20 \times 15)$ cm^2

$= 300$ cm^2

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Example: Find the the Area and Perimeter of the following 2 Dimensional shapes -

(a)
3cm

4cm

5cm

(b)
4cm

4cm

(c)
4cm   4cm   4cm

4cm

Solution: (a) The Area and Perimeter of Trapezium -

$$\text{Area} = \frac{1}{2} \times \text{(parallel sides)} \times \text{height}$$

$$= [\frac{1}{2} \times (3 \times 5) \times 5] cm^2$$

$$= (\frac{1}{2} \times 15 \times 5) cm^2$$

$$= (\frac{75}{2}) cm^2$$

$$= 36.2 \ cm^2$$

Perimeter of Trapezium -

$$\text{Perimeter} = \text{Sum of all the sides}$$

$$= (3 + 3 + 4 + 4) cm$$

$$= 14 \ cm$$

(b) Area and Perimeter of a square having a side equal to 4cm -

$$\text{Area} = (\text{side})^2$$

$$= (4\text{ cm})^2$$

$$= 16\text{ cm}^2$$

$$\text{Perimeter} = 4 \times \text{side}$$

$$= 4 \times 4\text{ cm}$$

$$= 16\text{ cm}$$

(c) Area and Perimeter of a Triangle with base equal to 4cm and height equal to 4cm -

$$\text{Area} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times 4 \times 4\text{ cm}^2$$
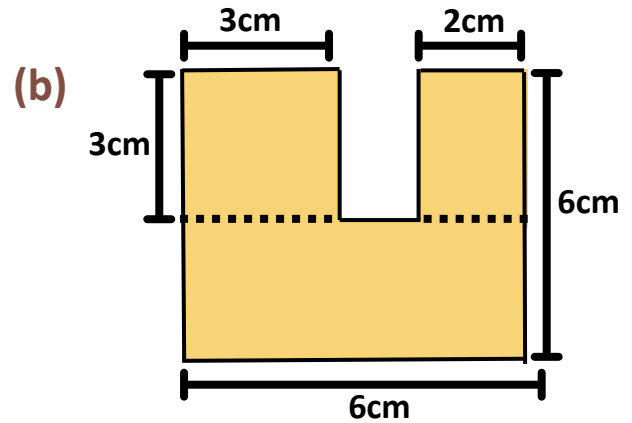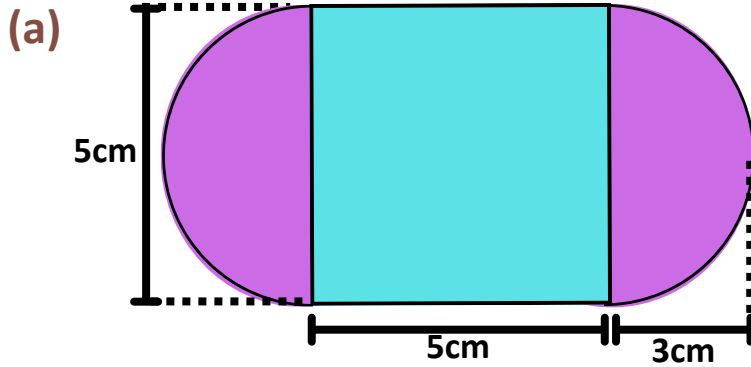
$$= \frac{16}{2}\text{ cm}^2 = 8\text{cm}^2$$

$$\text{Perimeter} = \text{Sum of all the sides}$$

$$= (4 + 4 + 4)\text{ cm}$$

$$= 12\text{ cm}$$

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Example: Work out the area of the following shapes -

(a)

5cm

5cm   3cm

(b)

3cm   2cm

3cm

6cm

6cm

Solution:

(a) The shape is combination of three shapes the two semi-circles and one square. The area of this shape will be -

Area = 2 X Area of semi-circle + Area of Square

$= 2 \times \pi r^2 + (\text{Side})^2$

$= 2 \times [\ 3.14 \times (3)^2\ ] + (5)^2 \ cm^2$ (using π = 3.14)

$= (\ 56.52 + 25\ )\ cm^2$

$= 81.52\ cm^2$

(b) The shape is combination of two Rectangles and one square -

Area = Area of 1st rectangle + 2nd rectangle

+ Area of square

$= (2 \times 3) + (6 \times 3) + (3 \times 3)\ cm^2$

$= 6 + 18 + 9\ cm^2$

$= 33\ cm^2$