Ratio and Proportion
Exercise 8B

Q1

Answer :

We have:

Product of the extremes = 30 × 60 = 1800
Product of the means = 40 × 45 = 1800
Product of extremes = Product of means

Hence, 30 : 40 :: 45 : 60

Q2

Answer :

We have:
Product of the extremes = 36 × 7 = 252
Product of the means = 49 × 6 = 294
Product of the extremes ≠ Product of the means

Hence, 36, 49, 6 and 7 are not in proportion.

Q3

Answer :

Product of the extremes = 2 × 27 = 54
Product of the means = 9 × x = 9x

Since 2 : 9 :: x : 27, we have:
Product of the extremes = Product of the means
⇒ 54 = 9x
⇒ x = 6

Q4

Answer :

Product of the extremes = 8 × 35 = 280
Product of the means = 16 × x = 16x

Since 8 : x :: 16 : 35, we have:
Product of the extremes = Product of the means
⇒ 280 = 16x
⇒ x = 17.5

Q5

Answer :

Product of the extremes = x × 60 = 60x
Product of the means = 35 × 48 = 1680

Since x : 35 :: 48 : 60, we have:
Product of the extremes = Product of the means
⇒ 60x= 1680
⇒ x = 28

Q6

Answer :

(i) Let the fourth proportional be x.
Then, 8 : 36 :: 6 : x

$8 \times x = 36 \times 6$ [Product of extremes = Product of means]
⇒ 8x = 216
⇒ x = 27
Hence, the fourth proportional is 27.

(ii) Let the fourth proportional be x.
Then, 5 : 7 :: 30 : x
⇒ $5 \times x = 7 \times 30$ [Product of extremes = Product of means]
⇒ 8x = 216
⇒ 5x = 210
⇒ x = 42

Hence, the fourth proportional is 42.

(iii) Let the fourth proportional be x.
Then, 2.8 × x = 14 × 3.5   [Product of extremes = Product of means]
⇒ 8x = 216
⇒ 2.8x = 49
⇒ x = 17.5
Hence, the fourth proportional is 17.5.

Q7

Answer :

36, 54 and x are in continued proportion.
Then, 36 : 54 :: 54 : x
⇒ $36 \times x = 54 \times 54$ [Product of extremes = Product of means]

⇒ 36x = 2916
⇒ x = 81

Q8

Answer :

27, 36 and x are in continued proportion.
Then, 27 : 36 :: 36 : x
$\Rightarrow$ 27×x = 36 ×36   [Product of extremes = Product of means]
$\Rightarrow$ 27x = 1296
$\Rightarrow$ x = 48

Hence, the value of x is 48.

Q9

Answer :

(i) Suppose that x is the third proportional to 8 and 12.
Then, 8 :12 :: 12 : x
$\Rightarrow 8 \times x = 12 \times 12$ (Product of extremes = Product of means)
$\Rightarrow$ 8x = 144
$\Rightarrow$ x = 18

Hence, the required third proportional is 18.

(ii) Suppose that x is the third proportional to 12 and 18.
Then, 12 : 18 :: 18 : x
$\Rightarrow 12 \times x = 18 \times 18$ (Product of extremes = Product of means)
$\Rightarrow$ 12x = 324
$\Rightarrow$ x = 27

Hence, the third proportional is 27.

(iii) Suppose that x is the third proportional to 4.5 and 6.
Then, 4.5 : 6:: 6 : x
$\Rightarrow 4.5 \times x = 6 \times 6$ (Product of extremes = Product of means)
$\Rightarrow$ 4.5x = 36
$\Rightarrow$ x = 8

Hence, the third proportional is 8.

Q10

Answer :

The third proportional to 7 and x is 28.
Then, 7 : x :: x : 28
$\Rightarrow 7 \times 28 = x^2$ (Product of extremes = Product of means)
$\Rightarrow$ x = 14

Q11

Answer :

(i) Suppose that x is the mean proportional.

Then, 6 : x :: x : 24

$\Rightarrow 6 \times 24 = x \times x$ (Product of extremes = Product of means)
$\Rightarrow x^2 = 144$
$\Rightarrow$ x = 12

Hence, the mean proportional to 6 and 24 is 12.

(ii) Suppose that x is the mean proportional.

Then, 3 : x :: x : 27
$\Rightarrow 3 \times 27 = x \times x$ (Product of extremes =Product of means)
$\Rightarrow x^2 = 81$
$\Rightarrow$ x = 9

Hence, the mean proportional to 3 and 27 is 9.

(iii) Suppose that x is the mean proportional.

Then, $0.4 : x :: x : 0.9$

$\Rightarrow 0.4 \times 0.9 = x \times x$ (Product of extremes =Product of means)
$\Rightarrow x^2 = 0.36$
$\Rightarrow x = 0.6$

Hence, the mean proportional to 0.4 and 0.9 is 0.6.

Q12
Answer :

Suppose that the number is x.

Then, $(5 + x) : (9 + x) :: (7 + x) : (12 + x)$

$\Rightarrow (5 + x) \times (12 + x) = (9 + x) \times (7 + x)$
(Product of extremes $=$ Product of means)
$\Rightarrow 60 + 5x + 12x + x^2 = 63 + 9x + 7x + x^2$
$\Rightarrow 60 + 17x = 63 + 16x$
$\Rightarrow x = 3$

Hence, 3 must be added to each of the numbers: 5, 9, 7 and 12, to get the numbers which are in proportion.

Q13
Answer :

Suppose that x is the number that is to be subtracted.

Then, $(10 - x) : (12 - x) :: (19 - x) : (24 - x)$

$\Rightarrow (10 - x) \times (24 - x) = (12 - x) \times (19 - x)$
(Product of extremes $=$ Product of means)
$\Rightarrow 240 - 10x - 24x + x^2 = 228 - 12x - 19x + x^2$
$\Rightarrow 240 - 34x = 228 - 31x$
$\Rightarrow 3x = 12$
$\Rightarrow x = 4$

Hence, 4 must be subtracted from each of the numbers: 10, 12, 19 and 24, to get the numbers which are in proportion.

Q14
Answer :

Distance represented by 1 cm on the map = 5000000 cm = 50 km

Distance represented by 3 cm on the map = 50 × 4 km = 200 km

∴ The actual distance is 200 km.

Q15
Answer :

(Height of tree) : (height of its shadow) = (height of the pole) : (height of its shadow)

Suppose that the height of pole is x cm.

Then, $6 : 8 = x : 20$

$\Rightarrow x = \frac{6 \times 20}{8} = 15$
∴ Height of the pole = 15 cm