Direct Proportion

This type of proportion involves the relationship where if one thing is increased (decreased) then the other is increased (decreased) as well.

Eg. The members of staff are paid according to number of hours they work. This means that if a member of staff has ***an increase*** in his number of hours then he will receive ***an increase*** in his salary. Likewise, if there is ***a decrease*** in the number of hours worked then he will receive ***a decrease*** in his salary.

Question

A bottling machine fills 500 bottles in 15 minutes. How many bottles will it fill in one and a half hour?

Solution

All units should be similar. Therefore one and a half hour converted to minutes = $1\frac{1}{2}$ x 60 = 90 minutes

$\frac{x}{90} = \frac{500}{15}$

Hence x = $\frac{500 \times 90}{15}$ = 3000

Therefore 3000 bottles are filled in one and a half hours.

Inverse Proportion

An increase (decrease) in one quantity may cause a decrease (increase) in another. This is known as inverse proportion.

Question

If 8 people can pick the apples from trees in 6 days, how long will it take 12 people?

Solution

8 people take 6 days

1 person will take 6 x 8 = 48 days

Hence 12 persons will take $\frac{48}{12}$ = 4 days.

Increase and decrease by a given ratio

A quantity or measurement is decreased (increased) due to a decrease (an increase) in ratio.

Question

A photograph is 12cm wide and 8 cm tall. It is enlarged in the ratio 3:2. What are the dimensions of the enlarged photograph?

Solution

The ratio 3:2 indicates an increase in the dimensions of $\frac{3}{2}$. The width is enlarged by $\frac{3}{2}$ x 12 = 18cm. The height is also increased by $\frac{3}{2}$ x 8 = 12cm.

The new dimensions are 18cm and 12cm.

PRACTICE QUESTIONS

1. Increase 100 by the ratio of a) 8:5 b) 5:2
2. Decrease 60 by the ratio of a) 7:12
3. A photocopier enlarges in the ratio 7:4. What would be the new size of a diagram measuring 16cm by 12cm?

4. A square of side length 3cm is enlarged by a ratio of 3:1. What is the area of:

a) The original square

b) The enlarged square

By what ratio has the area been enlarged?

5. Six people can dig a trench in 8 hours. How long would it take: a) 4 people b) 12 people c) 1 person? How many people would it take to dig the trench in : a) 3 hours b) 16 hours c) 1 hour

6. The angles of a triangle are in the ratio 3:5:4. Calculate the size of each angle.

7. A television set uses 3 units of electricity in 2 hours. How many units will it use in 7 hours?