



ST. LAWRENCE HIGH SCHOOL



A JESUIT CHRISTIAN MINORITY INSTITUTION

Sub: Arithmetic

Class: 7

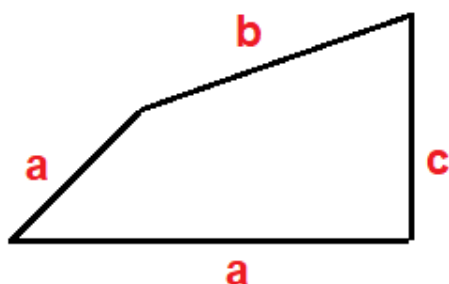
Date: 07.05.20

STUDY MATERIAL: PERIMETER AND AREA

Important Formulae and Concepts

Perimeter

- Perimeter is the total length or total distance covered along the boundary of a closed shape.

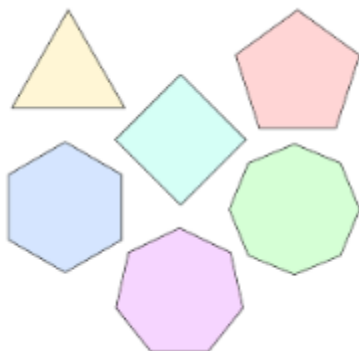


$$p = a + b + c + d$$

The perimeter of a Quadrilateral

Area

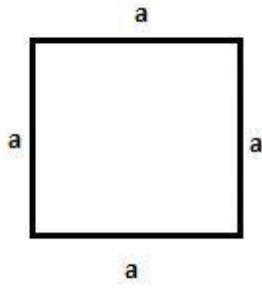
- The area is the total amount of surface enclosed by a closed figure.



Areas of a closed figure

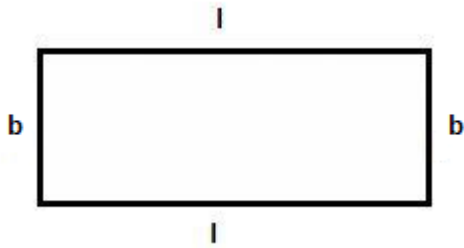
The perimeter of Square and Rectangle

- Perimeter of a square = $a + a + a + a = 4a$, where a is the length of each side.



Square with side length 'a' units

- Perimeter of a rectangle = $l + l + b + b = 2(l + b)$, where l and b are length and breadth, respectively.

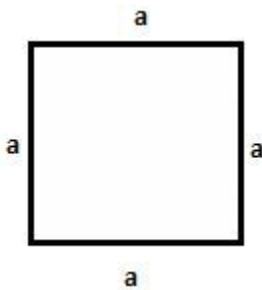


Rectangle with length 'l' units and breadth 'b' units

Area of Square & Rectangle

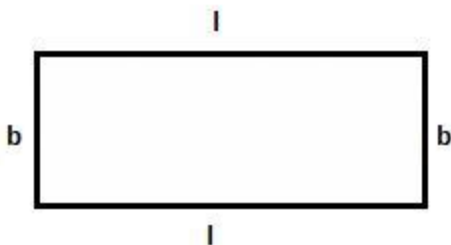
Area of square = $4a^2$

Here a is the length of each side



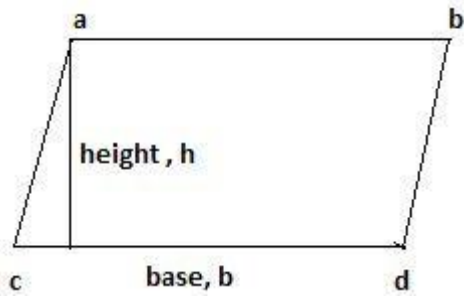
Square with the length of each side 'a' units

Area of rectangle = Length(l) \times Breadth(b) = $l \times b$



Rectangle with length 'a' units and breadth 'b' units

Area of a Parallelogram

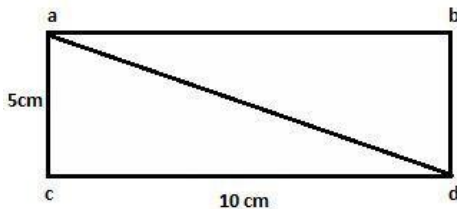


- Area of parallelogram ABCD = (base × height)

Area of parallelogram ABCD = $(b \times h)$

Triangle as Part of Rectangle

- The rectangle can be considered as a combination of two congruent triangles.
- Consider a rectangle ABCD, it is divided into 2 triangles ACD and ABD.

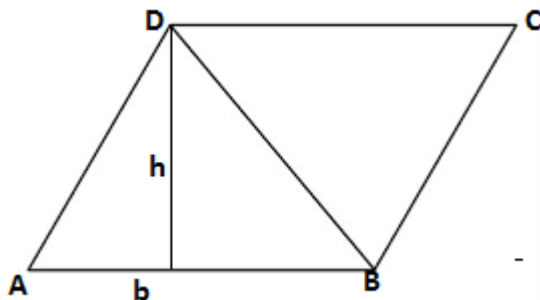


Triangles as parts of Rectangle

- Area of each triangle = $\frac{1}{2}$ (Area of the rectangle).
- = $\frac{1}{2}$ (length × breadth)
- = $\frac{1}{2}$ (10cm × 5cm)
- = 25cm²

Area of a Triangle

- Consider a parallelogram ABCD.
- Draw a diagonal BD to divide the parallelogram into two congruent triangles.



Area of Triangle

- Area of triangle ABD = $\frac{1}{2}$ (Area of parallelogram ABCD)
- = $\frac{1}{2}$ (base × height)

Area of triangle ABD = $\frac{1}{2}(b \times h)$

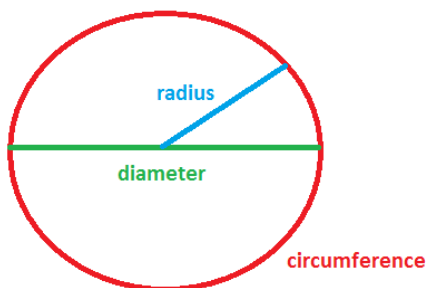
Conversion of Units

- Kilometres, metres, centimetres, millimetres are units of length.
- 10 millimetres = 1 centimetre
- 100 centimetres = 1 metre
- 1000 metres = 1 kilometre

Life of Pi

Terms Related to Circle

- A **circle** is a **simple closed curve** which is not a polygon.
- A circle is a **collection of points** which are **equidistant from a fixed point**.



- The fixed point in the middle is called the **centre**.
- The fixed distance is known as **radius**.
- The perimeter of a circle is also called as the **circumference** of the circle.

Circumference of a Circle

- The **circumference** of a circle (C) is the **total path** or **total distance** covered by the circle. It is also called a **perimeter** of the circle.

Circumference of a circle = $2 \times \pi \times r$,

where r is the radius of the circle.

Visualizing Area of a Circle

Area of Circle

- **Area of a circle** is the **total region enclosed** by the circle.

Area of a circle = $\pi \times r^2$, where r is the radius of the circle.

Introduction and Value of Pi

- **Pi (π)** is the constant which is defined as the ratio of a circle's **circumference ($2\pi r$)** to its **diameter ($2r$)**.

$$\pi = \frac{\text{Circumference}(2\pi r)}{\text{Diameter}(2r)}$$

- The value of pi is approximately equal to 3.14159 or 22/7.

SOLVED NUMERICALS

Cost of Framing, Fencing

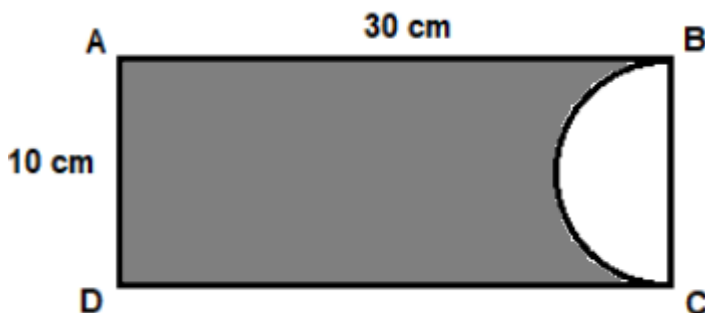
- Cost of framing or fencing a land is calculated by finding its perimeter.
- Example: A square-shaped land has length of its side 10m.
Perimeter of the land = $4 \times 10 = 40\text{m}$
Cost of fencing 1m = Rs10
Cost of fencing the land = $40\text{m} \times \text{Rs}10 = \text{Rs } 400$

Cost of Painting, Laminating

- Cost of painting a surface depends on the area of the surface.
- Example: A wall has dimensions 5m×4m.
Area of the wall = $5\text{m} \times 4\text{m} = 20\text{m}^2$
Cost of painting 1m² of area is Rs 20.
Cost of painting the wall = $20\text{m}^2 \times \text{Rs } 20 = \text{Rs } 400$

Area of Mixed Shapes

- Find the area of the shaded portion using the given information.



Area of the shaded portion

Solution: Diameter of the semicircle = 10cm

Radius of semicircle = 5cm

Area of the shaded portion = Area of rectangle ABCD – Area of semicircle

Area of the shaded portion = $l \times b - \pi r^2$

$$= 300 - \pi \times 5^2$$

$$= 300 - \pi \times 25$$

$$= 600 - 25\pi$$

$$= 600 - 78.52$$

$$= 260.7 \text{ cm}^2$$

Solution of Previous Years' Question Papers

2019

1st term

- 5) Find the perimeter of a square whose area is 441 m².

$$a = \sqrt{441} = 21 \text{ m}$$

$$\therefore \text{Perimeter} = 4 \times 21 = 84 \text{ m}$$

- 6) The area of a rectangular field is 120 m^2 . Its length is 40 m. Find the cost of fencing the boundary of the field at the rate of ₹ 3.20 per metre.

$$\text{Breadth of the field} = \frac{120}{40} \text{ m} = 3 \text{ m}$$

$$\therefore \text{Perimeter of the field} = 2(40+3) \text{ m} = 86 \text{ m}$$

$$\therefore \text{Total cost} = ₹ 86 \times 3.20 = ₹ 275.20$$

- 7) A room measures 12 m x 9 m. The floor of the room is to be covered by marble tiles measuring 45 cm by 30 cm. How many tiles are needed?

$$\text{Required no. of tiles} = \frac{\text{Area of the floor}}{\text{Area of each tile}} = \frac{1200 \times 900}{45 \times 30} = 800 \text{ tiles}$$

- 8) A path 2 m wide is built along the border inside a square park of side 100 m. Find the cost of covering the remaining portion of park by grass at the rate of ₹15 per sq. m.

Area of the portion of the park to be covered by grass

$$\therefore \text{Required cost} = ₹ (96 \times 96 \times 15) = ₹ 138240$$

3rd Term

- vi) The area of a rectangular field is 1120 m^2 . It's length is 40m. Find the cost of fencing the boundary of the field of rate of Rs 3.20 per meter.

Ans- Breadth = $1120/40 = 28 \text{ m}$. Therefore perimeter = $2(40+28) = 136 \text{ m}$. Hence cost of fencing = $136 \times 3.20 = ₹ 435.20$

2018

1st Term

- (iv) The area of a rectangular garden is 850 m^2 . Its breadth is 17m. Find its length and perimeter.

(iv) Area = 850 sq. m and Breadth = 17 m .

$$\therefore \text{Length} = \frac{850}{17} = 50 \text{ m}$$

$$\therefore \text{Perimeter} = 2(50 + 17) \text{ m} = 2 \times 67 \text{ m} = 134 \text{ m}$$

- (v) The perimeter of a square park is 832 m. Find the area of the park.

$$(v) 4 \times (\text{Side}) = 832 \text{ m}$$

$$\therefore \text{Side} = \frac{832}{4} = 208 \text{ m.}$$

So, the area of the square park = $(\text{Side})^2 = (208)^2 = 43264 \text{ Sq. Meter.}$

3rd Term

- (vi) A room measure $12 \text{ m} \times 9 \text{ m}$. The floor of the room is to be covered by marble tiles measuring 45 cm by 30 cm. How many tiles are required?

$$\text{Number of tiles needed} = \frac{\text{Area of the floor}}{\text{Area of one tile}} = \frac{12 \times 9}{\frac{45}{100} \times \frac{3}{10}} = \frac{12 \times 9 \times 100 \times 10}{45 \times 3} = 800$$

Exercise Problems

1. Find the area and perimeter of the following rectangles whose dimensions are:

(a) length = 17 m breadth = 13 m

(b) length = 6.9 cm breadth = 5.1 cm

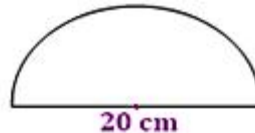
(c) length = 5 m breadth = 32 dm

(d) length = 9 hm breadth = 7 dam

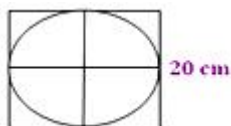
2. The perimeter of a rectangle is 230 cm. If the length of the rectangle is 70 cm, find its breadth and area.
3. The area of a rectangle is 96 cm^2 . If the breadth of the rectangle is 8 cm, find its length and perimeter.
4. How many tiles whose length and breadth are 13 cm and 7 cm respectively are needed to cover a rectangular region whose length and breadth are 520 cm and 140 cm?
5. Find the cost of tiling a rectangular plot of land 300 m long and 150 m wide at the rate of \$6 per hundred square m.
6. If it costs \$1600 to fence a rectangular park of length 20 m at the rate of \$25 per m^2 , find the breadth of the park and its perimeter. Also, find the area of the field.
7. How many rectangles can be drawn with 38 cm as perimeter? Also, find the dimensions of the rectangle whose area will be maximum.
8. The length of a rectangular wooden board is thrice its width. If the width of the board is 120 cm, find the cost of framing it at the rate of \$5 for 20 cm.
9. Find the perimeter and area of the following squares whose dimensions are:
 - a) 16 cm
 - b) 5.3 m
 - c) 2 m 37 cm
 - d) 86 dm
10. Find the perimeter of a square whose area is 625 cm^2 .
11. Find the area of the square whose perimeter is 440 cm.
12. The area of a square field is 100 ares. Find its perimeter.
13. How many square tiles of side 9 cm will be needed to fit in a square floor of a bathroom of side 720 cm. Find the cost of tiling at the rate of \$75 per tile.
14. The areas of a square and rectangle are equal. If the side of the square is 20 cm and the breadth of the rectangle 10 cm, find the length of the rectangle and its perimeter.
15. If it costs \$2400 to fence a square field at the rate of \$6 per m, find the length of the side and the area of the field.
Perimeter = (Total cost)/(Cost per m^2)
16. A wire in the shape of rectangle whose width is 22 cm is bent to form a square of side 31 cm. Find the length of the rectangle. Also, find which shape encloses more area.
17. The area of a square field is 81 hectares. Find the cost of fencing the field with a wire at the rate of \$2.25 per m.
18. Convert the following units:

- a) 17 m^2 to cm^2
 - b) 18000 m^2 to hectares
 - c) 3000 m^2 to ares
 - d) 6.3 m^2 to mm^2
 - e) 3.7 hectares to ares
19. A verandah 1.25 m is constructed all along outside of a room 7.5 m long and 5 m wide.
- Find:**
- a) the area of the verandah.
 - b) the cost of cementing the floor of the verandah at the rate of \$15 per m^2 .
20. A floor is 10 m long and 6 m wide. A square carpet of side 5 m is laid on the floor. Find the area of the floor not carpeted.
21. Four square flowerbeds each of sides 2 m are dug on a piece of land 12 m long and 9 m wide. Find the area of the remaining portion of the land. Find the cost of levelling this land at the rate of \$3 per 100 cm^2 .
22. The side of a square flowerbed is 1 m 60 cm. It is enlarged by digging a path 25 cm wide all around.
- Find:**
- a) the increase in the area of flowerbed.
 - b) the area of the enlarged flowerbed.
23. Two crossroads, each of width 8 m, run at right angles through the centre of a rectangular garden of length 500 m and breadth 250 m and parallel to its sides.
- Find:**
- a) the area of the garden excluding crossroads.
 - b) the area of the crossroads.
 - c) Convert these areas into hectares and ares.
24. A rectangular field is of dimensions $20 \text{ m} \times 15 \text{ m}$. Two paths run parallel to the sides of the rectangle through the centre of the field. The width of the longer path is 2 m and that of the shorter path is 1 m.
- Find that:**
- a) area of the paths
 - b) area of the remaining portion of the field.
 - c) cost of constructing the roads at the rate of \$10 per m^2 .
25. A square lawn is surrounded by a path 2 m wide. If the area of the path is 240 m^2 , find the area of the lawn.
26. A path 5 m wide runs along inside a rectangular field. The length of the rectangular field is three times the breadth of the field. If the area of the path is 500 m^2 , then find the length and breadth of the field.
27. A strip of width 3 cm is cut out all round from a sheet of paper with dimensions $30 \text{ cm} \times 20 \text{ cm}$. Find the area of the strip cut out and the area of the remaining sheet.
- Find the circumference of the circle whose radius is
- a) 12 cm
 - b) 7.2 cm
 - c) 15 mm (Take $\pi = 22/7$)

28. Find the area of the circle whose diameter is
- 28 cm
 - 10 cm
 - 6.8 mm (Take $\pi = 22/7$)
29. If the circumference of a circular sheet is 176 m, find its area.
30. The area of a circle is 616 cm^2 . Find its circumference.
31. From a circular sheet of a radius 5 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet.
32. Find the perimeter of the adjoining figure which is a semicircle including the diameter.



33. The diameter of a wheel is 70 cm. How many times the wheel will revolve in order to cover a distance of 110 m?
34. The ratio of the radii of two wheels is 4 : 5. Find the ratio of their circumference.
35. A well of diameter 150 cm has a stone parapet around it. If the length of the outer edge of the parapet is 616 cm, find the width of the parapet.
36. A thin wire is in the form of an equilateral triangle of side 11 cm. Find the area of a circle whose circumference is equal to the length of the wire.
37. Find the area of a circle whose circumference is same as the perimeter of square of side 22 cm.
38. From a rectangular metal sheet of size 20 cm by 30 cm, a circular sheet as big as possible is cut. Find the area of the remaining sheet.
39. Two circles have areas in the ratio 36 : 49. Find the ratio of their circumference.
40. Find the circumference of a wheel whose radius is 35 cm. Find the distance covered in 60 seconds, if it revolves 5 times per second.
41. The radius of a cycle wheel is 35 cm. Find the number of turns required to cover a distance of 1540 m.
42. A 3 m wide road runs around a circular park whose circumference is 132 m. Find the cost of fencing the outer boundary of the road at the rate of \$10 per m.
43. A circular flowerbed is surrounded by a path 2.5 m wide. The diameter of the flower-bed is 40 m. Find the area of the path.
44. A square metallic frame has a perimeter 208 cm. It is bent in the shape of a circle. Find the area of the circle.
45. From a circular sheet of radius 18 cm, two circles of radii 4.5 cm and a rectangle of length 4 cm and breadth 1 cm are removed; find the area of the remaining sheet.
46. Find the area of a circle inscribed in a square of side 20 cm.



47. Find the area of a triangle having
- base = 18 cm height = 12 cm
 - base = 6.5 m height = 5 cm
 - base = 7.2 m height = 7 dm
 - base = 10.5 m height = 8 mm
48. Find the height of a triangle whose
- Area = 420 cm² base = 60 cm
 - Area = 1500 mm² base = 7.5 cm
 - Area = 64 dm² base = 1.6 m
49. Find the base of a triangle whose
- Area = 300 cm² height = 7.5 cm
 - Area = 3.6 dm² height = 90 cm
 - Area = 3.6 m² height = 1.8 m
50. Find the area of a triangle whose sides are 24 cm, 32 cm and 40 cm.
51. The three sides of a triangle are in the ratio 2 : 3 : 4 and the perimeter 225 m. Find its area.
52. Find the area of a triangle, sides of which are 10 cm and 9 cm and the perimeter 36 cm.
53. The sides of a triangle are in the ratio 14 : 18 : 26, and its perimeter is 580 cm. Find the area. Also, find the altitude corresponding to the smallest side.
54. Find the height of a triangle whose base is 50 cm and whose area is 500 cm².
55. Find the base of a triangle whose altitude is 20 cm and area is 0.8 m².
56. Find the area of an equilateral triangle, the length of whose sides is 12 cm.
57. Find the area of an isosceles right angled triangle of equal sides 15 cm each.
58. The base and height of a triangle are in the ratio 8 : 5 and its area is 320 m². Find the height and base of the triangle.
59. Find the area of a right angled triangle whose hypotenuse is 13 cm and one of its sides containing the right angle is 12 cm. Find the length of the other side.
60. The area of a right triangle is 184 cm² and one of its legs is 16 cm long. Find the length of other leg.
61. The length of one of the diagonals of a field in the form of a quadrilateral is 46 m. The perpendicular distance of the other two vertices from the diagonal are 13 m and 10 m, find the area of the field.
62. The area of the triangle is equal to that of square whose each side measures 30 cm. Find the side of the triangle whose corresponding altitude is 36 cm.

63. $\triangle ABC$ is isosceles with $AB = AC = 6$ cm, $BC = 8$ cm. The height AD from A to BC is 7 cm. Find the area of $\triangle ABC$. What will be the height from C on AB ?

