Miscellaneous Problems : Set 2

1. Angela deposited 15000 rupees in a bank at a rate of 9 p.c.p.a. She got simple interest amounting to 5400 rupees. For how many years had she deposited the amount?

Solution:

Here, P = 15,000 , R rupees = 9 p.c.p.a., T = ? I = 5,400

$$I = \frac{P \times R \times T}{100}$$

$$\therefore 5400 = \frac{15,000 \times 9 \times T}{100}$$

$$\therefore 5400 = 1350 \times T$$

$$\therefore T = \frac{5400}{1350}$$

$$\therefore T = 4$$

∴ Angela had deposited the amount for 4 years.

2. Ten men take 4 days to complete the task of tarring a road. How many days would 8 men take?

Solution:

As the number of men increases, the number of days decreases.

The number of men and the number of days are in inverse proportion.

Suppose 8 men take x days.

Number of men	Number of days
10	4
8	x

$8 \times x = 10 \times 4$

$\therefore\ 8x = 40$

$\therefore x = \dfrac{40}{8}$

$\therefore x = 5$

$\therefore$ 8 men will take 5 days to complete the work.

3. Nasruddin and Mahesh invested ₹ 40,000 and ₹ 60,000 respectively to start a business. They made a profit of 30%. How much profit did each of them make?

Solution:

Total investment = (40000 + 60000) = ₹ 1,00,000

They made a profit of 30 %

$\therefore$ profit = $\frac{30}{100} \times 100000$ = ₹ 30,000

The ratio of their investment is 40000 : 60000 = 2 : 3

$\therefore$ The ratio of their profit also will be 2 : 3

   suppose profit be x

$\therefore$ Nasruddin's profit be ₹ $2x$.

Then Mahesh's profit is ₹ $3x$.

$$2x + 3x = 30000$$

$$\therefore 3x = 30000$$

$$\therefore x = \frac{30000}{5}$$

$$\therefore x = 6000$$

$\therefore$ Nasruddin's profit is ₹ $2x$ = 2 × 6000 = ₹12,000

Mahesh's profit is ₹ $3x$ = 3 × 6000 = ₹18,000

4. The diameter of a circle is 5.6 cm. Find its circumference.

Solution: Given: The diameter of a circle is 5.6 cm

The circumference of a circle $= \pi d$

$$= \frac{22}{7} \times 5.6$$

$$= 17.6 \text{ cm}$$

5. Expand.

(i) $(2a - 3b)^2$

Solution :

$(2a - 3b)^2 = (2a)^2 - 2 \times (2a) \times (3b) + (3b)^2$

$$= 4a^2 - 12ab + 9b^2$$

(ii) $(10 + y)^2$

Solution :

$(10 + y)^2 = (10)^2 + 2 \times (10) \times (y) + (y)^2$

$$= 100 + 20y + y^2$$

(iii) $\left(\dfrac{p}{3} + \dfrac{q}{4}\right)^2$

Solution :

$$\left(\dfrac{p}{3} + \dfrac{q}{4}\right)^2 = \left(\dfrac{p}{3}\right)^2 + 2 \times \left(\dfrac{p}{3}\right) \times \left(\dfrac{q}{4}\right) + \left(\dfrac{q}{4}\right)^2$$

$$= \dfrac{p^2}{9} + \dfrac{pq}{6} + \dfrac{q^2}{16}$$

(iv) $\left(y - \dfrac{3}{y}\right)^2$

Solution :

$$\left(y - \dfrac{3}{y}\right)^2 = (y)^2 - 2 \times (y) \times \left(\dfrac{3}{y}\right) + \left(\dfrac{3}{y}\right)^2$$

$$= y^2 - 6 + \dfrac{9}{y^2}$$

6. Use a formula to multiply.

(i) $(x - 5)(x + 5)$

Solution :

$$(x - 5)(x + 5) = (x)^2 - (5)^2$$

$$= x^2 - 25$$

(ii) $(2a - 13)(2a + 13)$

Solution :

$(2a - 13)(2a + 13) = (2a)^2 - (13)^2$

$\qquad\qquad\qquad = 4a^2 - 169$

(iii) $(4z - 5y)(4z + 5y)$

Solution :

$(4z - 5y)(4z + 5y) = (4z)^2 - (5y)^2$

$\qquad\qquad\qquad = 16z^2 - 25y^2$

(iv) $(2t - 5)(2t + 5)$

Solution :

$(2t - 5)(2t + 5) = (2t)^2 - (5)^2$

$\qquad\qquad\qquad = 4t^2 - 25$

7. The diameter of the wheel of a cart is 1.05 m. How much distance will the cart cover in 1000 rotations of the wheel?

Solution:

Given : The diameter of the wheel of a cart is 1.05m.

The distance covered by the wheel in one rotation

= the circumference of the wheel

$= \pi d$

$= \frac{22}{7} \times 1.05$

= 3.3 m.

$\therefore$ the distance covered by the wheel in 1000 rotations.

$= 3.3 \times 1000$ m
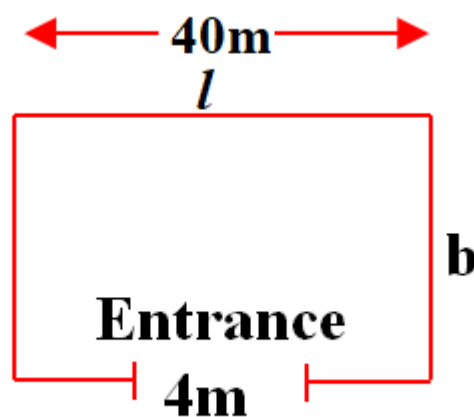
$= \frac{3.3 \times 1000}{1000}$ km

= 3.3 km

$\therefore$ The cart will cover 3.3 km.

8. The area of a rectangular garden of length 40 m, is 1000 sqm. Find the breadth of the garden and its perimeter. The garden is to be enclosed by 3 rounds of fencing, leaving an entrance of 4 m. Find the cost of fencing the garden at a rate of 250 rupees per metre.

Ans. In English diagram draw

Solution: Given : The area of a rectangular garden is 1000 sq.m

The length of a rectangular garden is 40 m

The area of a rectangle = $l \times b$

$$\therefore \ 1000 = 40 \times b$$

$$\therefore \ b = \frac{1000}{40} = 25 \text{ m}$$

The perimeter of the rectangular garden = $2l + 2b = 2(l + b)$

$$= 2 \times (40 + 25)$$

$$= 130 \text{ m}$$

The entrance is 4 m wide   …(Given)

The perimeter for fencing the garden = 130 m − 4 m = 126 m

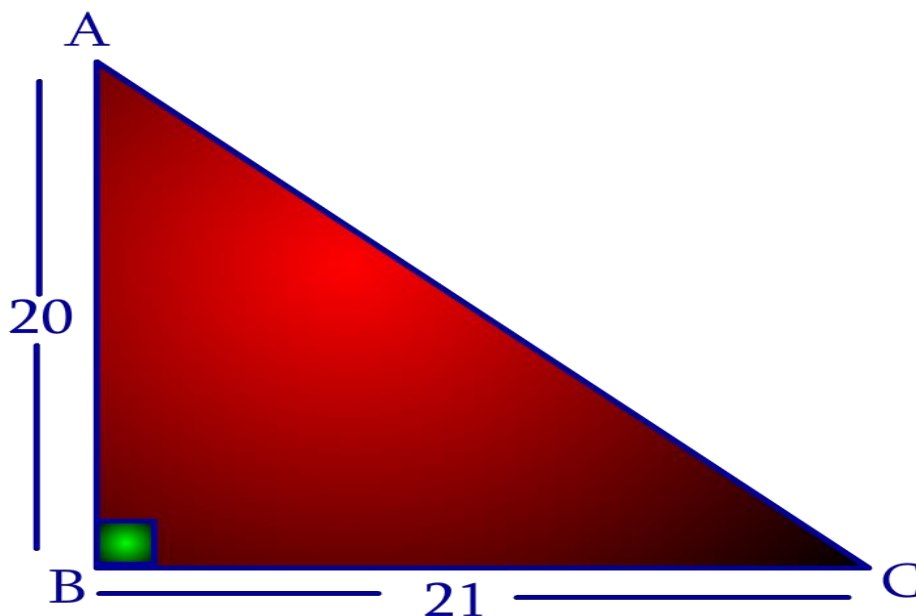Three rounds of fencing = 3 × 126 = 378 m

Cost of fencing = rate × length of fencing

$$= 250 × 378$$

$$= 94,500$$

∴ The breadth = 25 m ; The perimeter = 130 m ;

The Cost = ₹ 94,500

9. From the given figure, find the length of hypotenuse AC and the perimeter of ΔABC.

Solution:

In Δ ABC, AB = 20, BC = 21

Δ ABC is a right angled triangle.

By Pythagoras' theorem,

$$[l(\mathbf{AC})]^2 = [l(\mathbf{AB})]^2 + [l(\mathbf{BC})]^2$$

$$= (20)^2 + (21)^2$$

$$= 400 + 441$$

$$= 841$$

$\therefore l(\mathbf{AC}) = \sqrt{841} = 29$

The perimeter of Δ ABC $= l(\mathbf{AB}) + l(\mathbf{BC}) + l(\mathbf{AC})$

$$= 20 + 21 + 29$$

$$= 70$$

$\therefore$ The length of hypotenuse AC = 29 units,

The perimeter of Δ ABC = 70 units.

10. If the edge of a cube is 8 cm long, find its total surface area.

Solution:

Given : The edge of a cube is 8 cm.

The total surface of a cube = $6 \times l^2$

$$= 6 \times (8)^2$$

$$= 6 \times 64$$

$$= 384$$

∴ The total surface area of the cube is 384 sqcm.

11.Factorise.   365 y^4z^3 - 146 y^2z^4

Solution:

365 y^4z^3 -146 y^2z^4

= $5 \times 73 \times$ $y^4z^3 - 2 \times 73 \times y^2z^4$ ......(365 = 5×73; 146 = 2×73)

= 73 y^2z^3 (5y^2 - 2z)

∴ 365 y^4z^3 -146 y^2z^4 = 73 y^2z^3 (5y^2 - 2z)

Multiple Choice Questions

Choose the right answers from the options given for each of the following questions.

1. If the average of the numbers 33, 34, 35, x, 37, 38, 39 is 36, what is the value of x ?

(i) 40   (ii) 32   (iii) 42   (iv) 36

Explanation:

The given seven numbers are consecutive natural numbers.

$\therefore$ the average is the middle number, which is 36.

$\therefore$ The correct option is (iv) 36

2. The difference of the squares, $(61^2 - 51^2)$ is equal to

....

(i) 1120   (ii) 1230   (iii) 1240   (iv) 1250

Explanation:

$61 = 60 + 1$ and $51 = 50 + 1$

$\therefore (61^2) - (51^2) = (60 + 1)^2 - (50 + 1)^2$

$$= (3600 + 120 + 1) - (2500 + 100 + 1)$$

$$= 3721 - 2601 = 1120$$

$\therefore$ The correct option is (i) 1120

3. If 2600 rupees are divided between Sameer and Smita in the proportion 8 : 5, the share of each is .... and .... respectively.

(i) ₹ 1500, ₹ 1100

(ii) ₹1300, ₹ 900

(iii) ₹ 800, ₹ 500

(iv) ₹ 1600, ₹ 1000

Explanation:

$$8x + 5x = 2600$$

$$\therefore 13x = 2600$$

$$\therefore x = 200$$

$$\therefore 8x = 8 \times 200 = 1600 \quad ; \quad 5x = 5 \times 200 = 1000$$

∴ The correct option is (iv) ₹1600, ₹ 1000

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