1. If the cost of x metres of wire is d rupees, then what is the cost of y metres of wire at the same rate?

A. Rs. $(\frac{xd}{y})$

B. Rs. xd

C. Rs. $(\frac{yd}{x})$

D. Rs. yd

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

cost of x metres of wire = Rs. d

$\text{cost of 1 metre of wire} = \text{Rs.}\ (\frac{d}{x})$

$\text{cost of y metre of wire} = \text{Rs.}\ (y \times \frac{d}{x}) = \text{Rs.}\ (\frac{yd}{x})$

2. In a dairy farm, 40 cows eat 40 bags of husk in 40 days. In how many days one cow will eat one bag of husk?

A. 1

B. 40

C. 20

D. 26

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Assume that in x days, one cow will eat one bag of husk.

More cows, less days (Indirect proportion)
More bags, more days (direct proportion)

Hence we can write as

$$\begin{matrix} \text{Cows} & 40 : 1 \\ & \Box \\ \text{Bags} & 1 : 40 \end{matrix} :: x : 40$$

$\Rightarrow 40 \times 1 \times 40 = 1 \times 40 \times x$
$\Rightarrow x = 40$

3. If 7 spiders make 7 webs in 7 days, then how many days are needed for 1 spider to make 1 web?

A. 1

B. 7

C. 3 D. 14

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Let, 1 spider make 1 web in x days.

More spiders, Less days (Indirect proportion)
More webs, more days (Direct proportion)

Hence we can write as

$$\begin{matrix}\text{Spiders} & 7:1 \\ & \end{matrix}\Big\} :: x : 7$$
$$\text{Webs} \quad 1:7$$

$\Rightarrow 7 \times 1 \times 7 = 1 \times 7 \times x$
$\Rightarrow x = 7$

4. 4 mat-weavers can weave 4 mats in 4 days. At the same rate, how many mats would be woven by 8 mat-weavers in 8 days?

A. 4 B. 16

C. 8 D. 1

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Let the required number of mats be x

More mat-weavers, more mats (direct proportion)
More days, more mats (direct proportion)

Hence we can write as

$$\begin{matrix}\text{Mat-weavers} & 4:8 \\ & \end{matrix}\Big\} :: 4 : x$$
$$\text{Days} \quad 4:8$$

$\Rightarrow 4 \times 4 \times x = 8 \times 8 \times 4$
$\Rightarrow x = 2 \times 2 \times 4 = 16$

5. If a quarter kg of potato costs 60 paise, how many paise does 200 gm cost?

A. 65 paise
B. 70 paise
C. 52 paise
D. 48 paise

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1 (Chain Rule)

Let 200 gm potato costs x paise

Cost of ¼ Kg potato = 60 Paise

=> Cost of 250 gm potato = 60 Paise (∵ 1 Kg = 1000 gm => ¼ Kg = $^{1000}/_{4}$ gm = 250 gm)

More quantity, More Paise (direct proportion)

Hence we can write as

$$\text{Quantity} \quad 200 : 250 \} :: x : 60$$

$$\Rightarrow 200 \times 60 = 250 \times x$$
$$\Rightarrow 4 \times 60 = 5 \times x$$
$$\Rightarrow 4 \times 12 = x$$
$$\Rightarrow x = 48$$

Solution 2

Cost of ¼ Kg potato = 60 Paise

=> Cost of 250 gm potato = 60 Paise (∵ 1 Kg = 1000 gm => ¼ Kg = $^{1000}/_{4}$ gm = 250 gm)

$$\Rightarrow \text{Cost of 200 gm potato} = \frac{60 \times 200}{250} = \frac{60 \times 4}{5} = 48\text{paise}$$

6. In a camp, there is a meal for 120 men or 200 children. If 150 children have taken the meal, how many men will be catered to with remaining meal?

A. 50
B. 30
C. 40
D. 10

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Meal for 200 children = Meal for 120 men

$$\text{Meal for 1 child} = \text{Meal for } \frac{120}{200} \text{ men}$$

$$\text{Meal for 150 children} = \text{Meal for } \frac{120 \times 150}{200} \text{ men} = \text{Meal for 90 men}$$

Total mean available = Meal for 120 men

Renaming meal = Meal for 120 men - Meal for 90 men = Meal for 30 men

7. 36 men can complete a piece of work in 18 days. In how many days will 27 men complete the same work?

A. 26

B. 22

C. 12

D. 24

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1 (Chain Rule)

Let the required number of days be x

More men, less days (indirect proportion)

Hence we can write as

$$\text{Men} \quad 36 : 27 \} :: x : 18$$

$$\Rightarrow 36 \times 18 = 27 \times x$$
$$\Rightarrow 12 \times 18 = 9 \times x$$
$$\Rightarrow 12 \times 2 = x$$
$$\Rightarrow x = 24$$

Solution 2 (Using Time and Work)

Amount of work 36 men can do in 1 day = 1/18

$$\text{Amount of work 1 man can do in 1 day} = \frac{1}{18 \times 36}$$

$$\text{Amount of work 27 men can do in 1 day} = \frac{27}{18 \times 36} = \frac{3}{18 \times 4} = \frac{1}{24}$$

$\Rightarrow$ 27 men can complete the work in 24 days

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

In this case,

$M_1 = 36$, $M_2 = 27$

$D_1 = 18$, $D_2 = x$

$W_1 = W_2$

$H_1 = H_2$ ($\because$ We can assume like this as these vales are not explicitly given)

Hence, $M_1 D_1 = M_2 D_2$

$\Rightarrow 36 \times 18 = 27x$

$$\Rightarrow x = \frac{36 \times 18}{27} = \frac{4 \times 18}{3} = 4 \times 6 = 24$$

8. A wheel that has 6 cogs is meshed with a larger wheel of 14 cogs. If the smaller wheel has made 21 revolutions, what will be the number of revolutions made by the larger wheel?

A. 15

B. 12

C. 21

D. 9

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Let the number of revolutions made by the larger wheel be x

More cogs, less revolutions (Indirect proportion)

Hence we can write as

$$\text{Cogs} \quad 6 : 14 \} :: x : 21$$

$$\Rightarrow 6 \times 21 = 14 \times x$$
$$\Rightarrow 6 \times 3 = 2 \times x$$
$$\Rightarrow 3 \times 3 = x$$
$$\Rightarrow x = 9$$

9. 3 pumps, working 8 hours a day, can empty a tank in 2 days. How many hours a day should 4 pumps work in order to empty the tank in 1 day?

A. 10 B. 12

C. 8 D. 15

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Let the required hours needed be x

More pumps, less hours (Indirect proportion)
More Days, less hours (Indirect proportion)

Hence we can write as

$$\begin{matrix} \text{Pumps} & 3 : 4 \\ & \\ \text{Days} & 2 : 1 \end{matrix} :: x : 8$$

$$\Rightarrow 3 \times 2 \times 8 = 4 \times 1 \times x$$
$$\Rightarrow 3 \times 2 \times 2 = x$$
$$\Rightarrow x = 12$$

10. 39 persons can repair a road in 12 days, working 5 hours a day. In how many days will 30 persons, working 6 hours a day, complete the work?

A. 9 B. 12

C. 10 D. 13

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1 (Chain Rule)

Let the required number of days be x

More persons, less days (indirect proportion)
More hours, less days (indirect proportion)

Hence we can write as

$$\left.\begin{matrix}\text{Persons} & 39 : 30 \\ \text{Hours} & 5 : 6\end{matrix}\right\} :: x : 12$$

$\Rightarrow 39 \times 5 \times 12 = 30 \times 6 \times x$
$\Rightarrow 39 \times 5 \times 2 = 30 \times x$
$\Rightarrow 39 = 3 \times x$
$\Rightarrow x = 13$

Solution 2 (Using Time and Work)

Amount of work 39 persons can do in 1 day, working 5 hours a day = 1/12

$$\text{Amount of work 1 person can do in 1 day, working 5 hours a day} = \frac{1}{12 \times 39}$$

$$\text{Amount of work 1 person can do in 1 day, working 1 hours a day} = \frac{1}{12 \times 39 \times 5}$$

$$\text{Amount of work 30 person can do in 1 day, working 1 hours a day} = \frac{30}{12 \times 39 \times 5}$$

$$\text{Amount of work 30 person can do in 1 day, working 6 hours a day} = \frac{30 \times 6}{12 \times 39 \times 5}$$

$$= \frac{30}{2 \times 39 \times 5} = \frac{3}{39} = \frac{1}{13}$$

$\Rightarrow$ 30 persons can complete the work ,working 6 hours a day in 13 days

---

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

In this case,

$M_1 = 39$, $M_2 = 30$

$D_1 = 12$, $D_2 = x$

$W_1 = W_2$

$H_1 = 5$, $H_2 = 6$

Hence, $M_1 D_1 H_1 = M_2 D_2 H_2$

$\Rightarrow 39 \times 12 \times 5 = 30 \times x \times 6$

$\Rightarrow 39 \times 2 \times 5 = 30 \times x$

$\Rightarrow 39 = 3 \times x$

$\Rightarrow x = \frac{39}{3} = 13$

11. A certain industrial loom weaves 0.128 meters of cloth every second. Approximately how many seconds will it take for the loom to weave 25 meters of cloth?

A. 205

B. 200

C. 180

D. 195

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

Let the required number of seconds be x

More cloth, More time, (direct proportion)

Hence we can write as

Cloth $0.128 : 25\ \} :: 1 : x$

$\Rightarrow 0.128x = 25$

$\Rightarrow x = \frac{25}{.128} = \frac{25000}{128} = \frac{3125}{16} \approx 195$

12. A contract is to be completed in 56 days if 104 persons work, each working at 8 hours a day. After 30 days, $^2/_5$ of the work is completed. How many additional persons should be deployed so that the work will be completed in the scheduled time,each persons now working 9 hours a day.

A. 160
B. 150
C. 24
D. 56

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Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1 (Chain Rule)

Persons worked = 104
Number of hours each person worked per day = 8
Number of days they worked = 30
Work completed = $^2/_5$

Remaining days = 56 - 30 = 26
Remaining Work to be completed = 1 - $^2/_5$ = $^3/_5$
Let the total number of persons who do the remaining work = x
Number of hours each person needs to be work per day = 9

More days, less persons(indirect proportion)
More hours, less persons(indirect proportion)
More work, more persons(direct proportion)

Hence we can write as

$$\begin{matrix} \text{Days} & 30 : 26 \\ \text{Hours} & 8 : 9 \\ \text{Work} & \frac{3}{5} : \frac{2}{5} \end{matrix} :: x : 104$$

$$\Rightarrow 30 \times 8 \times \frac{3}{5} \times 104 = 26 \times 9 \times \frac{2}{5} \times x$$

$$\Rightarrow x = \frac{30 \times 8 \times \frac{3}{5} \times 104}{26 \times 9 \times \frac{2}{5}} = \frac{30 \times 8 \times 3 \times 104}{26 \times 9 \times 2} = \frac{30 \times 8 \times 104}{26 \times 3 \times 2}$$

$$= \frac{30 \times 8 \times 4}{3 \times 2} = 5 \times 8 \times 4 = 160$$

Number of additional persons required = 160 - 104 = 56

Solution 2 (Using Time and Work)

Persons worked = 104

Number of hours each person worked per day = 8

Number of days they worked = 30

Work completed = $^2/_5$

Remaining days = 56 - 30 = 26

Remaining Work to be completed = 1 - $^2/_5$ = $^3/_5$

Let the total number of persons who do the remaining work = x

Number of hours each person needs to be work per day = 9

Amount of work 1 person did in 1 day, working 1 hours a day = $\frac{(\frac{2}{5})}{104 \times 30 \times 8}$

Now, the amount of work x person should do in 1 day, working 1 hours a day = $\frac{(\frac{3}{5})}{26 \times 9}$

$$\Rightarrow x = \frac{\frac{(\frac{3}{5})}{26 \times 9}}{\frac{(\frac{2}{5})}{104 \times 30 \times 8}} = \frac{30 \times 8 \times \frac{3}{5} \times 104}{26 \times 9 \times \frac{2}{5}} = \frac{30 \times 8 \times 3 \times 104}{26 \times 9 \times 2} = \frac{30 \times 8 \times 104}{26 \times 3 \times 2}$$

$$= \frac{30 \times 8 \times 4}{3 \times 2} = 5 \times 8 \times 4 = 160$$

Number of additional persons required = 160 - 104 = 56

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

Persons worked (M_1) = 104

Number of hours each person worked per day (H_1) = 8

Number of days they worked (D_1) = 30

Work completed (W_1)= 2/5

Remaining days (D_2)= 56 - 30 = 26

Remaining Work to be completed (W_2)= 1 - 2/5 = 3/5

Let the total number of persons who do the remaining work (M_2) = x

Number of hours each person needs to be work per day (H_2) = 9

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$$\Rightarrow \frac{104 \times 30 \times 8}{(\frac{2}{5})} = \frac{x \times 26 \times 9}{(\frac{3}{5})}$$

$$\Rightarrow \frac{104 \times 30 \times 8}{2} = \frac{x \times 26 \times 9}{3}$$

$$\Rightarrow 52 \times 30 \times 8 = x \times 26 \times 3$$

$$\Rightarrow 2 \times 30 \times 8 = 3x$$

$$\Rightarrow x = 2 \times 10 \times 8 = 160$$

Number of additional persons required = 160 - 104 = 56

13. x men working x hours per day can do x units of a work in x days. How much work can be completed by y men working y hours per day in y days?

A. $\frac{x^2}{y^2}$ units

B. $\frac{y^3}{x^2}$ units

C. $\frac{x^3}{y^2}$ units

D. $\frac{y^2}{x^2}$ units

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Solution 1 (Chain Rule)

Let amount of work completed by y men working y hours per in y days = w units

More men, more work(direct proportion)
More hours, more work(direct proportion)
More days, more work(direct proportion)

Hence we can write as

Men x : y

Hours x : y :: x : w

Days x : y

$\Rightarrow x^3 w = y^3 x$

$\Rightarrow w = \frac{y^3 x}{x^3} = \frac{y^3}{x^2}$

Solution 2 (Using Time and Work)

Amount of work completed by 1 man in 1 day, working 1 hours a day = $\frac{x}{x^3} = \frac{1}{x^2}$

Amount of work y men in y days, working y hours a day = $y^3 \times \frac{1}{x^2} = \frac{y^3}{x^2}$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$

$M_1 = x$

$H_1 = x$

$D_1 = x$

$W_1 = x$

$M_2 = y$

$D_2 = y$

$H_2 = y$

Let $W_2 = w$

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$$\Rightarrow \frac{x^3}{x} = \frac{y^3}{w}$$

$$\Rightarrow x^2 = \frac{y^3}{w}$$

$$\Rightarrow w = \frac{y^3}{x^2}$$

14. 21 goats eat as much as 15 cows. How many goats each as much as 35 cows?

A. 49 B. 32

C. 36 D. 41

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Here is the answer and explanation

Answer : Option A

Explanation :

$$15 \text{ cows} \equiv 21 \text{ goats}$$
$$1 \text{ cow} \equiv \frac{21}{15} \text{ goats}$$
$$35 \text{ cows} \equiv \frac{21 \times 35}{15} \text{ goats} \equiv \frac{21 \times 7}{3} \text{ goats} \equiv 7 \times 7 \text{ goats} \equiv 49 \text{ goats}$$

15. A flagstaff 17.5 m high casts a shadow of length 40.25 m. What will be the height of a building, which casts a shadow of length 28.75 m under similar conditions?

A. 12.5 m B. 10.5 m

C. 14 D. 12

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1 (Chain Rule)

Let the required height of the building be x meter

More shadow length, More height(direct proportion)

Hence we can write as

$$\text{shadow length} \quad 40.25 : 28.75 \} :: 17.5 : x$$

$$\Rightarrow 40.25 \times x = 28.75 \times 17.5$$

$$\Rightarrow x = \frac{28.75 \times 17.5}{40.25} = \frac{2875 \times 175}{40250} = \frac{2875 \times 7}{1610} = \frac{2875}{230} = \frac{575}{46} = 12.5$$

Solution 2

$$\text{shadow of length } 40.25 \text{ m} \equiv 17.5 \text{ m high}$$

$$\text{shadow of length } 1 \text{ m} \equiv \frac{17.5}{40.25} \text{ m high}$$

$$\text{shadow of length } 28.75 \text{ m} \equiv \frac{28.75 \times 17.5}{40.25} \text{ m high} = 12.5 \text{ m high}$$

16. Running at the same constant rate, 6 identical machines can produce a total of 270 bottles per minute. At this rate, how many bottles could 10 such machines produce in 4 minutes?

A. 1800

B. 900

C. 2500

D. 2700

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Let required number of bottles be x

More machines, more bottles(direct proportion)
More minutes, more bottles(direct proportion)

Hence we can write as

$$\begin{matrix} \text{machines} & 6 : 10 \\ & \\ \text{minutes} & 1 : 4 \end{matrix} :: 270 : x$$

$\Rightarrow 6 \times 1 \times x = 10 \times 4 \times 270$

$\Rightarrow x = \frac{10 \times 4 \times 270}{6} = \frac{10 \times 4 \times 90}{2} = 10 \times 4 \times 45 = 1800$

17. A person works on a project and completes $^5/_8$ of the job in 10 days. At this rate, how many more days will he it take to finish the job?

A. 7

B. 6

C. 5

D. 4

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Solution 1 (Chain Rule)

Number of days he worked = 10

Work completed = $^5/_8$

Let the required number of days = x

Remaining Work to be completed = 1 - $^5/_8$ = $^3/_8$

More work, more days(direct proportion)

Hence we can write as

$\text{Work} \quad \frac{5}{8} : \frac{3}{8} \} :: 10 : x$

$\Rightarrow \frac{5}{8} \times x = \frac{3}{8} \times 10$

$\Rightarrow 5 \times x = 3 \times 10$

$\Rightarrow x = 3 \times 2 = 6$

Solution 2 (Using Time and Work)

Number of days he worked = 10

Work completed = $^5/_8$

Let the required number of days = x

Remaining Work to be completed = $1 - {}^{5}/_{8} = {}^{3}/_{8}$

$$\text{Amount of work 1 person did in 1 day} = \frac{(\frac{5}{8})}{10}$$

$$\text{Now, the amount of work 1 person should do in x days} = \frac{3}{8}$$

$$\Rightarrow x = \frac{(\frac{3}{8})}{\frac{(\frac{5}{8})}{10}} = \frac{3}{(\frac{5}{10})} = \frac{3 \times 10}{5} = 6$$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

Here,

$M_1 = M_2$

$H_1 = H_2$

$D_1 = 10$

$W_1 = 5/8$

Let $D_2 = x$

$W_2 = 1 - 5/8 = 3/8$

Hence, the equation can be written as

$$\frac{D_1}{W_1} = \frac{D_2}{W_2}$$

$$\Rightarrow \frac{10}{(\frac{5}{8})} = \frac{x}{(\frac{3}{8})}$$

$$\Rightarrow \frac{10}{5} = \frac{x}{3}$$

$$\Rightarrow 2 = \frac{x}{3}$$

$$\Rightarrow x = 2 \times 3 = 6$$

18. A fort had provision of food for 150 men for 45 days. After 10 days, 25 men left the fort. Find out the number of days for which the remaining food will last.

A. 44

B. 42

C. 40

D. 38

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Given that fort had provision of food for 150 men for 45 days
Hence, after 10 days, the remaining food is sufficient for 150 men for 35 days

Remaining men after 10 days = 150 - 25 = 125
Assume that after 10 days,the remaining food is sufficient for 125 men for x days

More men, Less days (Indirect Proportion)

$\Rightarrow$ Men $150 : 125\} :: x : 35$

$\Rightarrow 150 \times 35 = 125x$

$\Rightarrow 6 \times 35 = 5x$

$\Rightarrow x = 6 \times 7 = 42$

$\Rightarrow$ The remaining food is sufficient for 125 men for 42 days

19. If the price of 357 apples is Rs.1517.25, what will be the approximate price of 49 dozens of such apples?

A. Rs. 2500

B. Rs. 2300

C. Rs. 2200

D. Rs. 1400

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1 (Chain Rule)

Let the required price be x

More apples, More price(direct proportion)

Hence we can write as

apples $\quad 357 : (49 \times 12) \ \} :: 1517.25 : x$

$\Rightarrow 357x = (49 \times 12) \times 1517.25$

$\Rightarrow x = \dfrac{49 \times 12 \times 1517.25}{357} = \dfrac{7 \times 12 \times 1517.25}{51}$

$= \dfrac{7 \times 4 \times 1517.25}{17} = 7 \times 4 \times 89.25 \approx 2500$

Solution 2

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price of 357 apples = Rs.1517.25

price of 1 apple = Rs. $\frac{1517.25}{357}$

price of 49 dozens apples = Rs. $(\frac{49 \times 12 \times 1517.25}{357}) \approx$ Rs. 2500

20. On a scale of a map 0.6 cm represents 6.6km. If the distance between two points on the map is 80.5 cm , what is the the actual distance between these points?

A. 885.5 km

B. 860 km

C. 892.5 km

D. 825 km

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1 (Chain Rule)

Let the required actual distance be x km

More scale distance, More actual distance(direct proportion)

Hence we can write as

scale distance .6 : 80.5 } :: 6.6 : x

$\Rightarrow .6x = 80.5 \times 6.6$

$\Rightarrow .1x = 80.5 \times 1.1$

$\Rightarrow x = 80.5 \times 11 = 885.5$

Solution 2

$.6 \text{ cm in map} \equiv \text{actual distance of } 6.6 \text{ km}$

$1 \text{ cm in map} \equiv \frac{6.6}{.6} \text{ km}$

$80.5 \text{ cm in map} \equiv \frac{80.5 \times 6.6}{.6} \text{ km} = 885.5 \text{ km}$

21. A rope can make 70 rounds of the circumference of a cylinder whose radius of the base is 14cm. how many times can it go round a cylinder having radius 20 cm?

A. 49 rounds
B. 42 rounds
C. 54 rounds
D. 52 rounds

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Let the required number of rounds be x

More radius, less rounds(Indirect proportion)

Hence we can write as

$\text{radius} \quad 14 : 20 \} :: x : 70$

$\Rightarrow 14 \times 70 = 20x$

$\Rightarrow 14 \times 7 = 2x$

$\Rightarrow x = 7 \times 7 = 49$

22. 8 persons can build a wall 140m long in 42 days. In how many days can 30 persons complete a similar wall 100 m long?

A. 12
B. 10
C. 8
D. 6

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

Solution 1 (Chain Rule)

More persons, less days(indirect proportion)
More length of the wall, more days(direct proportion)

Hence we can write as

$$\begin{matrix}\text{persons} & 8 : 30 \\ & \Big\} :: x : 42 \\ \text{Length of the wall} & 100 : 140 \Big\}\end{matrix}$$

$\Rightarrow 8 \times 100 \times 42 = 30 \times 140 \times x$

$\Rightarrow x = \frac{8 \times 100 \times 42}{30 \times 140} = \frac{8 \times 100 \times 14}{10 \times 140} = \frac{8 \times 100}{10 \times 10} = 8$

Solution 2 (Using Time and Work)

Work done by 8 persons working 42 days = 140

Work done by 1 person working 42 days = $\frac{140}{8}$

Work done by 1 person working 1 day = $\frac{140}{8 \times 42}$

Work done by 30 persons working 1 day = $\frac{30 \times 140}{8 \times 42} = \frac{100}{8}$

Assume that 30 persons working x days complete a similar wall 100 m
$\Rightarrow$ Work done by 30 persons working x days =100

Hence $x = \frac{100}{(\frac{100}{8})} = 8$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$M_1 = 8$

$D_1 = 42$

$W_1 = 140$

$M_2 = 30$

Let $D_2 = x$

$W_2 = 100$

Here $H_1 = H_2$

$$\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$$

$$\Rightarrow \frac{8 \times 42}{140} = \frac{30 \times x}{100}$$

$$\Rightarrow \frac{8 \times 42}{14} = \frac{30 \times x}{10}$$

$$\Rightarrow 8 \times 3 = 3 \times x$$

$$\Rightarrow x = 8$$

23. A certain number of persons can finish a piece of work in 100 days. If there were 10 persons less, it would take 10 more days finish the work. How many persons were there originally?

A. 90

B. 100

C. 110

D. 120

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Here is the answer and explanation

Answer : Option C

Explanation :

Solution 1 (Chain Rule)

Assume that x persons can finish a piece of work in 100 days

Also it is given that (x-10) persons can finish a piece of work in 110 days (∵ 100 + 10 = 110)

More persons, less days(indirect proportion)

Hence we can write as

$$\left.\begin{matrix}\text{persons} & x : (x-10)\end{matrix}\right\} :: 110 : 100$$

$$\Rightarrow 100x = 110(x-10)$$

$$\Rightarrow 100x = 110x - 1100$$

$$\Rightarrow 10x = 1100$$

$$\Rightarrow x = \frac{1100}{10} = 110$$

Solution 2 (Using Time and Work)

Assume that x persons can finish the work in 100 days

$\Rightarrow$ Work done by 1 person in 1 day = $\frac{1}{100x}$ .....(Equation 1)

Also it is given that (x-10) persons can finish the work in 110 days($\because$ 100 + 10 = 110)

$\Rightarrow$ Work done by 1 person in 1 day = $\frac{1}{110(x-10)}$ .....(Equation 2)

But (Equation 1) = (Equation 2)

$\Rightarrow \frac{1}{100x} = \frac{1}{110(x-10)}$

$\Rightarrow 110(x-10) = 100x$

$\Rightarrow 110x - 1100 = 100x$

$\Rightarrow 10x = 1100$

$x = \frac{1100}{10} = 110$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$

Assume that x persons can finish a piece of work in 100 days

Also it is given that (x-10) persons can finish a piece of work in 110 days ($\because$ 100 + 10 = 110)

$M_1 = x$

$D_1 = 100$

$M_2 = (x-10)$

$D_2 = 110$

Here $H_1 = H_2$ and $W_1 = W_2$

$$\text{Hence } M_1D_1 = M_2D_2$$

$$\Rightarrow 100x = 110(x - 10)$$

$$\Rightarrow 100x = 110x - 1100$$

$$\Rightarrow 10x = 1100$$

$$x = \frac{1100}{10} = 110$$

24. 9 examiners can examine a certain number of answer books in 12 days by working 5 hours a day. How many hours in a day should 4 examiners work to examine twice the number of answer books in 30 days?

A. 9
B. 10
C. 11
D. 12

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Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1 (Chain Rule)

Let required number of hours be x

More examiners, less hours(indirect proportion)
More days, less hours(indirect proportion)
More answer books, more hours(direct proportion)

Hence we can write as

examiners 9 : 4

days 12 : 30 :: x : 5

answer books 2 : 1

$\Rightarrow 9 \times 12 \times 2 \times 5 = 4 \times 30 \times 1 \times x$

$\Rightarrow x = \frac{9 \times 12 \times 2 \times 5}{4 \times 30 \times 1} = \frac{9 \times 3 \times 2 \times 5}{30} = \frac{9 \times 2 \times 5}{10} = 9$

Solution 2 (Using Time and Work)

Given that Work done by 9 examiners in 12 day in working 5 hours a day = 1

$\Rightarrow$ Work done by 1 examiner in 1 day in 1 hour $= \frac{1}{9 \times 12 \times 5}$ .....(Equation 1)

$\Rightarrow$ Work needs to be done by 4 examiners in 30 days working x hours a day = 2
($\because$ twice work to be completed)

$\Rightarrow$ Work needs to be done by 1 examiner in 1 day working x hours a day $= \frac{2}{4 \times 30}$ ...(Equation 2)

From (Equation 1) and (Equation 2),

$\Rightarrow x = \frac{(\frac{2}{4 \times 30})}{(\frac{1}{9 \times 12 \times 5})} = \frac{2 \times 9 \times 12 \times 5}{4 \times 30} = \frac{9 \times 12 \times 5}{2 \times 30} = \frac{9 \times 6 \times 5}{30} = 9$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$M_1 = 9$

$D_1 = 12$

$H_1 = 5$

$W_1 = 1$

$M_2 = 4$

$D_2 = 30$

$H_2 = x$

$W_2 = 2$

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$$\Rightarrow \frac{9 \times 12 \times 5}{1} = \frac{4 \times 30 \times x}{2}$$

$$\Rightarrow 9 \times 12 \times 5 = 2 \times 30 \times x$$

$$\Rightarrow 3 \times 12 \times 5 = 2 \times 10 \times x$$

$$\Rightarrow 3 \times 6 \times 5 = 10 \times x$$

$$\Rightarrow 3 \times 3 \times 5 = 5 \times x$$

$$\Rightarrow x = 3 \times 3 = 9$$

25. 9 engines consume 24 metric tonnes of coal, when each is working 8 hours day. How much coal is required for 8 engines, each running 13 hours a day, if 3 engines of former type consume as much as 4 engines of latter type?

A. 20 metric tonnes
B. 22 metric tonnes
C. 24 metric tonnes
D. 26 metric tonnes

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Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1 (Chain Rule)

Let required amount of coal be x metric tonnes

More engines, more amount of coal (direct proportion)

If 3 engines of first type consume 1 unit, then 1 engine will consume 1/3 unit which is its the rate of consumption.
If 4 engines of second type consume 1 unit, then 1 engine will consume 1/4 unit which is its the rate of consumption
More rate of consumption, more amount of coal (direct proportion)

More hours, more amount of coal(direct proportion)

Hence we can write as

$$\begin{matrix} \text{engines} & 9 : 8 \\ \text{rate of consumption} & \frac{1}{3} : \frac{1}{4} \\ \text{hours} & 8 : 13 \end{matrix} :: 24 : x$$

$$\Rightarrow 9 \times \frac{1}{3} \times 8 \times x = 8 \times \frac{1}{4} \times 13 \times 24$$

$$\Rightarrow 3 \times 8 \times x = 8 \times 6 \times 13$$

$$\Rightarrow 3 \times x = 6 \times 13$$

$$\Rightarrow x = 2 \times 13 = 26$$

26. A garrison had provisions for a certain number of days. After 10 days, 1/5 of the men desert and it is found that the provisions will now last just as long as before. How long was that?

A. 50 days
B. 30 days
C. 40 days
D. 60 days

Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1

Assume that initially garrison had provisions for x men for y days
So, after 10 days, garrison had provisions for x men for (y-10) days

Also, garrison had provisions for $\frac{4x}{5}$ men for y days $(\because x - \frac{x}{5} = \frac{4x}{5})$

More men, Less days (Indirect Proportion)

$\Rightarrow$ Men $\quad x : \frac{4x}{5} \} :: y : (y - 10)$

$\Rightarrow x(y - 10) = \frac{4xy}{5}$

$\Rightarrow (y - 10) = \frac{4y}{5}$

$\Rightarrow 5(y - 10) = 4y$

$\Rightarrow 5y - 50 = 4y$

$\Rightarrow y = 50$

Solution 2

Assume that amount of food eaten by 1 man in 1 day = x,

total men = y

and the garrison had provisions for z days

Then total quantity of food = xyz

amount of food eaten by y men in 10 days = 10xy

Remaining food = xyz - 10xy = xy(z - 10) -------(Equation 1)

After 10 days, total men = 4y/5 ($\because$ $y - {}^{y}/_{5} = {}^{4y}/_{5}$)

food taken by ${}^{4y}/_{5}$ men in 1 day = ${}^{4xy}/_{5}$ -------(Equation 2)

From Equations 1 and 2,

Time taken for ${}^{4y}/_{5}$ men to complete xy(z - 10) food

$$= \frac{xy(z-10)}{(\frac{4xy}{5})} = \frac{5(z-10)}{4}$$

Given that number of days remain the same

$$\Rightarrow \frac{5(z-10)}{4} = z$$

$$\Rightarrow 5z - 50 = 4z$$

$$\Rightarrow z = 50$$

27. A garrison of 500 persons had provisions for 27 days. After 3 days a reinforcement of 300 persons arrived. For how many more days will the remaining food last now?

A. 12 days
B. 16 days
C. 14 days
D. 15 days

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Here is the answer and explanation

Answer : Option D

Explanation :

Solution 1

Given that fort had provision for 500 persons for 27 days

Hence, after 3 days, the remaining food is sufficient for 500 persons for 24 days

Remaining persons after 3 days = 500 + 300 = 800
Assume that after 10 days,the remaining food is sufficient for 800 persons for x days

More men, Less days (Indirect Proportion)

$\Rightarrow$ Men $500 : 800\} :: x : 24$

$\Rightarrow 500 \times 24 = 800x$

$\Rightarrow 5 \times 24 = 8x$

$\Rightarrow x = 5 \times 3 = 15$

Solution 2

Assume that amount of food taken by 1 man in 1 day = x

Given that the garrison had provisions for 500 persons for 27 days

$\Rightarrow$ Total quantity of food $= 500 \times 27 \times x = 13500x$

Amount of food eaten by 500 persons in 3 days $= 500 \times 3 \times x = 1500x$

Remaining food $= 13500x - 1500x = 12000x$.....(Equation 1)

After 10 days, total persons = 500 + 300 = 800
Food eaten by 800 persons 1 day = 800x .....(Equation 2)

From Equations 1 and 2,

Time taken for 800 persons to complete 12000x food

$$= \frac{12000x}{800x} = \frac{120}{8} = 15$$

28. A hostel had provisions for 250 men for 40 days. If 50 men left the hostel, how long will the food last at the same rate?

A. 48 days B. 50 days

C. 45 days D. 60 days

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Here is the answer and explanation

Answer : Option B

Explanation :

Solution 1

A hostel had provisions for 250 men for 40 days

If 50 men leaves the hostel, remaining men = 250 - 50 = 200
We need to find out how long the food will last for these 200 men.
Let the required numer of days = x days

More men, Less days (Indirect Proportion)

$\Rightarrow$ Men $250 : 200\} :: x : 40$

$\Rightarrow 250 \times 40 = 200x$
$\Rightarrow 5 \times 40 = 4x$
$\Rightarrow x = 5 \times 10 = 50$

Solution 2

Assume that amount of food taken by 1 man in 1 day = x

Given that the hostel had provisions for 250 men for 40 days

$\Rightarrow$ Total quantity of food $= 250 \times 40 \times x = 10000x$...(Equation 1)

If 50 men leaves the hostel, remaining men = 250 - 50 = 200

Food eaten by 200 men 1 day $= 200x$ .....(Equation 2)

From Equations 1 and 2,

Time taken for 200 men to complete 10000x food

$$= \frac{10000x}{200x} = \frac{100}{2} = 50$$

29. in a camp, food was was sufficient for 2000 people for 54 days. After 15 days, more people came and the food last only for 20 more days. How many people came?

A. 1900 B. 1800

C. 1940 D. 2000

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Here is the answer and explanation

Answer : Option A

Explanation :

Solution 1

Given that food was sufficient for 2000 people for 54 days
Hence, after 15 days, the remaining food was sufficient for 2000 people for 39 days (∵ 54 - 15 = 39)

Let x number of people came after 15 days.
Then, total number of people after 15 days = (2000 + x)
Then, the remaining food was sufficient for (2000 + x) people for 20 days

More men, Less days (Indirect Proportion)

$\Rightarrow$ Men $2000 : (2000 + x)$ } :: $20 : 39$

$\Rightarrow 2000 \times 39 = (2000 + x)20$

$\Rightarrow 100 \times 39 = (2000 + x)$

$\Rightarrow 3900 = 2000 + x$

$x = 3900 - 2000 = 1900$

Solution 2

Assume that amount of food eaten by 1 person in 1 day = k

Given that food was sufficient for 2000 people for 54 days

Hence,Total quantity of food = 2000 × 54 × k = 108000k

Amount of food eaten by 2000 persons in 15 days = 2000 × 15 × k = 30000k

Remaining food = 108000k - 30000k = 78000k .....(Equation 1)

Let x number of people came after 15 days.

Then, total number of people after 15 days = (2000 + x)

Food eaten by (2000 + x) persons 1 day = (2000 + x)k .....(Equation 2)

From Equations 1 and 2,

Time taken for (2000 + x) persons to complete 78000k food

$$= \frac{78000k}{(2000+x)k} = \frac{78000}{(2000+x)}$$

Given that food lasted only for 20 more days

$$\Rightarrow \frac{78000}{(2000+x)} = 20$$

$$\Rightarrow 78000 = 20(2000+x)$$

$$\Rightarrow 3900 = 2000 + x$$

$$\Rightarrow x = 3900 - 2000 = 1900$$

30. If 40 men can make 30 boxes in 20 days, How many more men are needed to make 60 boxes in 25 days?

A. 28

B. 24

C. 22

D. 26

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Solution 1 (Chain Rule)

Given that 40 men can make 30 boxes in 20 days

Let x more men are needed to make 60 boxes in 25 days
Then (40 + x) men can make 60 boxes in 25 days

More boxes, more men(direct proportion)
More days, less men(indirect proportion)

Hence we can write as

$$\begin{matrix}\text{boxes} & 30 : 60 \\ & \\ \text{days} & 25 : 20\end{matrix} \Big\} :: 40 : (40 + x)$$

$\Rightarrow 30 \times 25 \times (40 + x) = 60 \times 20 \times 40$

$\Rightarrow 25 \times (40 + x) = 2 \times 20 \times 40$

$\Rightarrow 5 \times (40 + x) = 2 \times 4 \times 40$

$\Rightarrow (40 + x) = 2 \times 4 \times 8 = 64$

$\Rightarrow x = 64 - 40 = 24$

Solution 2 (Using Time and Work)

Let x more men are needed to make 60 boxes in 25 days

Then (40 + x) men can make 60 boxes in 25 days

Work done by 40 men in 20 days = 30

Work done by 1 man in 1 day = $\frac{30}{40 \times 20}$

Work done by (40 + x) men in 25 days = $\frac{30(40 + x) \times 25}{40 \times 20}$ ...(Equation 1)

If (40 + x) men can make 60 boxes in 25 days,

$\Rightarrow$ Work done by (40 + x) men in 25 days =60.....(Equation 2)

Hence, from equation 1 and equation 2, $\frac{30(40 + x) \times 25}{40 \times 20} = 60$

$\Rightarrow 30(40 + x) \times 25 = 60 \times 40 \times 20$

$\Rightarrow (40 + x) \times 25 = 2 \times 40 \times 20$

$\Rightarrow (40 + x) \times 5 = 2 \times 8 \times 20$

$\Rightarrow (40 + x) = 2 \times 8 \times 4 = 64$

$\Rightarrow x = 64 - 40 = 24$

Solution 3 (Using Time and Work)

If M_1 men can do W_1 work in D_1 days working H_1 hours per day and M_2 men can do W_2 work in D_2 days working H_2 hours per day (where all men work at the same rate), then

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$M_1 = 40$

$D_1 = 20$

$W_1 = 30$

Let $M_2 = x$

Let $D_2 = 25$

$W_2 = 60$

Here $H_1 = H_2$

Hence, $\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$

$\Rightarrow \frac{40 \times 20}{30} = \frac{x \times 25}{60}$

$\Rightarrow 2(40 \times 20) = x \times 25$

$\Rightarrow 2(8 \times 20) = x \times 5$

$\Rightarrow x = 2(8 \times 4) = 64$

Hence, additional men required = 64 - 40 = 24