Unitary Method

1. If 12 flowerpots cost $156, what do 28 flowerpots cost?

Ans. This is the situation of direct variation as

More flowerpots, result in more cost.

Cost of 12 flowerpots $= \$ 156$

Cost of 1 flowerpot $= \$ \left(\dfrac{156}{12}\right)$

Cost of 28 flowerpots $= \$ \left(\dfrac{156}{12} \times 28\right) = \$ 364.$

2. A motor bike travels 280 km in 40 liters of petrol. How much distance will it cover in 9 liters of petrol?

Ans. This is the situation of direct variation.

Less quantity of petrol, less distance covered.

In 40 liters of petrol, distance covered $= 280$ km

In 1 liter of petrol, distance covered $= \dfrac{280}{40}\ km$

In 9 liters of petrol, distance covered $= \dfrac{280}{40} \times 9\ km = 63$ km.

3. If 48 men can do a piece of work in 24 days, in how many days will 36 men complete the same work?

Ans. This is a situation of indirect variation.

Less men will require more days to complete the work.

48 men can do the work in 24 days

1 man can do the same work in 48×24 days

36 men can do the same work in $\dfrac{48 \times 24}{36} = 32$ days

Therefore, 36 men can do the same work in 32 days.

4. 100 soldiers in a fort had enough food for 20 days. After 2 days, 20 more soldiers join the fort. How long will the remaining food last?

Ans. More soldiers, therefore, food lasts for less days.

This is a situation of indirect variation.

Since 20 soldiers join the fort after 2 days, therefore, the remaining food is sufficient for 100 soldiers and 18 days.

5. The cost of 3 kg of sugar is $ 60. What will the cost of 8 kg of sugar be?

Ans. This is a situation of direct variation, now we solve using unitary method.

Cost of 3 kg of sugar = $ 60

Cost of 1 kg of sugar = $ $\frac{60}{3}$ = $ 20

Cost of 8 kg of sugar = $ 20 × 8

Therefore, cost of 8 kg of sugar = $ 160

6. If 13 books cost 169, what do 30 books cost?

Ans. This is a situation of direct variation, now we solve using unitary method.

Cost of 13 books = $ 169.

Cost of 1 book = $ $\frac{169}{13}$ = $ 13.

Cost of 30 books = $ 13 × 30.

Therefore, cost of 30 books = $ 390.

7. A labourer gets $ 684 for 9 days. How many days should he work to get $ 912?

Ans. This is also a situation of direct variation, now we solve using unitary method.

For $ 684, the labourer works 9 days.

For $ 1, the labourer works $\frac{9}{684}$ days.

For $ 912, the labourer works $\frac{9}{684}$ × 912 days.

Therefore, for $ 912, the labourer works 12 days.

8. If 52 men can do a piece of work in 35 days, then 28 men will complete the same work in how many days?

Ans. This is a situation of inverse variation, now we solve using unitary method.

52 men can do the work in 35 days.

1 man can do the work in (35 × 52) days.

28 men can do the work in days. $\frac{35 \times 52}{28}$ days

Therefore, 28 men can do the work in 65 days.

9. In a camp there is enough food for 500 soldiers for 35 days. If 200 more soldiers join the camp, how many days will the food last?

Ans. This is a situation of inverse variation, now we solve using unitary method.

For 500 soldiers, food lasts for 35 days.

For 1 soldier, food lasts for (35 × 500) days.

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1

Since 200 more join. So, now the number of soldiers is $(500 + 200) = 700$.

For 700 soldiers, food lasts for $\frac{35 \times 500}{700}$ days

Therefore, for 700 soldiers, food lasts for $= 25$ days.

10. Sara starts at 8:00 AM by bicycle to reach school. She cycles at the speed of $18 \frac{km}{hour}$ and reaches the school at 8:22 AM. By how much should she increase the speed so that she can reach the school at 8:12 AM?

Ans. This is a situation of inverse variation, now we solve using unitary method.

In 22 minutes the same distance is covered at the speed of 18 km/hr.

In 1 minute the same distance is covered at the speed of (18×22) km/hr .

In 12 minutes the same distance is covered at the speed of $\frac{18 \times 22}{12}$ km/hr.

Therefore, in 12 minutes the same distance is covered at the speed of 16 km/hr.

11. 32 workers can complete a work in 84 days. How many workers will complete the same work in 48 days?

Ans. This is a situation of inverse variation, now we solve using unitary method.

To complete the work in 84 days, workers required $= 32$

To complete the work in 1 day, worker required $= (32 \times 84)$

To complete the work in 48 days workers required $= \frac{32 \times 84}{48}$

Therefore, to complete the work in 48 days, 56 workers are required.

12. A lobour get $980 for 14 days work. How many days should he work to get $2100?

Ans. This is also a situation of direct variation as money is received for working more days.

$980 is earned by a labour in 14 days.

$1 is earned by a labour in $\frac{14}{980}$ days.

$2100 is earned by a labour in $\frac{14}{980} \times 2100$ days.

Therefore, $2100 is earned by a labour in 30 days.

13. If 4 men and 5 women can earn $480 in a day, find how much 9 men and 11 women will earn in a day?

Ans. This is a situation of direction variation.

More men can earn more in a day.

In a day 4 men can earn $ 480

1 men can earn $480/4 and 9 men can earn $$\frac{480}{4} \times 9 = 1080

Also, 5 women can earn $ 480 and 1 woman can earn $ $\frac{480}{5} = 96

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2

11 women can earn $= \$ 96 \times 11 = \$1056$

Therefore, 9 men and 11 women can earn $\$(1080 + 1056) = \$ 2136$.

14. A car travels 360 km in 60 liters of petrol. How much distance will it cover in 12 liters of petrol?

Ans. This is also a situation of direct variation.

Less quantity of petrol, less distance covered.

In 60 liters of petrol, distance covered $= 360$ km.

In 1 liter of petrol, distance covered $= \frac{360}{60}$ km.

In 12 liters of petrol, distance covered $= \frac{360}{60} \times 12$ km

Therefore, in 12 liters of petrol, distance covered $= 72$ km.

15. 12 typists working for 4 hours to type a book in 18 days. In how many days 4 typists will work for 8 hours to type same book?

Ans. This is a situation of indirect variation.

12 typists working for 4 hours type a book in 18 days

1 typist working for 4 hours types a book in 18×12 days.

1 typist working for 1 hour types a book in $18 \times 12 \times 4$ days.

4 typists working for 1 hour type a book in $\frac{18 \times 12 \times 4}{4}$

4 typists working for 8 hours type a book in $\frac{18 \times 12 \times 4}{4 \times 8}$ days.

Therefore, 4 typists working for 8 hours type a book in 27 days.

16. 16 men can build a wall in 56 hours. How many men will be required to do the same work in 32 hours?

Ans. This is a situation of inverse variation

More the number of men, the faster will they build the wall.

In 56 hours, the wall is built by 16 men.

In 1 hour, the wall is built by 16×56 men.

In 32 hours, the wall is built by $\frac{16 \times 56}{32}$ men

Therefore, in 32 hours, the wall is built by 28 men.

17. If 72 workers can do a piece of work in 40 days, in how many days will 64 workers complete the same work?

Ans. This is a situation of indirect variation.

Less workers will require more days to complete the work.

72 workers can do the work in 40 days

1 worker can do the same work in 72×40 days

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3

64 workers can do the same work in $\frac{72 \times 40}{64}$

Therefore, 64 workers can do the same work in 45 days.

18. If 24 painters working for 7 hours a day, for painting a house in 16 days. How many painters are required working for 8 hours a day will finish painting the same house in 12 days?

Ans. 24 painters working for 7 hours paint a house in 16 days.

1 painter working for 7 hours paints a house in 16 × 24 days.

1 painter working for 1 hour paints a house in 16 × 24 × 7 days.

Let the required number of painters be x, then;

x painters working for 1 hour a day paint the house $in \frac{16 \times 24 \times 7}{x}$ days

x painters working for 8 hours a day paint the house $in \frac{16 \times 24 \times 7}{x \times 8}$ days

But the number of days given = 12

According to the problem;

$$\frac{16 \times 24 \times 7}{x \times 8} = 12$$

2688/8x = 12

8x × 12 = 2688

96x = 2688

$$x = \frac{2688}{96}$$

x = 28

Therefore, 28 painters working for 8 hours a day will finish the same work in 12 days.

19. 11 potters can make 143 pots in 8 days. How many potters will be required to make 169 pots in 4 days?

Ans. 11 potters can make 143 pots in 8 days.

1 potter can make 143 pots in 8 × 11 days.

1 potter can make 1 pot $in \frac{8 \times 11}{143} \ days$.

Let the number of potters required be x, then;

x potters can make 1 pot in $\frac{8 \times 11}{143 \times x}$ days

x potters can make 169 pots in $\frac{8 \times 11 \times 169}{143 \times x}$ days

But the number of days given = 4

According to the problem;

$\frac{8 \times 11 \times 169}{143 \times x} = 4$

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4

$$\frac{14872}{143}x \ = \ 4$$

$$572x = 14872$$

$$x = \frac{14872}{572}$$

$$x = 26$$

Therefore, 26 potters are required to make 169 pots in 4 days.

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5