Exercise 20.5

Question: 1

The sides of a rectangle are in the ratio 5 : 4. If its perimeter is 72 cm, then its length is

(a) 40 cm

(b) 20 cm

(c) 30 cm

(d) 60 cm

Solution:

(b) 20 cm

Explanation:

Let the sides of the rectangle be 5x and 4x. (Since, they are in the ratio 5 : 4)

Now, perimeter of rectangle = 2 (Length + Breadth)

72 = 2 (5x + 4x)

72 = 2 × 9x

72 = 18x

x = 4

Thus, the length of the rectangle = 5x = 5 × 4 = 20 cm

Question: 2

The cost of fencing a rectangular field 34 m long and 18 m wide at As 2.25 per metre is

(a) Rs 243

(b) Rs 234

(c) Rs 240

(d) Rs 334

Solution:

(b) Rs. 234

Explanation:

For fencing the rectangular field, we need to find the perimeter of the rectangle.

Length of the rectangle = 34 m

Breadth of the rectangle = 18 m

Perimeter of the rectangle = 2 (Length + Breadth) = 2 (34 + 18) m = 2 × 52 m = 104 m

Cost of fencing the field at the rate of Rs. 2.25 per meter = Rs. 104 × 2.25 = Rs. 234

Question: 3

If the cost of fencing a rectangular field at Rs. 7.50 per metre is Rs. 600, and the length of the field is 24 m, then the breadth of the field is

(a) 8 m

(b) 18 m

(c) 24 m

(d) 16 m

Solution:

(d) 16 m

Explanation:

Cost of fencing the rectangular field = Rs. 600

Rate of fencing the field = Rs. 7.50 per m

Therefore, perimeter of the field = Cost of fencing / Rate of fencing = 600 / 7.50 = 80 m

Now, length of the field = 24 m

Therefore, breadth of the field = Perimeter/2 – Length = 80/2- 24 = 16 m

Question: 4

The cost of putting a fence around a square field at As 2.50 per metre is As 200. The length of each side of the field is

(a) 80 m

(b) 40 m

(c) 20 m

(d) None of these

Solution:

(c) 20 m

Explanation:

Cost of fencing the square field = Rs. 200

Rate of fencing the field = Rs. 2.50

Now, perimeter of the square field = Cost of fencing / Rate of fencing = 200/2.50 = 80 m

Perimeter of square = 4 × Side of the square

Therefore, side of the square = Perimeter/4 = 80/4 = 20 m

Question: 5

The length of a rectangle is three times of its width. If the length of the diagonal is 8√10 m, then the perimeter of the rectangle is

(a) 15√10 m

(b) 16√10 m

(c) 24√10 m

(d) 64 m

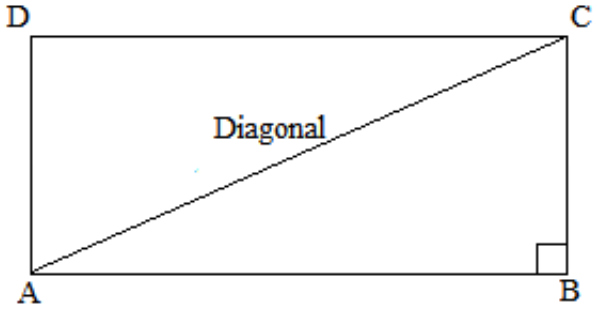
Solution:

(d) 64 m

Explanation:

Let us consider a rectangle ABCD.

Also, let us assume that the width of the rectangle, i.e., BC be x m.



It is given that the length is three times width of the rectangle.

Therefore, length of the rectangle, i.e., AB = 3x m

Now, AC is the diagonal of rectangle.

In right angled triangle ABC.

$AC^2 = AB^2 + BC^2$

$\left(8\sqrt{10}\right)^2 = (3x)^2 + x^2$

$640 = 9x^2 + x^2$

$640 = 10x^2$

$x^2 = 640/10 = 64$

$x = 64 = 8$ m

Thus, breadth of the rectangle = x = 8 m

Similarly, length of the rectangle = 3x = 3 × 8 = 24 m

Perimeter of the rectangle = 2 (Length + Breadth)

= 2 (24 + 8)

= 2 × 32 = 64 m

Question: 6

If a diagonal of a rectangle is thrice its smaller side, then its length and breadth are in the ratio

(a) 3:1

(b) √3:1

(c) √2:1

(d) 2√2:1

Solution:

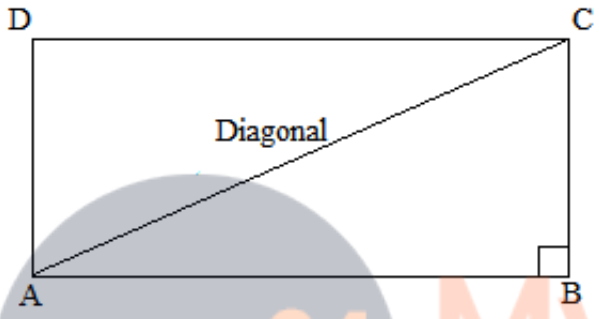
(d) 22 : 1

Explanation:

Let us assume that the length of the smaller side of the rectangle, i.e., BC be x and length of the larger side , i.e., AB be y.

It is given that the length of the diagonal is three times that of the smaller side.

Therefore, diagonal = 3x = AC



Now, applying Pythagoras theorem, we get:

$(\text{Diagonal})^2 = (\text{Smaller side})^2 + (\text{Larger side})^2$

$(AC)^2 = (AB)^2 + (BC)^2$

$(3x)^2 = (x)^2 + (y)^2$

$9x^2 = x^2 + y^2$

$8x^2 = y^2$

Now, taking square roots of both sides, we get:

22 x = y

or, y / x = 22 / 1

Thus, the ratio of the larger side to the smaller side = 22 : 1

Question: 7

The ratio of the areas of two squares, one having its diagonal double than the other, is

(a) 1 : 2

(b) 2:3

(c) 3 : 1

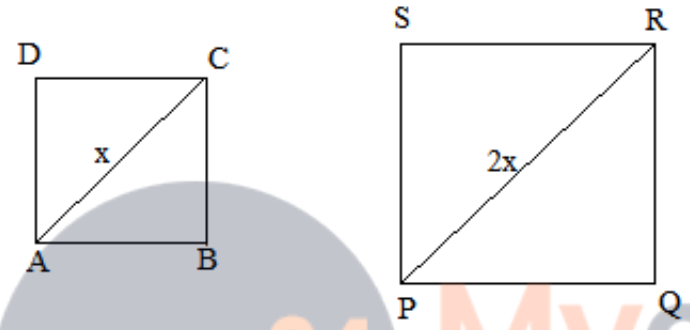
(d) 4 : 1

Solution:

(d) 4 : 1

Explanation:

Let the two squares be ABCD and PQRS. Further, the diagonal of square PQRS is twice the diagonal of square ABCD



PR = 2 AC

Now, area of the square = $(\text{diagonal})^2/2$

Area of PQRS = $(PR)^2)/2$

Similarly, area of ABCD = $(AC)^2/2$

According to the question:

If AC = x units, then, PR = 2x units

$$\text{Therefore,} \quad \frac{\text{Area of PQRS}}{\text{Area of ABCD}} = \frac{(PR)^2 \times 2}{2 \times (AC)^2} = \frac{(PR)^2}{(AC)^2} = \frac{(2x)^2}{(1x)^2} = \frac{4}{1} = 4:1$$

Thus, the ratio of the areas of squares PQRS and ABCD = 4:1

Question: 8

If the ratio of areas of two squares is 225:256, then the ratio of their perimeters is

(a) 225 : 256

(b) 256 : 225

(c) 15:16

(d) 16 : 15

Solution:

(c) 15 : 16

Explanation:

Let the two squares be ABCD and PQRS.

Further, let the lengths of each side of ABCD and PQRS be x and y, respectively.

Therefore Area of sq. ABCD / Area of sq. PQRS = x^2 / y^2

$\Rightarrow x^2/y^2 = 225 / 256$

Taking square roots on both sides, we get:

x/y = 15/16

Now, the ratio of their perimeters:

Perimeter of sq. ABCD / Perimeter of sq. PQRS

= 4 × side of sq. ABCD / 4 × Side of sq. PQRS = 4x / 4y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = x y

Perimeter of sq. ABCD / Perimeter of sq. PQRS = 15 / 16

Thus, the ratio of their perimeters = 15:16

Question: 9

If the sides of a square are halved, then its area

(a) remains same

(b) becomes half

(c) becomes one fourth

(d) becomes double

Solution:

(c) becomes one fourth

Explanation:

Let the side of the square be x.

Then, area = (Side × Side) = (x × x) = x^2

If the sides are halved, new side = x/2

Now, new area = $(x/2)^2$

= $(x^2)/4$

It is clearly visible that the area has become one-fourth of its previous value.

Question: 10

A rectangular carpet has area 120 m^2 and perimeter 46 metres. The length of its diagonal is

(a) 15 m

(b) 16 m

(c) 17 m

(d) 20 m

Solution:

(c) 17 m

Explanation:

Area of the rectangle = 120 m^2

Perimeter = 46 m

Let the sides of the rectangle be l and b.

Therefore

Area = lb = 120 m^2 …(1)

Perimeter = 2 (l + b) = 46

Or, (l + b) = 46 / 2 =23 m …(2)

Now, length of the diagonal of the rectangle = $l^2 + b^2$

So, we first find the value of ($l^2 + b^2$)

Using identity:

$(l^2 + b^2) = (l + b)^2 - 2\,(lb)$ [From (1) and (2)]

Therefore

$(l^2 + b^2) = (23)^2 - 2\,(120)$

$= 529 - 240 = 289$

Thus, length of the diagonal of the rectangle = $l^2 + b^2 = 289 = 17$ m

Question: 11

If the ratio between the length and the perimeter of a rectangular plot is 1: 3, then the ratio between the length and breadth of the plot is

(a) 1 : 2

(b) 2 : 1

(c) 3 : 2

(d) 2 : 3

Solution:

(b) 2 : 1

Explanation:

It is given that Length of rectangle / Perimeter of rectangle = 1 / 3

$\Rightarrow l/(2l + 2b) = 1 / 3$

After cross multiplying, we get:

$3l = 2l + 2b$

$\Rightarrow l = 2b$

$\Rightarrow l / b = 2 / 1$

Thus, the ratio of the length and the breadth is 2: 1.

Question: 12

If the length of the diagonal of a square is 20 cm, then its perimeter is

(a) $10\sqrt{2}$ cm

(b) 40 cm

(c) 40√2 cm

(d) 200 cm

Solution:

(c) 40√2 cm

Explanation:

Length of diagonal = 20 cm

$$\text{Length of diagonal} = 20 \text{ cm}$$

$$\text{Length of side of a square} = \frac{\text{Length of diagonal}}{\sqrt{2}}$$

$$= \frac{20}{\sqrt{2}}$$

$$= \frac{10}{\sqrt{2}}$$

Therefore, perimeter of the square is $4 \times \text{side} = 4 \times 10\sqrt{2}$ cm

$= 40\sqrt{2}$ cm