ODM EDUCATIONAL GROUP
Changing your Tomorrow

SUB TOPIC: Proportion , Continued Proportion

SUBJECT : MATHEMATICS
CHAPTER NUMBER:
CHAPTER NAME : RATIO AND PROPORTION

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LEARNING OUTCOME

- Students will be able to check whether the quantities
- are in Proportion or not .
- Continued Proportion.
- Mean proportional
- Find any unknown quantity

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PREVIOUS CONNECT

- Check whether 48: 12 = 2: 3 or not.

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Proportion

Proportion: When two ratios are equal, then the four quantities involved in the two ra
are said to be proportional.

When a, b, c, d are in proportion, then a and d are called **EXTREMES** and b and c are ca
MEANS.

If a: b = c: d, we write, a: b :: c:d and say that a, b, c, d are in proportion. Here a and b
called extremes, and b and c are called means terms.

Thus a:b :: c:d $\Rightarrow$ (a × d) = (b × c)

Continued proportion:

If the quantities a, b, c are such that a/b = b/c then a, b, c are said to be in continued proportion.

If a:b :: b:c then a/b = b/c.

•a is called the first proportional of b and c.

•b is called the second proportional or mean proportional of a and c.

•c is called the third proportional of a and b.

If three quantities a, b and c are in continued proportion, then a/b = b/c or $b^2 = ac$.

In a:b :: b:c, the mean proportional ‘b’, between two quantities a and c is given by $b^2 = ac$ or b = □ac.

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1. Check whether the following quantities form a proportion or not:

(i) 3x, 7x, 24 and 56

(ii) 0.8, 3, 2.4 and 9

(iii) 1 ½, 3 ¼, 4 1/2 and 9 ¾

(iv) 0.4, 0.5, 2.9 and 3.5

(v) 2 ½, 5 ½, 3.0 and 6.0

Solution:

(i) 3x, 7x, 24 and 56

If the quantities are in proportion

$3x \times 56 = 7x \times 24$

By further calculation

$168x = 168x$ which is true

Therefore, 3x, 7x, 24 and 56 are in proportion.

(ii) 0.8, 3, 2.4 and 9

If the quantities are in proportion

$0.8 \times 9 = 3 \times 2.4$

By further calculation

$7.2 = 7.2$ which is true

Therefore, 0.8, 3, 2.4 and 9 are in proportion.

(iii) 1 ½, 3 ¼, 4 1/2 and 9 ¾

If the quantities are in proportion

1 ½ × 9 ¾ = 3 ¼ × 4 ½

3/2 × 39/4 = 13/4 × 9/2

117/8 = 117/8 which is true

Therefore, 1 ½, 3 ¼, 4 1/2 and 9 ¾ are in proportion.

(iv) 0.4, 0.5, 2.9 and 3.5

If the quantities are in proportion

0.4 × 3.5 = 0.5 × 2.9

1.40 = 1.45 which is not true

Therefore, 0.4, 0.5, 2.9 and 3.5 are not in proportion.

(v) 2 ½, 5 ½, 3.0 and 6.0

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2. Find the fourth proportional of:

(i) 3, 12 and 4

(ii) 5, 9 and 45

(iii) 2.1, 1.5 and 8.4

(iv) 1/3, 2/5 and 8.4

(v) 4 hours 40 minutes, 1 hour 10 minutes and 16 hours

Solution:

i) 3, 12 and 4

Here the 4^{th} proportional = (12 × 4)/ 3 = 16

(ii) 5, 9 and 45

Here the 4^{th} proportional = (9 × 45)/ 5 = 81

(iii) 2.1, 1.5 and 8.4

Here the 4^{th} proportional = (1.5 × 8.4)/ 2.1 = 1.5 × 4 = 6.0

(iv) 1/3, 2/5 and 8.4

Here the 4^{th} proportional = (2/5 × 8.4)/ 1/3

= 2/5 × 8.4 × 3/1

= (2 × 84 × 3)/ (5 × 10 × 1)

= 252/25

= 10.08

(v) 4 hours 40 minutes, 1 hour 10 minutes and 16 hours

It can be written as

4 hours 40 minutes = 4 × 60 + 40 = 240 + 40 = 280 minutes

1 hour 10 minutes = 1 × 60 + 10 = 60 + 10 = 70 minutes

16 hours = 16 × 60 = 960 minutes

So the fourth proportional = (70 × 960)/ 280 = 240 minutes

= 240/60

= 4 hours

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4. Find the mean proportional between:

(i) 16 and 4
(ii) 3 and 27
(iii) 0.9 and 2.5
(iv) 0.6 and 9.6
(v) ¼ and 1/16

Solution:

(i) 16 and 4

Here the mean proportional between them

= √ (16 × 4)

By multiplication

= √ 64

= 8

(ii) 3 and 27

Here the mean proportional between them

= √ (3 × 27)

By multiplication

= √ 81

= 9

(iii) 0.9 and 2.5

Here the mean proportional between them

= √ (0.9 × 2.5)

Multiplying and dividing by 10

= √ (9/10 × 25/10)

So we get

= √ 225/100

= 15/10

= 1.5

(iv) 0.6 and 9.6

Here the mean proportional between them

= √ (0.6 × 9.6)

8. Two numbers are in the ratio 5: 7. Their difference is 10. Find the numbers.

Solution:

It is given that

The ratio between two numbers = 5: 7

The difference between two numbers = 7 – 5 = 2

Here if 2 is the difference, the first number is 5

Similarly if 10 if the difference, the first number = 5/2 × 10 = 25

Second number = 7/2 × 10 = 35

12. The population of a town is 180,000, out of which males are 1/3 of the whole population. Find the number of females. Also, find the ratio of the number of females to the whole population.

Solution:

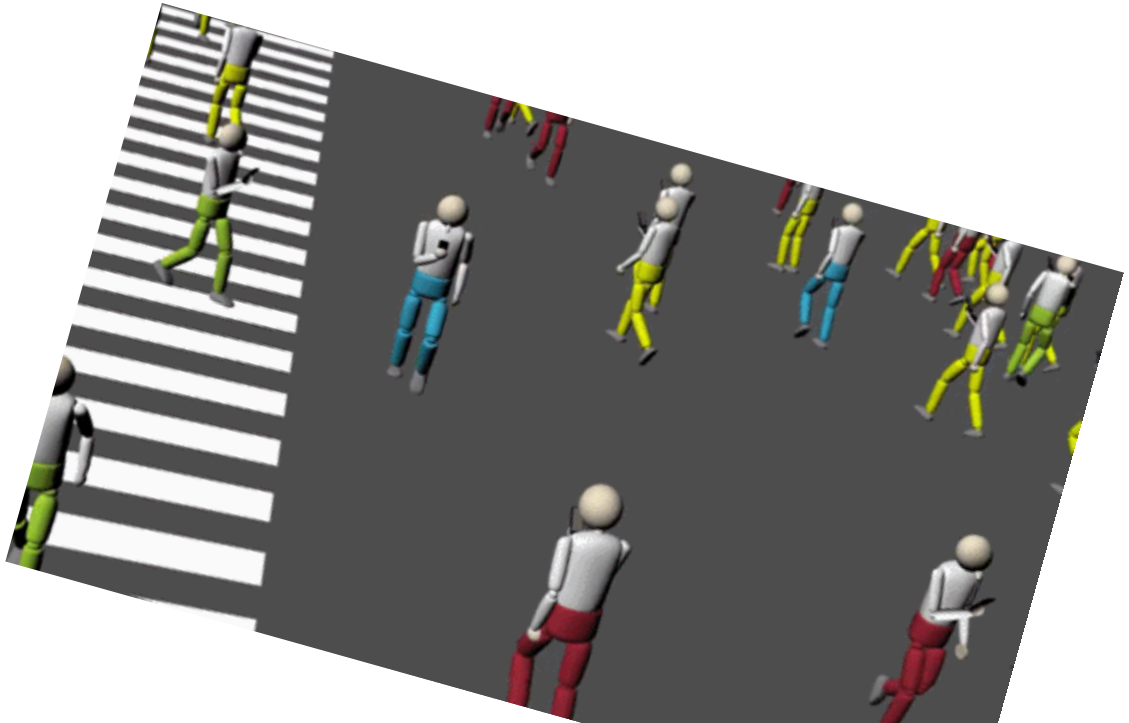
It is given that

Total population = 180000

So the population of males = 1/3 of 180000 = 60, 000

Similarly the population of females = 180000 – 60000 = 120000

Here the ratio of females to whole population = 120000: 180000 = 2: 3



13. Ten gram of an alloy of metals A and B contains 7.5 gm of metal A and the rest is metal B. Find the ratio between:
(i) the weights of metals A and B in the alloy.
(ii) the weight of metal B and the weight of the alloy.

Solution:
We know that
Total weight of A and B metals = 10 gm A weight – 7.5 gm B weight
So we get
= 10 – 7.5
= 2.5 gm
(i) Ratio between the weight of A and B in the alloy = 7.5: 2.5
It can be written as
= 75/10: 25/10
So we get
= 3: 1
(ii) Ratio between the weight of metal B and the weight of the alloy = 2.5: 10
It can be written as
= 25/10: 10
So we get
= 25: 100
= 1: 4

19. ₹ 300 is divided between A and B in such a way that A gets half of B. Find:
(i) the ratio between the shares of A and B.
(ii) the share of A and the share of B.
Solution:

Amount divided between A and B = ₹ 300
(i) We know that A gets half of B
So the ratio between the shares of A and B = ½ = 1: 2
(ii) We know that
Sum of the ratios = 1 + 2 = 3
Share of A = (300 × 1)/ 3 = ₹ 100
Share of B = (300 × 2)/ 3 = ₹ 200

21. A bag contains ₹ 1,600 in the form of ₹ 10 and ₹ 20 notes. If the ratio between the numbers of ₹ 10 and ₹ 20 notes is 2: 3; find the total number of notes in all.

Solution:

Amount in the bag = ₹ 1,600

The bag has notes in the denomination of ₹ 10 and ₹ 20

So the ratio between the number of ₹ 10 and ₹ 20 notes = 2: 3

Consider the number of ₹ 10 notes = x

Number of ₹ 20 notes = y

Using the condition

10x + 20y = 1600 …. (1)

x = 2/3 y ….. (2)

By substituting the value of x in equation (1)

10 × 2/3 y + 20y = 1600

20/3y + 30y = 1600

(20 + 60)/ 3 y = 1600

80/3 y = 1600

y = (1600 × 3)/ 80

y = 60

Substituting the value of y in equation (2)

x = 2/3 × 60 = 40

So the total number of notes in all = x + y

= 60 + 40

= 100 notes

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