12.Perimeter and Area

Practice Set 44

1. If the length and breadth of a rectangle are doubled, how many times the perimeter of the old rectangle will that of the new rectangle be?

Solution : Suppose the length and breadth of a rectangle be x cm and y cm respectively.

The perimeter of a rectangle $= (2x + 2y)$ cm

$= 2(x + y)$cm .....(i)

Now,

the length and breadth of rectangle are doubled ...(Given)

$\therefore$ the new length is $2x$ cm and the new breadth be 2y cm.

The perimeter of this new rectangle $= (2 \times 2x) + (2 \times 2y)$

$= 4x + 4y$

$= 4(x + y)$ cm ..... (ii)

From (ii) and (i) $4(x + y)$cm is twice $2(x + y)$cm

$\therefore$ The perimeter of the new rectangle is twice the perimeter of the original rectangle.

2. If the side of a square is tripled, how many times the perimeter of the first square will that of the new square be?

Solution :

Suppose the side of the square be a cm.

The perimeter of the square = 4a cm ….(i)

The side of a square is tripled. …(Given)

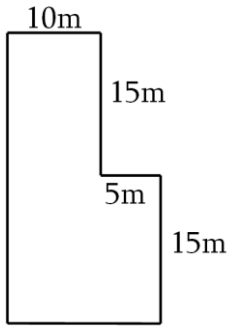
∴ The length of the side of new square = 3a cm.

Perimeter of new square = $4 \times 3a = 12a$ cm.

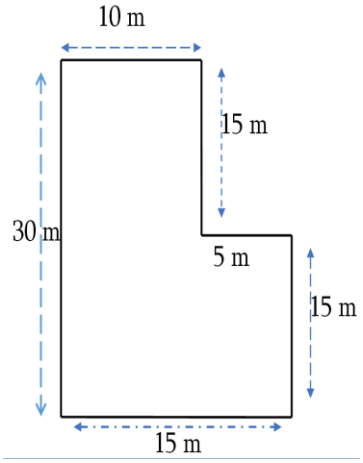
Now, $12a = 3 \times 4a$ …[From (i) and (ii)]

∴ The perimeter of the new square is three times the perimeter of the original square.

3. Given alongside is the diagram of a playground. It shows the length of its sides.Find the perimeter of the playground.



Solution :



AB = 10 m, BC = 15 m, CD = 5 m,

DE = 15 m

Here AF = BC + DE = 15 + 15 = 30 m

FC = AB + CD = 15 m

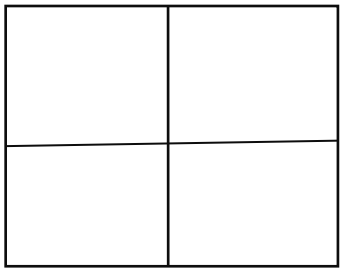
The perimeter of the playground =

AB + BC + CD + DE + EF + AF

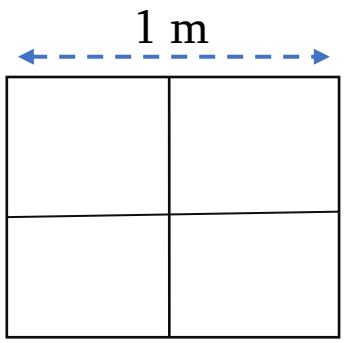
= (10 + 15 + 5 + 15 + 15 + 30) m = 90 m

∴ The perimeter of the playground = 90 m

4. As shown in the figure, four napkins all of the samesize were made from a square piece of cloth of length1 m. What length of lace will be required to trim all four sides of all the napkins ?



Solution :



The side of the square shaped cloth =1m…(Given)

It is divided into four equal parts

$\therefore$ the side of each new square-shaped cloth $= \frac{1}{2}$ m

$\therefore$ The perimeter of one square-shaped napkin $= 4 \times \frac{1}{2}$ m $= 2$ m

$\therefore$ The total perimeter of 4 napkins $= 4 \times 2$m $= 8$ m

$\therefore$ The length of the required lace of all four sides of all the napkins = 8m

Practice Set 45

1. If the side of a square is 12 cm, find its area.

Solution :

Given : the side of a square is 12 cm

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

$\therefore$ The area of the square is 144 cm^2

2. If the length of a rectangle is 15 cm and breadth is 5 cm, find its area.

Solution : Given: length = 15 cm, breadth = 5 cm

The area of a rectangle = length × breadth

$= 15 \times 5 = 75$

∴ The area of the rectangle is 75 cm^2.

3. The area of a rectangle is 102 sq.cm. If its length is 17 cm, what is its perimeter ?

Solution : Given : The area of a rectangle is 102 sq.cm.

The length of a rectangle = 17 cm

The area of a rectangle = length × breadth

$\therefore 102 = 17 \times \text{breadth}$

$\therefore \text{breadth} = \frac{102}{17} = 6$

∴ The breadth of the rectangle = 6cm

The perimeter of a rectangle = $2(l + b)$

$= 2(17+ 6)$

$= 2(23)$

$= 46$

∴ The perimeter of the rectangle is 46 cm.

4*. If the side of a square is tripled, how many times will its area be as compared to the area of the original square ?

Solution : Suppose the side of the square be x cm.

Then area of the square $(\text{side})^2 = x^2$ cm^2

The side of a square is tripled …(Given)

∴ the side of the new square is $3x$ cm.

The area of the new square = $(\text{side})^2 = (3x)^2 = 9x^2$ cm^2

$9x^2$ is 9 times x^2.

∴ The area of the new square is 9 times the area of the original square.

Practice Set 46

1. A page of a calendar is 45 cm long and 26 cm wide. What is its area ?

Solution :

Given : The length of the page of a calendar is 45cm and breadth is 26cm.

The page of a calendar is rectangular-shaped.

∴ the area of the page = l × b

$= 45 \times 26$

$= 1170$

$\therefore$ The area of the page is 1170 cm^2.

2. What is the area of a triangle with base 4.8 cm and height 3.6 cm ?

Solution :

Given: The base of a triangle = 4.8cm

The height of a triangle = 3.6cm

Area of a triangle $= \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times 4.8 \times 3.6$

$= 8.64$

$\therefore$ The area of the triangle is 8.64 cm^2.

3. What is the value of a rectangular plot of land 75.5 m long and 30.5 m broad at the rate of 1000 rupees per square metre ?

Solution :

Given: The length of the rectangular plot = 75.5m

The breadth of the rectangular plot = 30.5m

The rate of the rectangular plot per square metre = 1000 rupees.

The area of the rectangular plot = length $\times$ breadth

$= 75.5 \times 30.5$

$= 2302.75\ m^2$

The value of a rectangular plot = rate per square metre × area

$= 1000 \times 2302.75$

$= 2302750$

∴ The value of a rectangular plot of land is 23,02,750 rupees.

4. A rectangular hall is 12 m long and 6 m broad. Its flooring is to be made of square tiles of side 30 cm. How many tiles will fit in the entire hall ? How many would be required if tiles of side 15 cm were used?

Solution : Given: The length of a rectangular hall = 12 m

The breadth of rectangular hall = 6 m

The area of the floor of the hall = length × breadth

$= 12 \times 6 = 72\ m^2$

The area of 1 square the tile = $\frac{30}{100} \times \frac{30}{100} = \frac{9}{100}\ m^2$

The number of tiles required = $\frac{\text{area of the floor}}{\text{area of one floor}}$

$= 72 \div \frac{9}{100}$

$$= 72 \times \frac{100}{9} = 800$$

If the side of the tile is 15 cm

Area of the tile $= \frac{15}{100} \times \frac{15}{100} = \frac{3}{20} \times \frac{3}{20} = \frac{9}{400}$ m^2

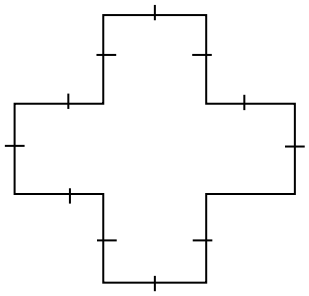
$\therefore$ the number of tiles acquired $= 72 \div \frac{9}{400}$

$$= 72 \times \frac{400}{9}$$

$$= 8 \times 400 = 3200$$

$\therefore$ 800 tiles will fit in the entire hall and 3200 tiles would be required if tiles of side 15 cm were used.

5. Find the perimeter and area of a garden with measures as shown in the figure alongside.



Solution : The figure has 12 sides.

The length of each side of figure = 13 m

$\therefore$ its perimeter = $13 \times 12 = 156$ m

The figure consists of 5 squares, each with side 13 m.

$\therefore$ its area = $5 \times (13)^2 = 5 \times 169 = 845$ m^2

$\therefore$ The perimeter of the garden is 156 m and its area is 845 m^2

Practice Set 47

1. Find the total surface area of cubes having the following sides.

(i) 3 cm

Solution :

The total surface area of a cube = $6 \times (l)^2$ …(formula)

$= 6 \times (3)^2$

$= 6 \times 9$

$= 54$

∴ The total surface area of a cube is 54 sqcm

(ii) 5 cm

Solution :

The total surface area of a cube = $6 \times (l)^2$ …(formula)

$= 6 \times (5)^2$

$= 6 \times 25$

$= 150$

∴ The total surface area of a cube is 150 sqcm

(iii) 7.2 m

Solution :

The total surface area of a cube $= 6 \times (l)^2$ …(formula)

$= 6 \times (7.2)^2$

$= 6 \times 51.84$

$= 311.04$

∴ The total surface area of a cube is 311.04 sqm

(iv) 6.8 m

Solution :

The total surface area of a cube $= 6 \times (l)^2$ …(formula)

$= 6 \times (6.8)^2$

$= 6 \times 46.24$

$= 277.44$

∴ The total surface area of a cube is 277.44 sqm

(v) 5.5 m

Solution :

The total surface area of a cube $= 6 \times (l)^2$ …(formula)

$= 6 \times (5.5)^2$

$= 6 \times 30.25$

$= 181.5$

$\therefore$ The total surface area of a cube is 181.5 sqm

2. Find the total surface area of the cuboids of length, breadth and height as given below:

(i) 12 cm, 10 cm, 5 cm

Solution: Here $l = 12$ cm, $b = 10$ cm, $h = 5$ cm

The total surface area of the cuboid $= 2(lb + bh + lh)$ …(formula)

$= 2[(12 \times 10) + (10 \times 5) + (12 \times 5)]$

$= 2(120 + 50 + 60)$

$= 2(230) = 460$

$\therefore$ The total surface area of the cuboid is 460 sqcm

(ii) 5 cm, 3.5 cm, 1.4 cm

Solution: Here, $l = 5$ cm, $b = 3.5$ cm, $h = 1.4$ cm,

The total surface area of the cuboid $= 2(lb + bh + lh)$ …(formula)

$= 2[(5 \times 3.5) + (3.5 \times 1.4) + (5 \times 1.4)]$

$= 2(17.5 + 4.9 + 7.0)$

$= 2(29.4) = 58.8$

$\therefore$ The total surface area of the cuboid is 58.8 sqcm

(iii) 2.5 m, 2 m, 2.4 m

Solution : Here l = 2.5 cm, b = 2 cm, h = 2.4 cm,

The total surface area of the cuboid = $2(lb + bh + lh)$ ….(formula)

$= 2[(2.5 \times 2) + (2 \times 2.4) + (2.5 \times 2.4)]$

$= 2(5.0 + 4.8 + 6.0)$

$= 2(15.8) = 31.6$

∴ The total surface area of the cuboid is 31.6 sqm.

(iv) 8 m, 5 m, 3.5 m

Solution : Here, l = 8 m, b = 5 m, h = 3.5 m .

The total surface area of the cuboid = $2(lb + bh + lh)$ …..(formula)

$= 2[(8 \times 5) + (5 \times 3.5) + (8 \times 3.5)]$

$= 2(40 + 17.5 + 28.0)$

$= 2(85.5) = 171$

∴ The total surface area of the cuboid is 171 sqm.

3. A matchbox is 4 cm long, 2.5 cm broad and 1.5 cm in height. Its outer sides are to be covered exactly with craft paper. How much paper will be required to do so ?

Solution: l = 4 cm, b = 2.5 cm, h = 1.5 cm.

The total surface area of the matchbox = $2(lb + bh + lh)$ …(formula)

$= 2 (4 \times 2.5 + 2.5 \times 1.5 + 4 \times 1.5)$

$= 2 (10.0 + 3.75 + 6.0)$

$= 2 (19.75)$

$= 39.5$

$\therefore$ 39.5 sqcm of craft paper is required.

4. An open box of length 1.5 m, breadth 1 m, and height 1 m is to be made for use on a trolley for carrying garden waste. How much sheet metal will be required to make this box ? The inside and outside surface of the box is to be painted with rust proof paint. At a rate of 150 rupees per sqm, how much will it cost to paint the box?

Solution: Given : The length of the box (l) = 1.5m

The breadth of the box (b) = 1m

The height of the box (h) = 1m

The box is open. So it has five sides.

The total surface area of the open box = lb + 2bh + 2lh

$= [(1.5\times 1) + (2 \times 1 \times 1) + (2 \times 1.5 \times 1)]$

$= 1.5 + 2 + 3.0$

$= 6.5$ sqm

The cost of painting from inside and outside

= total area (inside + outside) × rate

$= (6.5 + 6.5) \times 150$

$= 13.0 \times 150$

$= 1950$

∴ 6.5 sqm of metal sheet is required to make for open box and the cost of painting is 1950 rupees.

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