EXERCISE 8B

1. Show that 30, 40, 45, 60 are in proportion.
2. Show that 36, 49, 6, 7 are not in proportion.
3. If $2 : 9 :: x : 27$, find the value of x.
4. If $8 : x :: 16 : 35$, find the value of x.
5. If $x : 35 :: 48 : 60$, find the value of x.
6. Find the fourth proportional to the numbers:
   (i) 8, 36, 6 (ii) 5, 7, 30 (iii) 2.8, 14, 3.5
7. If 36, 54, x are in continued proportion, find the value of x.
8. If 27, 36, x are in continued proportion, find the value of x.
9. Find the third proportional to:
   (i) 8 and 12 (ii) 12 and 18 (iii) 4.5 and 6
10. If the third proportional to 7 and x is 28, find the value of x.
    Hint. $7 : x :: x : 28$. *Find x.*
11. Find the mean proportional between:
    (i) 6 and 24 (ii) 3 and 27 (iii) 0.4 and 0.9
12. What number must be added to each of the numbers 5, 9, 7, 12 to get the numbers which are in proportion?
13. What number must be subtracted from each of the numbers 10, 12, 19, 24 to get the numbers which are in proportion?
14. The scale of a map is 1 : 5000000. What is the actual distance between two towns, if they are 4 cm apart on the map?
15. At a certain time a tree 6 m high casts a shadow of length 8 metres. At the same time a pole casts a shadow of length 20 metres. Find the height of the pole.

    Hint. *(height of the tree) : (length of the shadow of the tree)*
    = (height of the pole) : (length of the shadow of the pole).

Q1

Answer :

We have:

Product of the extremes = $30 \times 60 = 1800$

Product of the means = $40 \times 45 = 1800$

Product of extremes = Product of means

Hence, 30 : 40 :: 45 : 60

Q2

Answer :

We have:

Product of the extremes = $36 \times 7 = 252$

Product of the means = $49 \times 6 = 294$

Product of the extremes $\neq$ Product of the means

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

Q3

Answer :

Product of the extremes = $2 \times 27 = 54$

Product of the means = $9 \times x = 9x$

Since 2 : 9 :: x : 27, we have:

Product of the extremes = Product of the means

$\Rightarrow 54 = 9x$

$\Rightarrow x = 6$

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, $2.8 \times x = 14 \times 3.5$ [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

Answer :

27, 36 and x are in continued proportion.

Then, 27 : 36 :: 36 : x

$\Rightarrow 27 \times x = 36 \times 36$ [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.

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

$\Rightarrow (5 + x) \times (12 + x) = (9 + x) \times (7 + x)$

$(\text{Product of extremes} = \text{Product of means})$

$\Rightarrow 60 + 5x + 12x + x^2 = 63 + 9x + 7x + x^2$

$\Rightarrow 60 + 17x = 63 + 16x$

$\Rightarrow x = 3$

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

$\Rightarrow (10 - x) \times (24 - x) = (12 - x) \times (19 - x)$

$(\text{Product of extremes} = \text{Product of means})$

$\Rightarrow 240 - 10x - 24x + x^2 = 228 - 12x - 19x + x^2$

$\Rightarrow 240 - 34x = 228 - 31x$

$\Rightarrow 3x = 12$

$\Rightarrow x = 4$

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