PERIMETER AND AREA

CLASS 7

CHAPTER 11

MODULE 2/2

CONTENTS

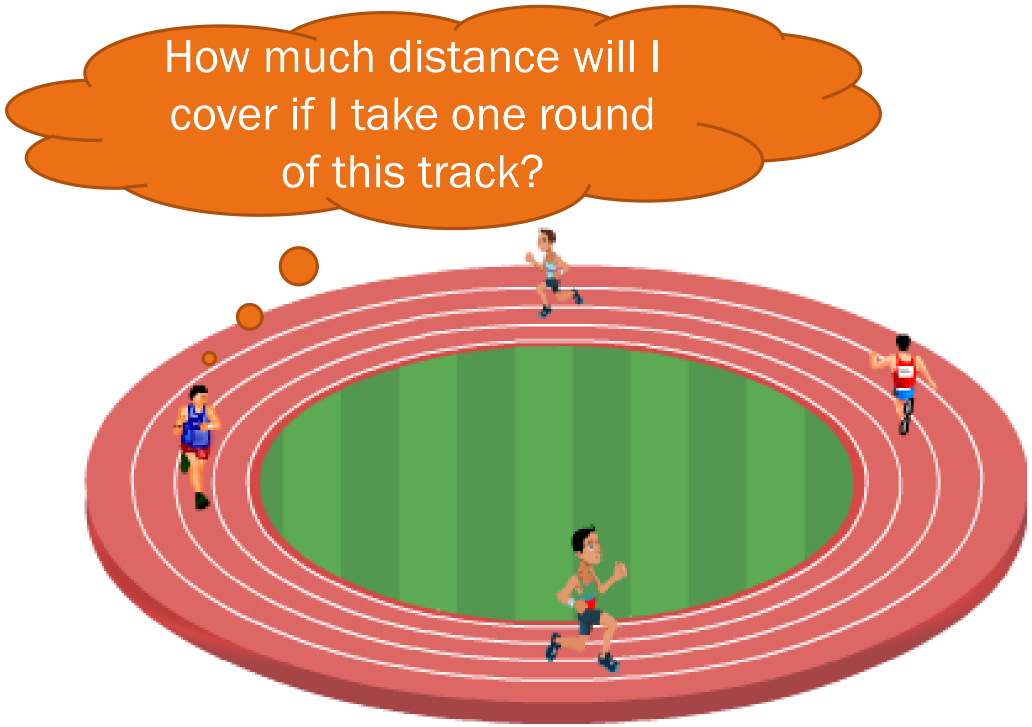
Recapitulation of Module 1

1. Perimeter of a square = 4 × side
2. Perimeter of a rectangle = 2 × (length + breadth)
3. Area of a square = side × side
4. Area of a rectangle = length × breadth
5. Area of a parallelogram = base × height
6. Area of a triangle = $\frac{1}{2} \times \text{base} \times \text{height}$

CIRCLES

A circle is a closed curve consisting of all points in a plane which are at equidistant from a fixed point inside it.

The distance around a circle is called the circumference of the circle.



CIRCUMFERENCE OF A CIRCLE - ACTIVITY

Draw 5 circles of different radii and find their circumference by using string. Also find the ratio of the circumference to its diameter:

Circle	Radius	Diameter	Circumference	Ratio of Circumference to Diameter
1	3.5cm	7cm	22cm	$\frac{22}{7}$ = 3.14
2	7.0cm	14cm	44cm	$\frac{44}{14}$ = 3.14
3	10.5cm	21cm	66cm	$\frac{66}{21}$ = 3.14
4	21cm	42cm	132cm	$\frac{132}{42}$ = 3.14
5	5cm	10cm	32cm	$\frac{32}{10}$ = 3.2

The ratio of circumference and diameter is a constant and is denoted by π (pi).

Its approximate value is $\frac{22}{7}$ or 3.14

$$\frac{C}{d} = \frac{C}{2r} = \pi.$$

Therefore, Circumference of a circle = 2π(radius) = $\pi \times$ diameter

A circle has the shortest perimeter of all closed figures with the same area. Justify with an example.

Example

Find the distance covered by a wheel of diameter 70cm in one revolution.

Solution:

Diameter of the wheel = 70cm

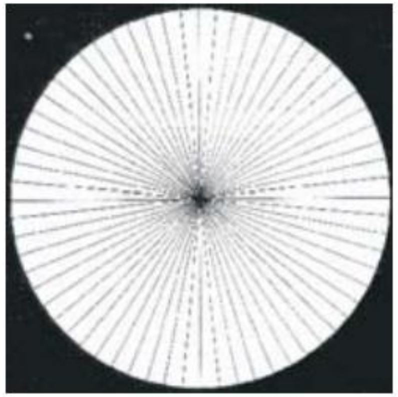
Distance covered by the wheel = Circumference of the wheel

$= \pi d$

$= \frac{22}{7} \times 70 = 220\text{cm}$

AREA OF A CIRCLE – ACTIVITY

Draw a circle of radius r. Now fold the circle into 64 folds and cut along the folds. Arrange the pieces as shown in figure



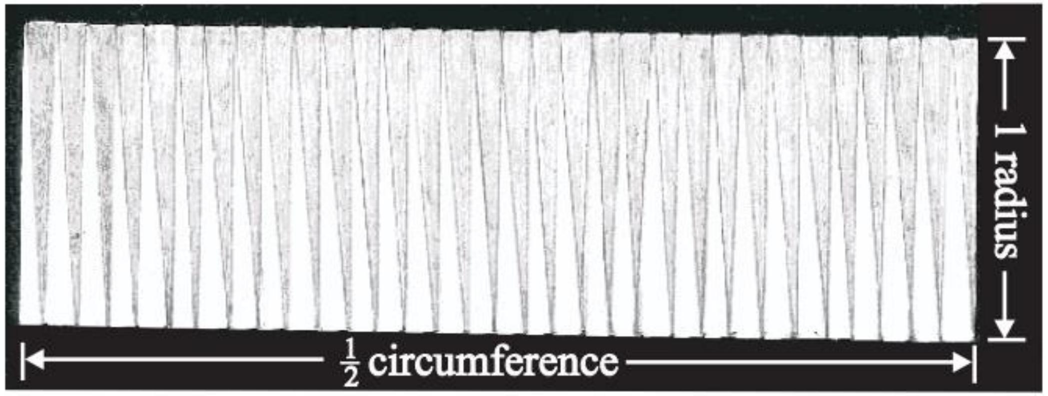


Figure2 looks like a rectangular region with length equal to half the circumference and breadth equal to radius of the circle.

AREA OF A CIRCLE

Area of circle = Area of rectangle = length x breadth

$= \frac{1}{2}$ (Circumference) x r

$= \frac{1}{2}$ x 2πr x r

Area of circle $= \boldsymbol{\pi r^2}$

Example: Find the area of circle of radius 7cm.

Solution:

Radius of circle = 7cm

Area of circle $= \pi r^2$

$= \frac{22}{7}$ x 7 x 7 = 154 cm^2

AREAS OF RECTANGULAR PATHS:

Below are some of the examples of rectangular paths

A rectangular grassy lawn is surrounded by a pathway.

A verandah constructed all along outside the room (Area)

Area of margin in a painting.

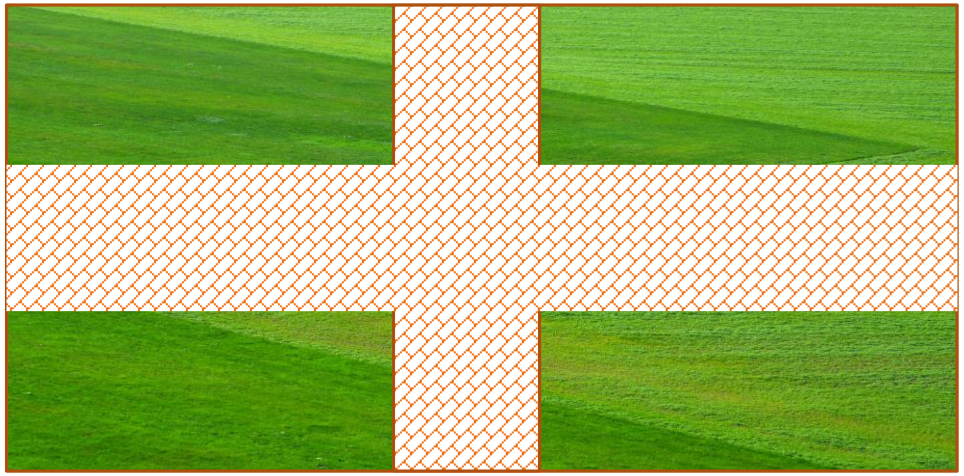
TYPE 1: Path runs outside/inside the given rectangle

Rule1: When the path runs outside, twice the width of the pathway should be added to length and breadth of the inner rectangle.

Rule2: When the path runs inside, twice the width of the path should be subtracted from the length and breadth of the outer rectangle.

TYPE 2: Central Paths

When the paths run in the centre of the given rectangle, the area of the middle small square should be subtracted from the sum of the areas of the two paths



EXAMPLE

A grassy plot is 70 x 45m. Two cross paths each 5m wide are constructed at right angles through the centre of the field, such that each path is parallel to the sides of rectangle. Find the total area of the path.

Solution:

Area of the crossroads is the area of shaded portion, i.e., the area of the rectangle PQRS and the area of the rectangle EFGH. But while doing this, the area of the square KLMN is taken twice, which is to be subtracted.

Now, PQ = 5 m and PS = 45 m

EH = 5 m and EF = 70 m

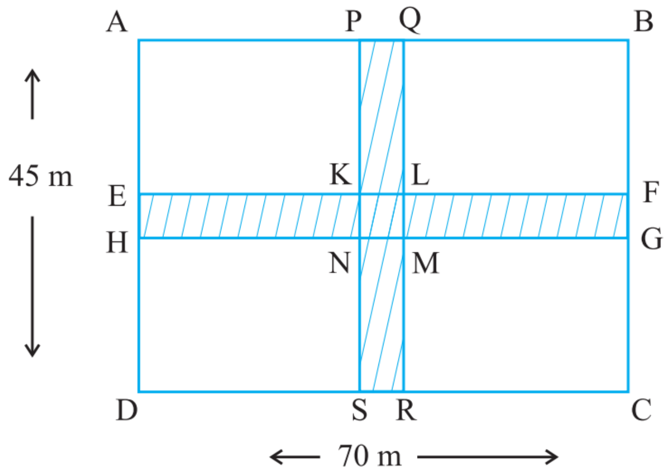
KL = 5 m and KN = 5 m

Area of the path = (Area of the rectangle) + (PQRS area of the rectangle EFGH) – (Area of the square KLMN)

$= (PS \times PQ) + (EF \times EH) - (KL \times KN)$

$= (45 \times 5) + (70 \times 5) - (5 \times 5)\ m^2$

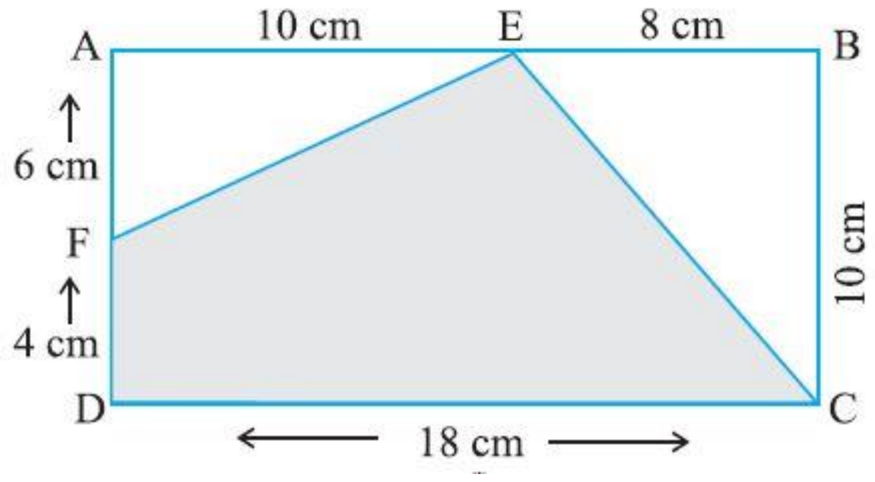
$= (225 + 350 - 25)\ m^2 = 550\ m^2$



EXAMPLE

In the following figure, find the area of the shaded portions

Given ∠A = 90°, ABCD is a rectangle



Solution:

Area of the rectangle ABCD = l x b = 18 x 10

= $180\ \text{cm}^2$

Area of Δ FAE = $\frac{1}{2}$ x b x h = $\frac{1}{2}$ x 6 x 10

= $30\ \text{cm}^2$

Area of Δ EBC = $\frac{1}{2}$ x10 x 8

= $40\ \text{cm}^2$

Therefore, Area of shaded region = 180 – (30 + 40)

= 180 – 70

= $110\ \text{cm}^2$

Choose the correct answer:

1. Formula used to find the area of a circle is

(i) $2\pi r$ *units* (ii) $\pi r^2 + 2r$ *units* (iii) πr^2 *sq. units* (iv)πr^3 *cu. Units*

2. In the formula, $C = 2\pi r$, '*r*' refers to

(i) Circumference (ii) area (iii) rotation (iv) radius

3. If the circumference of a circle is 82π, then the value of 'r' is

(i) 41 cm (ii) 82 cm (iii) 21 cm (iv) 20 cm

4. Circumference of a circle is always

(i) three times of its diameter

(ii) more than three times of its diameter

(iii) less than three times of its diameter

(iv) three times of its radii

5. The ratio of the area of a circle to the area of its semicircle is

(i) 2:1 (ii) 1:2 (iii) 4:1 (iv) 1:4

THANK YOU