



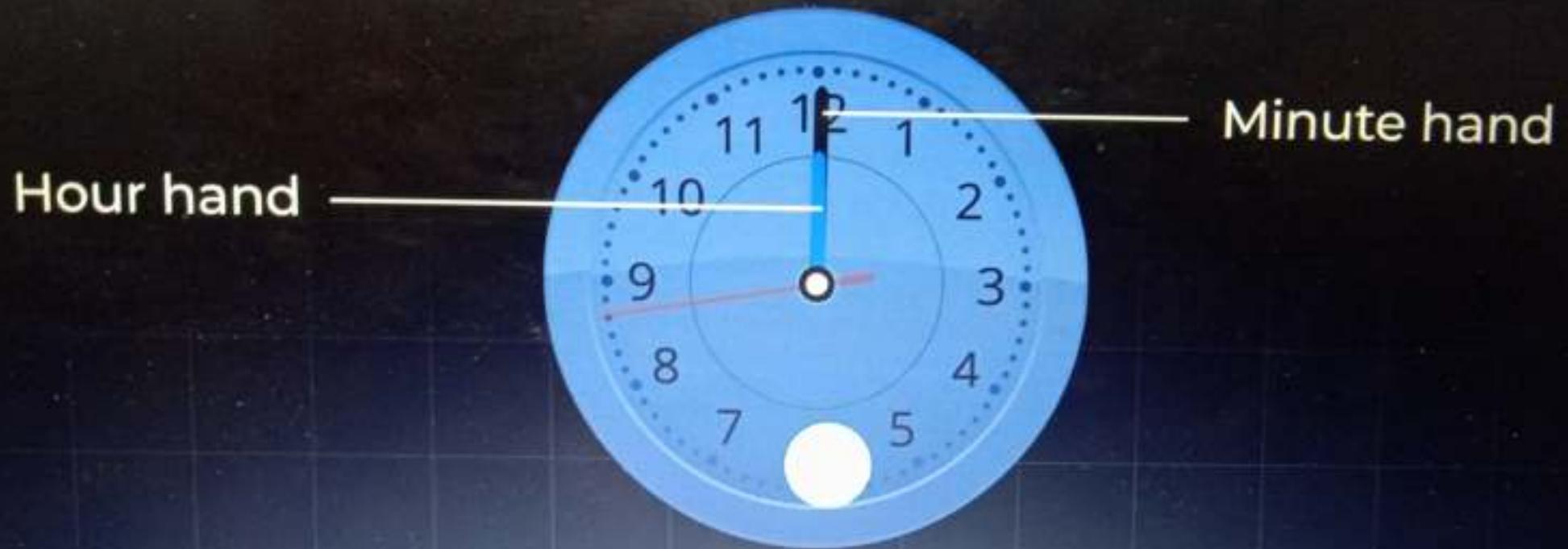
Time taken by the minute hand to rotate 360° = 60 mins

Rotational speed of the minute hand = 6 dpm

Time taken by the hour hand to rotate 360° = 12 hrs

Rotational speed of the hour hand = 30 dph = 0.5 dpm





Relative speed of the hour hand and minute hand = 5.5 dpm

Rotational speed of the minute hand = 6 dpm

Rotational speed of the hour hand = 0.5 dpm



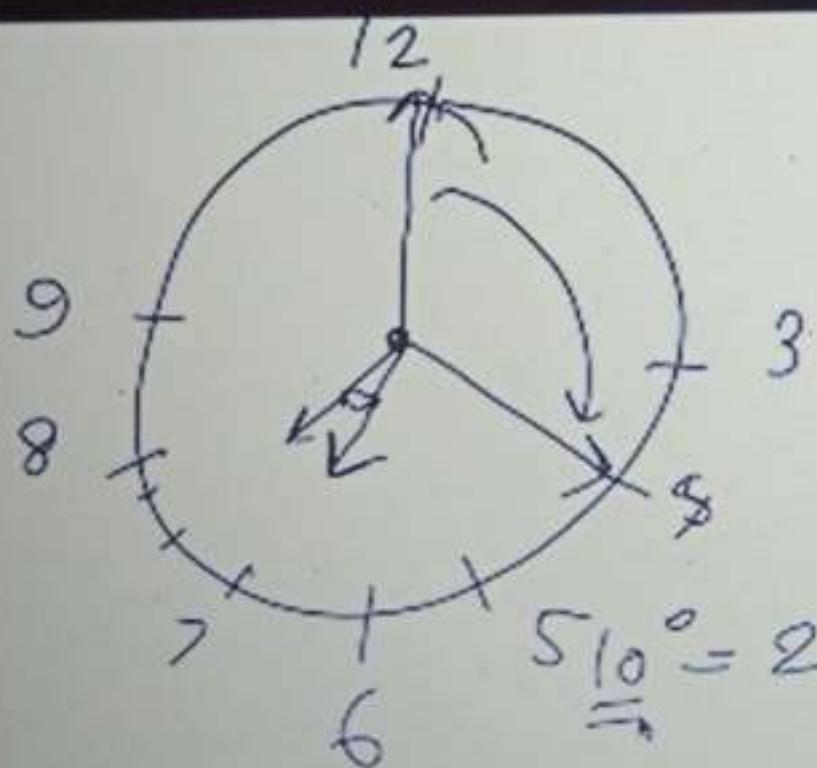
The angle between the two hands at M minutes past H 'o clock will be =



$$\Theta = \left| 30H - \frac{11}{2}M \right|$$

A clock is started at noon. By 20 minutes past 7, the hour hand has turned through:

- A. 200 degrees
- C. 220 degrees
- B. 280 degrees
- D. 240 degrees



7:20

12 hrs - 360°

1 hrs - 30°

7 hrs - $30 \times 7 = \underline{\underline{210^\circ}}$

$0.5^\circ \longrightarrow 1 \text{ min}$

$20 \times 0.5 \longrightarrow 20 \text{ mins}$

$$\theta = 30 + \frac{1}{2}M$$



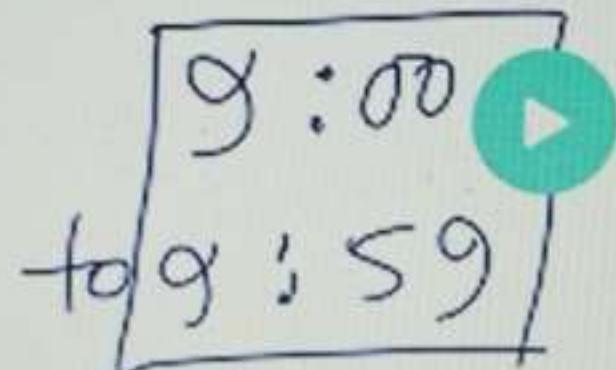
$$= 30 \times 8 \underset{240^\circ}{\sim} \frac{1}{2}(30)^{15}$$

$$= \cancel{180} \sim 165^\circ$$

$$= 240^\circ - 165^\circ$$

$$= 75^\circ$$

$$\theta = 30H \sim \frac{1}{2}M$$



$$80 = 30 \times 9 \sim \frac{1}{2}M$$

$$80 = 270 - \frac{1}{2}M \quad M = \frac{190 \times 2}{11} \quad 9:3$$

$$\frac{1}{2}M = 270 - 80$$

$$M = 34\frac{6}{11}$$

$$11M = 190 \times 2$$

$$O = 30H \sim \frac{1}{2}M$$



$$O = 30H \sim \frac{1}{2}M$$

$$30H = \frac{1}{2}M \quad 420 = 11M$$

$$\underline{\underline{60H = 11M}} \quad M = \frac{420}{11} = \underline{\underline{38\frac{2}{11}}}$$

In a clock the long hand is of 8cm and the short hand is of 7cm. If the clock runs for 2 days find out the total distance covered by both the hands.

A. 848 Pi

C. 824 Pi

B. 840 Pi

D. 822 Pi

$$M = 8 \text{ cm}$$

$$H = 7 \text{ cm}$$

$$2\pi r_m \times 48 + 2\pi r_h \times 4$$

$$2\pi \times 8 \times 48 + 2\pi \times 7 \times 4$$

$$8\pi(96 + 7)$$

$$= 824\pi$$

$$\begin{aligned}1 \text{ hr} &= 1 \text{ rot} \\48 \text{ hr} &= 48 \text{ rot}\end{aligned}$$

$$\begin{aligned}12 \text{ hr} &= 1 \text{ rot} \\48 \text{ hr} &= 4 \text{ rot}\end{aligned}$$



2088 hours per day

$$\text{hours } 8.04 \times 2088 = 168 \text{ hrs}$$

$$168 \text{ hrs} = 3.36 \text{ days}$$

$$3.36 \text{ days} \times 100\% = 33.6\%$$



$$2 \text{ weeks} = 2 \times 7 \text{ days}$$

work days = 168 hrs

$$168 \text{ hrs} - 89.1 = 78.9 \text{ hrs}$$

$$78.9 \text{ hrs} = 1.65 \text{ days}$$

$$1.65 \text{ days} = 16.5\%$$

$$16.5\% \times 168 \text{ hrs} = 28 \text{ hrs}$$

$$168 \text{ hrs} - 28 \text{ hrs} = 140 \text{ hrs}$$

Calendars

Introduction

A calendar is a system of organizing the days in a year. The calendar starts on 1st January and ends on 31st December.

The year is classified into two types: ordinary years (365 days) and a leap year (366 days).

Calendars

Odd Days

Odd days are the number of days that are more than the number of days in a complete week.



For example: Calculate odd days for 10 and 14 days

10 days = 1 week (7 days) + 3 days. Here, 3 days are odd days

14 days = 2 weeks (14 days) + 0 day (0 odd day)

Calendars

Number of Odd Days

$$\begin{array}{r} 52 \\ 7 \overline{)365} \\ -35 \\ \hline 15 \\ -14 \\ \hline 1 \end{array}$$

- 1 ordinary year has 1 odd day
- 1 leap year has 2 odd days
- 100 years has 5 odd days
- 200 years has 3 odd days
- 300 years has 1 odd day
- 400 years has 0 odd day
- Similarly, all the 4th centuries 800 years, 1200 years, 1600 yrs
 2000 years etc. have 0 odd day.

- Here are the exact conditions for determining whether a year is a leap year:
- 1. If the year is divisible by 400, it is a leap year.
 - 2. If the year is divisible by 100 but not by 400, it is not a leap year.
 - 3. If the year is divisible by 4 but not by 100, it is a leap year.
 - 4. If the year is not divisible by 4, it is not a leap year.
- Examples:
- 1600: Divisible by 400 — Leap Year.
 - 1900: Divisible by 100 but not by 400 — Not a leap year.
 - 1600: Divisible by 400 — Leap Year.
 - 1900: Divisible by 100 but not by 400 — Not a leap year.
 - 2020: Divisible by 4 but not by 100 — Leap Year.
 - 2023: Not divisible by 4 — Not a leap year.

Calendars

Points to remember

- ⇒ Last day of a century cannot be Tuesday or Thursday or Saturday because of the number of odd days.
- ⇒ For the calendars of two different years to be the same, the following conditions must be satisfied.
 - a. Both years must be of the same type. i.e., both years must be ordinary years or both years must be leap years.
 - b. 1st January of both the years must be the same day of the week.

UO#5821905452



What day was it be on 15th Aug 1947 ?

- A. Friday
- C. Wednesday
- B. Saturday
- D. Tuesday

~~400, 800, 1200, 1600 yrs~~ — 0 days

$$\begin{array}{r}
 1947 \\
 \cancel{0} \\
 \overline{4} \overline{5} \overline{6} \\
 4 \overline{6} \\
 \overline{0} \\
 \overline{2}
 \end{array}
 \quad
 \begin{array}{l}
 1600 + 300 + 46 + (\text{Jan to Aug 15}) \\
 0 + 1 + 11 \text{ ly & 850y} \left(\begin{array}{c} 31 \\ 28 \\ 31 \\ 30 \\ 31 \end{array} \right) \\
 0 + 1 + (11 \times 2) + (35) + \\
 (2/7) \text{ Remainder } (0, \text{ to } 6) \left(\begin{array}{c} 31 \\ 28 \\ 31 \\ 30 \\ 31 \end{array} \right)
 \end{array}$$



What day was it be on 15th Aug 1947 ?

- A. Friday
- C. Wednesday
- B. Saturday
- D. Tuesday

J F M A M J S O N D
0 3 3 6 1 4 6 2 5 0 3 5 300 ↑
 $(D + M + Y + LY) / 7$ 1947
 $(15 + 2 + 47 + 11) / 7$ - 1900 11
754 = Rem = 5 0 1 2 3 4 5 6 4749 47
S M T W T F S



033614625035

$(D+M+Y+L\alpha)/7$

$(1+5+16+29)/7$.

16 $\frac{1}{7}$ (0) days

$$\begin{array}{r} 2016 \\ - 1900 \\ \hline 116 \\ | \\ 41 \\ | \\ 116 \\ \hline 36 \end{array}$$

question

What day was it be on 26th Jan 1950 ?

- A. Friday
- C. Wednesday
- B. Saturday
- D. Thursday

0 33 6 14625035

$$(D + M + Y + LY) \mod 7$$
$$(26 + 0 + 50 + 12) \mod 7$$

$88 \mod 7$ 4 Rem \rightarrow Thursday

$$\begin{array}{r} 4 \sqrt{50} \\ \quad \quad \quad 12 \\ \hline 18 \\ \quad \quad \quad 18 \\ \hline 0 \end{array}$$



What is the angle between two hands when time is 2:30 PM ?

- A. 105 degrees
- C. 107 degrees
- B. 108 degrees
- D. 110 degrees

$$\theta = 30H - \frac{11}{2}M$$

2:30

$$\theta = 30 \times 2 - \frac{11}{2} \times \frac{15}{60}$$

$$= 60 - 16.5$$

$$= 105^\circ$$



What is the time between 1 and 2 O'Clock when the angle between two hands of the clock is 120 degrees ?

- A. 1: 16 $\frac{4}{11}$
- C. 1: 32 $\frac{4}{11}$
- B. 2: 16 $\frac{2}{11}$
- D. 2: 32 $\frac{6}{11}$

$$\theta = 3 \cdot H \sim \frac{11}{2} M$$

1 - 2



$$120^\circ = 30 \times 1 \sim \frac{11}{2} M$$

$$90 = \frac{11}{2} M$$

$$1: 16 \frac{4}{11}$$

$$\frac{180}{11} = M$$

$$M = 16 \frac{4}{11}$$

Question

On the R0z planet, there are 8 days in a week- sunday to saturday and another day called R0z day. There are 72 hours in a day and each hours has 180 minutes while each minute has 60 seconds. As on the earth, the hour hand covers the dial twice everyday. Find the approximate angle between the hands of a clock on R0z when the time is 12:20 am.

- A. 81 Degrees C. 91 Degrees
 B. 121 Degrees D. 61 Degrees

$$1\text{day} = 72 \text{ hrs}$$

$$1\text{hr} = 180 \text{ min}$$

$$1\text{min} = 60 \text{ sec}$$

12:20

$$\theta = 12 \times 10 + \frac{2}{18} \sim 2 \times 2$$

Hour hand

$$360^\circ = 360^\circ$$

$$1\text{min} = \frac{1}{180}$$

$$1\text{hr} = 10$$

$$180 \text{ min} = 10^\circ$$

$$= \frac{1}{18}^\circ$$

Min hand

$$180 \text{ min} = 360^\circ$$

$$1\text{min} = 2^\circ$$

$$= 120 + 11 \sim 4^\circ$$

$$= 121.1 \sim 4^\circ$$

$$\theta = 81.1^\circ$$

In a particular year, the month of january had exactly 4 thursdays, and 4 sundays.
On which day of the week did january 1st occur in the year.

- A. Friday
- C. Wednesday
- B. Monday
- D. Tuesday

1 Jan → Sunday → 5(Sun, Mon, Tue) (3)

1 Jan Monday → 5(Mon, Tue, Wed)

↙ [Thu, Friday]

Monday

Question

A clock loses 2% time during first week and then gains 4% time during the next one week. If the clock was set right at 11am on Sunday. What will be the time exactly that the clock will show 14 days from the time it was set right?

- A. 2:21:36 P.M.
- C. 3:21:08 P.M.
- B. 3:41:48 P.M.
- D. 3:21:06 P.M.

1 week

$$\begin{aligned}7 \text{ days} &= 21 \times 7 \\&= 128 \text{ hrs}\end{aligned}$$

Net loss/gain = 3.36 min

3.36 hrs

$$21 \text{ of } 128 = 3.36 \checkmark$$

$$3.36 \times 60$$

7 days

$$41 \text{ of } 128 = 6.72$$

$$= 201.6$$

$$\begin{array}{r} \diagup \\ 128 \\ \diagdown \end{array} \quad \begin{array}{r} \diagup \\ 21.6 \\ \diagdown \end{array}$$

$$0.6 \times 60$$

If Anjali's birthday is on May 26 which is sunday and his sister's birthday is on July 12.
Which day of the week is his sister's birthday?

- A. thrusday
- C. tuesday
- B. saturday
- D. friday

26 May (Sunday) ✓



5 + 30 + 12

$\frac{47}{7} \Rightarrow R(5)$

\rightarrow Friday

The famous temple in the city of Kanpur has a big clock tower and is said to be over 500 years old. Every Monday 11.00 A.M the clock is set by Ana, doing service in the temple. The Clock loses 5 mins every hour. What will be the actual time when the faulty clock shows 4 P.M on Friday?

A. Saturday 1:06 am ✓ Saturday 12:25 am

B. Friday 12:25 am D. Friday 1:06 am

11:00 AM → 4:00 PM Fri
(Mon)

→ Fri (11 am)

4 days → 24×4 hrs

Thus $\Rightarrow 24 \times 4 + 5$

$\Rightarrow 101$ hrs

$$\begin{aligned} 60\text{min} &\Rightarrow 101 \times 5\text{min} \\ &\Rightarrow 505 \text{min} \end{aligned}$$

8 hr 25 min ✓

4pm Fri + 8hr

1.7 \Rightarrow 12:25 am

Saturday

Quantitative Aptitude - Python X ChatGPT X

chatgpt.com/c/b6eff8214-deb4-800f-b2cc-e2efab3ca5e4

Share

ChatGPT Auto

To find out what day August 15, 2012, falls on, given that January 1, 2012, was a Saturday, follow these steps:

1. January 1, 2012 is a Saturday.
2. We need to find out how many days are between January 1 and August 15, 2012 (which we previously calculated as 228 days).

Now, divide 228 days by 7 (since a week has 7 days) to find out how many full weeks have passed and the remainder:

$$228 \div 7 = 32 \text{ weeks and } 4 \text{ days.}$$

This means 32 full weeks pass, and then there are 4 extra days.

Starting from Saturday, count 4 days forward:

- Saturday → Sunday (1 day)
- Sunday → Monday (2 days)
- Monday → Tuesday (3 days)
- Tuesday → Wednesday (4 days)

Therefore, August 15, 2. What about September 1? What day is July 20?

Message ChatGPT

ChatGPT can make mistakes. Check information online.

26°C Fairly sunny

Question

How many degrees will the minute hand move, in the same time in which the second hand move 7200?

- A. 120°
- C. 80°
- B. 60°
- D. 90°

$$\begin{array}{r} 7200 \\ \hline 60 \\ \Rightarrow 120 \end{array}$$

version

April 1st is tuesday. Which month of the same year starts with the same day?

A. june

C. july

B. august

D. september

April 1 → Tuesday

A M T
↓ ↓ ↓
2 3 2

$$\gamma = R(0)$$



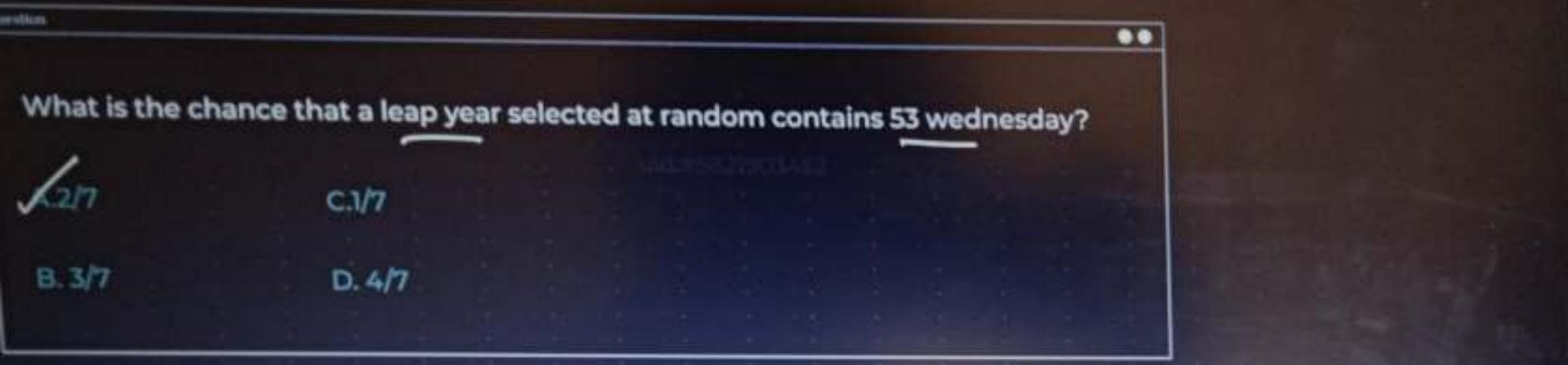
If today is Monday, after 846 days it will be ?

- A. Friday
- C. Wednesday
- B. Saturday
- D. Tuesday

$$\frac{846}{7}$$

\Rightarrow ((odd days))

↓
Saturday



$$\text{L.Y} \Rightarrow \frac{366}{7} = 20 \text{ odd days}$$

2 (Sun, Mon) (Mon, Tue) (Tue, Wed) (Wed, Thu) (Thu, Fri)

(Fri, Sat)

(Sat, Sun)

$$= \frac{2}{7}$$

Case 1

If the ratio of present age and the ratio of age after 'n' years is given then present age factor is given by

Formula

$$\text{Factor} = \frac{|C - D|xt}{|AD - BC|}$$

↓ ↓
 Ax, Bx

$\left\{ \begin{array}{l} \text{Past} \\ \underline{x:y} \\ A:B \\ C:D \end{array} \right. \quad \left. \begin{array}{l} \text{Present} \\ p:q \\ \bullet:\bullet \\ C:D \end{array} \right. \quad \left. \begin{array}{l} \text{Future} \\ \underline{u:v} \\ A:B \end{array} \right.$

Past, Future Present Future
 $A:B$ $C:D$ $\underline{C:D}$ $\underline{A:B}$

Present ages Age Future



Question

The ratio of the present age of Puneet and Appu is 2 : 3. After 3 years the ratio of their age will be 3 : 4. The present age of Puneet is:

- A. 3 years
- C. 9 years
- B. 6 years
- D. 12 years

uid:#5821903452

Present P & A P & A $x = \frac{(C - D) \times 3}{AD - BC}$

$$\begin{matrix} 2 : 3 \\ A : B \\ \text{t} = 3 \end{matrix} \quad \begin{matrix} 3 : 4 \\ C : D \end{matrix} \quad = \frac{|3 - 4| \times 3}{|2 \times 4 - 3 \times 3|}$$

$$x = \frac{3}{1} \quad \begin{matrix} Ax, Bx \\ B, 9 \end{matrix} \quad 6 \text{ yrs}$$

$$x = \frac{|C - D| + t}{AD - BC}$$

$$\text{② } x = 3$$

Four years ago, the ratio of A's age to B's age was 11:14 and four years later their age will be in the ratio 13:16. The present age of A is

- A. 48 years
- C. 56 years
- B. 44 years
- D. 60 years

Part Future

$$\begin{matrix} 11:14 & 13:16 \\ \text{A} \text{---} \text{B} & \text{C} \text{---} \text{D} \end{matrix}$$



$$t = 4 + 4 = 8$$
$$\frac{3 \times 8}{(11 \times 16 - 14 \times 13)} = \frac{24}{6} = 4$$
$$\begin{matrix} 48, 56 \\ \uparrow +4 \\ 52, 60 \end{matrix}$$



Case 2

If the product of present ages and Ratio are given, then, present age factor is

Formula

$$\textcircled{2} = \sqrt{\frac{\text{Product of Present ages}}{\text{Product of ratio}}}$$

Present ages = Ax ; Bx



The product of two ages of two persons is 1575 and their ratio is 9 : 7. The younger person age is

- A. 25
- C. 45
- B. 35
- D. 36

$$\begin{aligned}x &= \sqrt{\frac{\text{P of ages}}{\text{P of ratios}}} \\&= \sqrt{\frac{1575}{63}} \quad 9 \times 5, 7 \times 5 \\&= \sqrt{25} \quad 45, 35 \\&= 5\end{aligned}$$



Case 3

If sum of present age and ratio of the ages is given then, present age factor is

Formula

$$x = \frac{\text{Sum of ages}}{\text{Sum of ratios}}$$

uid #5821903452

Problem on Ages



Case 4

If difference of present age and ratio of the ages is given then, present age factor is

Formula

$$n = \frac{\text{Diff of ages}}{\text{diff of ratio}}$$

Case 6

If 'n' years before, the ratio of ages of A, B and C was $x:y:z$, then the ratio of their present ages is $(x+n):(y+n):(z+n)$

$$x:y:z$$

n yrs ago

$$x+n:y+n:z+n$$

Case 7



If after m years, the ratio of ages of A and B will be $x:y$, then the ratio of their present ages is $(x - m):(y - m)$.



The ratio of ages of two brothers is 4 : 3. One is older to the other by 13 years.
What is the age of the younger brother?

A. 52 years C. 65 years

~~B. 59 years~~ D. 26 years

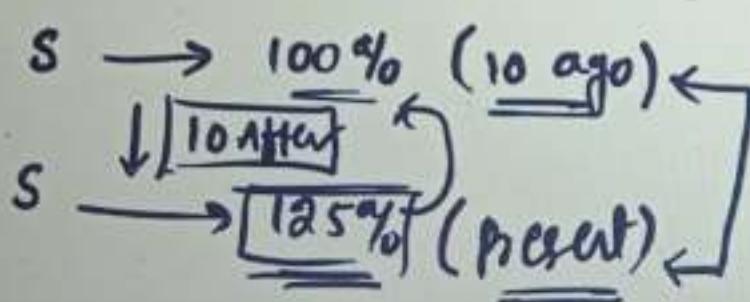
$$(4) : (3)$$

1 unit \rightarrow 13 years

3 units \rightarrow 39 years

Suresh's age is 125% of what it was ten years ago, but 250/3% of what it will be after ten years. What is the present age of Suresh?

- A. 60 years
- C. 40 years
- B. 50 years
- D. Can't determine



$$25\% \xrightarrow{\text{increased}} 10 \text{ years}$$

$$125\% \rightarrow ?$$

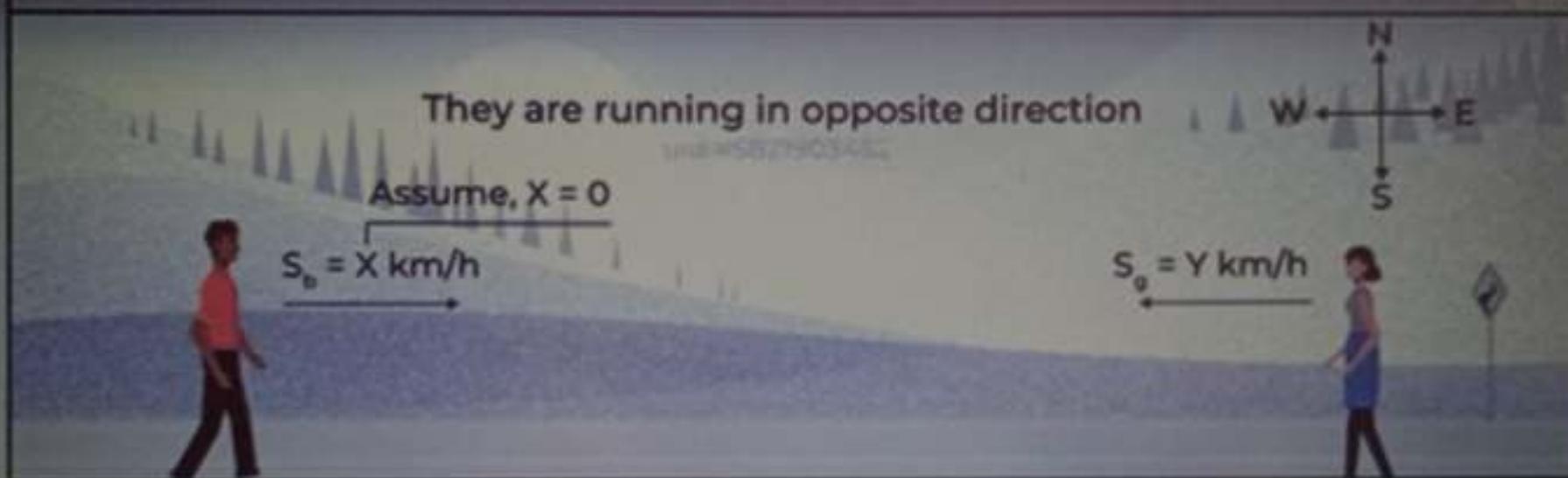
$$\left| \frac{125 \times 100}{25} = 50 \text{ years} \right.$$

$$x \frac{\text{Km/hr}}{\text{m/s}} = \frac{5}{18} \times d \frac{\text{m}}{\text{s}}$$

$$x \frac{\text{m}}{\text{s}} = \frac{18}{5} x \frac{\text{Km}}{\text{hr}}.$$

More videos

Speed time and distance



Relative speed of the girl with respect to the boy is = $(X+Y)$ Km/h

Relative speed of the boy with respect to the girl is = $(X+Y)$ Km/h

MORE VIDEOS

Speed time and distance

Case 1

Relative speed = (X + Y) Km/h

$$S_a = X \text{ km/h}$$

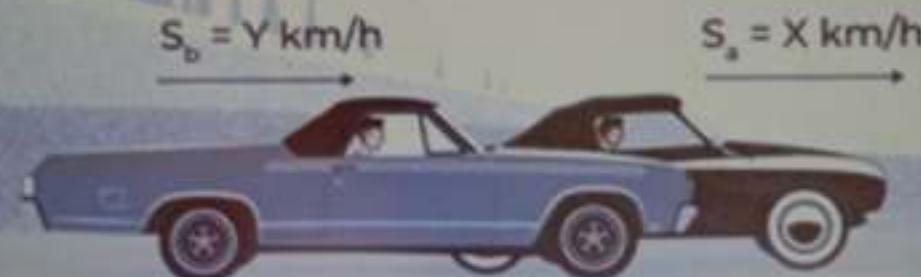


$$S_b = Y \text{ km/h}$$



Case 1

Relative speed of one car with respect to the other = $(X - Y)$ Km/h
or
 $(Y - X)$ Km/h

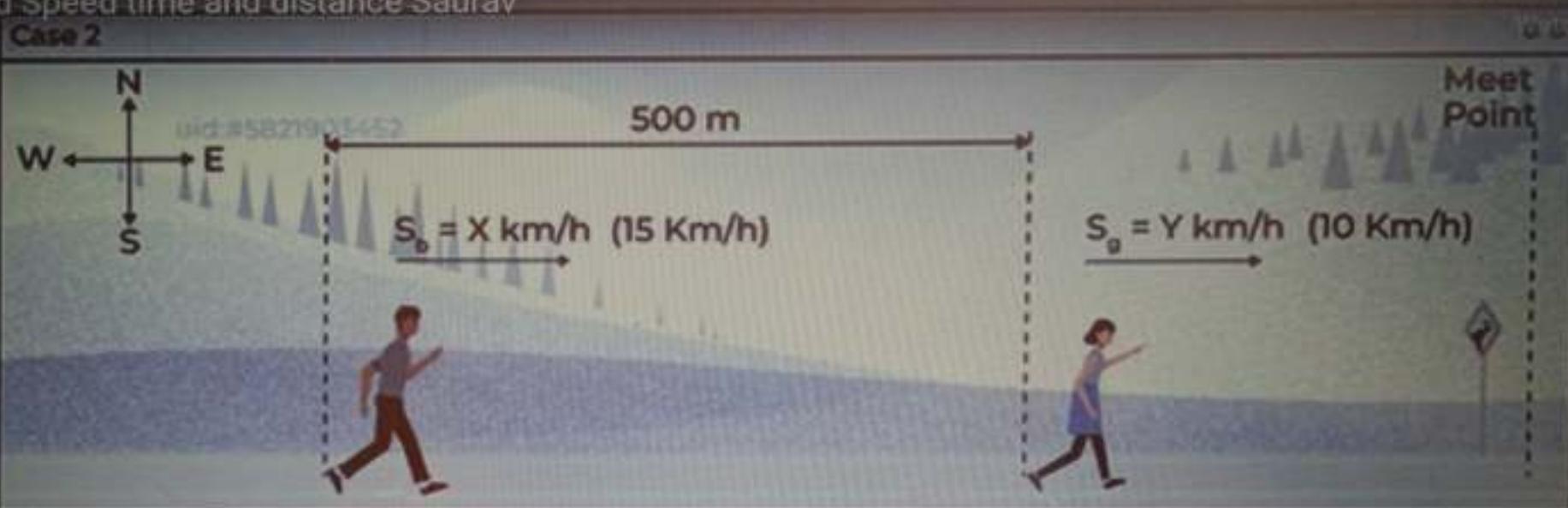


MORE VIDEOS

Speed time and distance

Verified Speed time and distance Saurav

Case 2



After what time will the boy catch the girl ?

After how much distance will the boy catch the girl ?

MORE VIDEOS

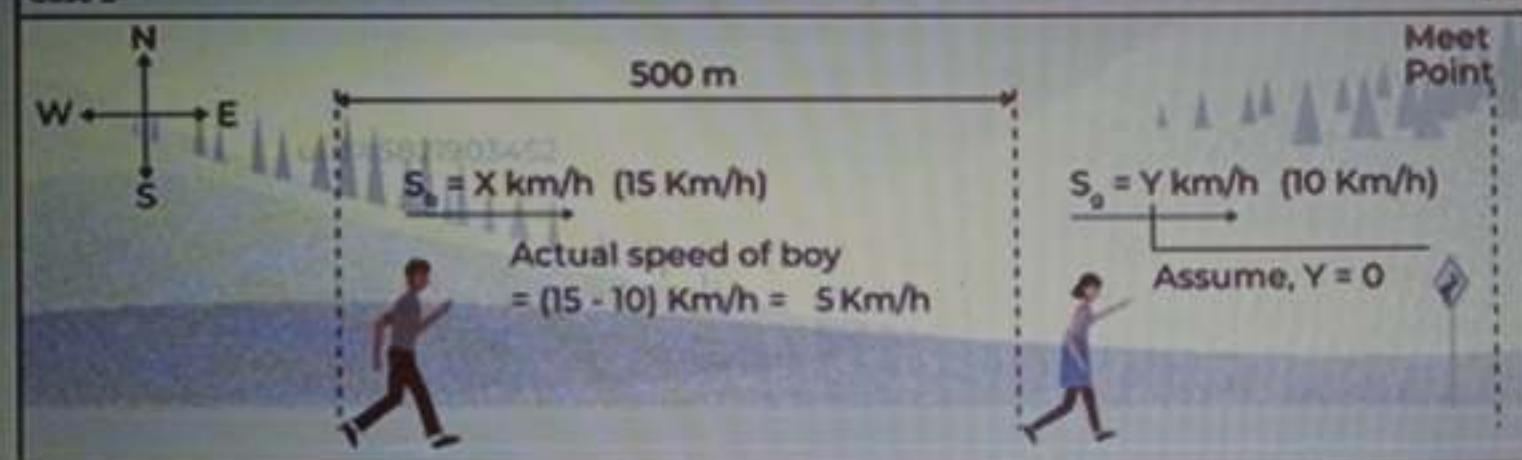
Speed time and distance



Verified Speed time and distance Saurav



Case 2



In the same direction
 $(R.S) = |X-Y| \text{ Km/h}$

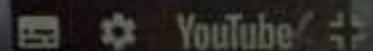
In the opposite direction
 $(R.S) = X+Y \text{ Km/h}$

After what time will the boy catch the girl ?

After how much distance will the boy catch the girl ?

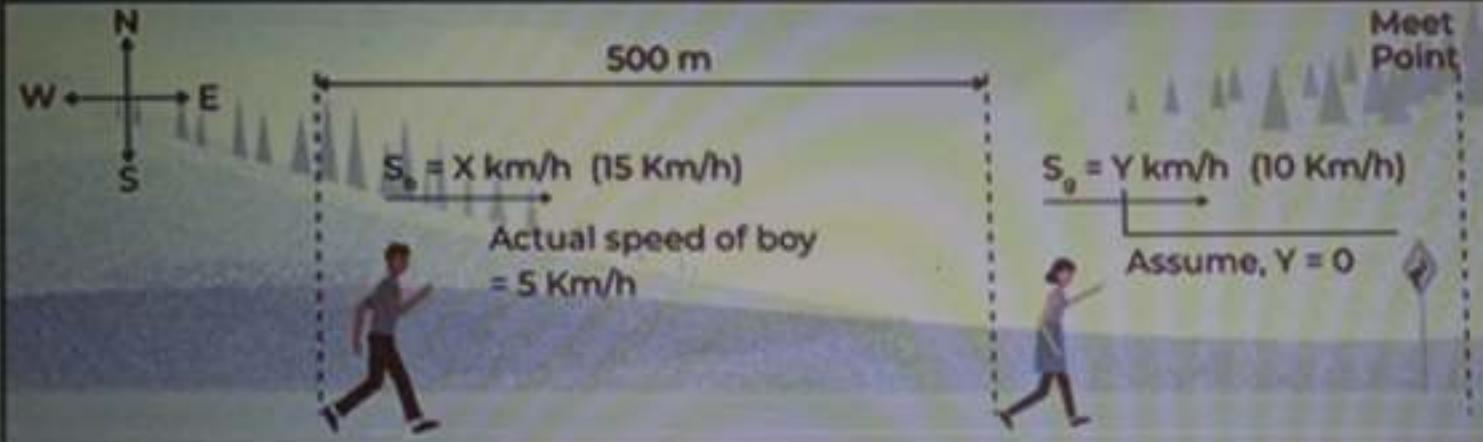
MORE VIDEOS

Speed time and distance





Case 2



In the same direction
 $(R.S) = |X-Y| \text{ Km/h}$

In the opposite direction
 $(R.S) = X+Y \text{ Km/h}$

Time required by boy to catchup with the girl = $\frac{0.5 \text{ Km}}{5 \text{ Km/h}} = 0.10 \text{ h}$

MORE VIDEOS



Verified Speed time and distance Saurav



Relative speed = X - X = 0

Case: Cars travelling in same direction

Speed = X km/h



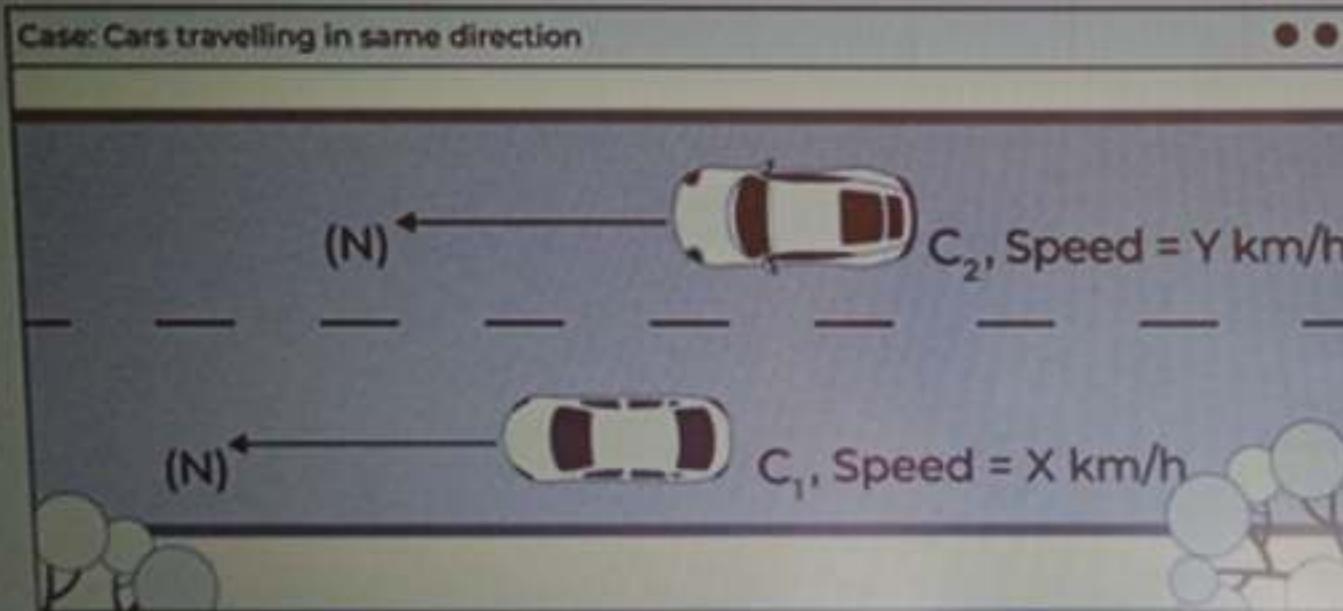
Speed = X km/h



MORE VIDEOS

Speed time and distance

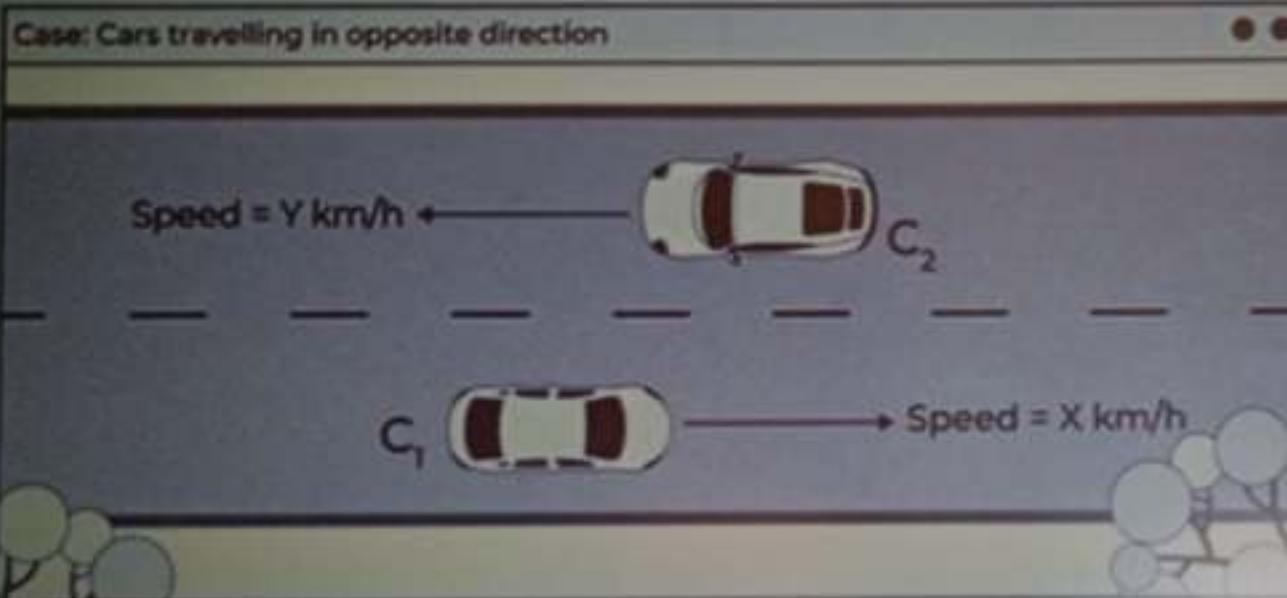
YouTube



Relative speed
 $=|X - Y|$

MORE VIDEOS

Speed time and distance



Relative speed
= $(X + Y)$ km/h

MORE VIDEOS

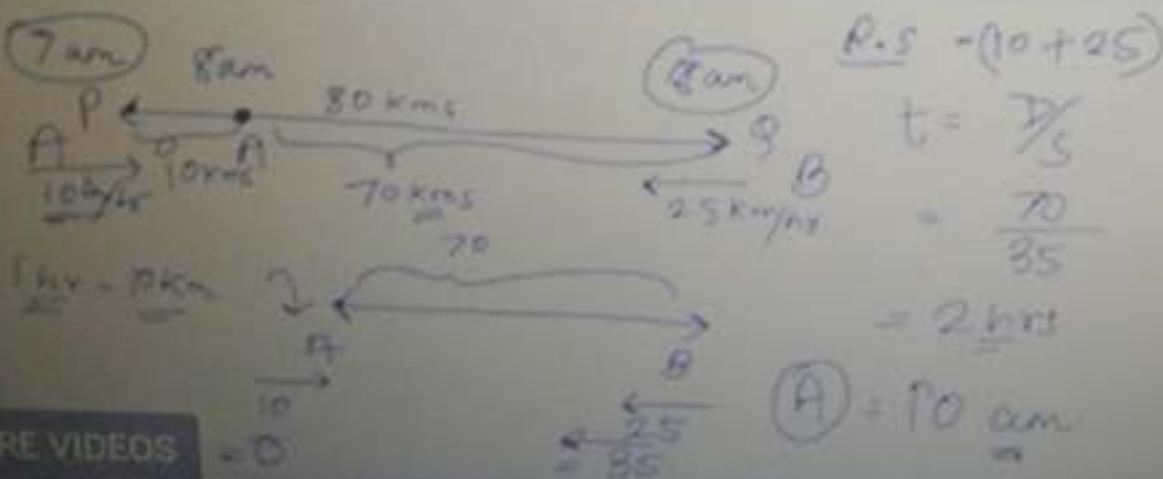
Speed time and distance

YouTube



The distance between two cities P and Q is 80 km. A cycle rider starts from P towards Q at 7 am at a speed of 10 km/hr. Another motorcyclist starts from Q towards P at 8 am at a speed of 25 km/hr. At what time will they cross each other?

- A. 10 am
- C. 11 am
- B. 10:30 am
- D. 11:30 am

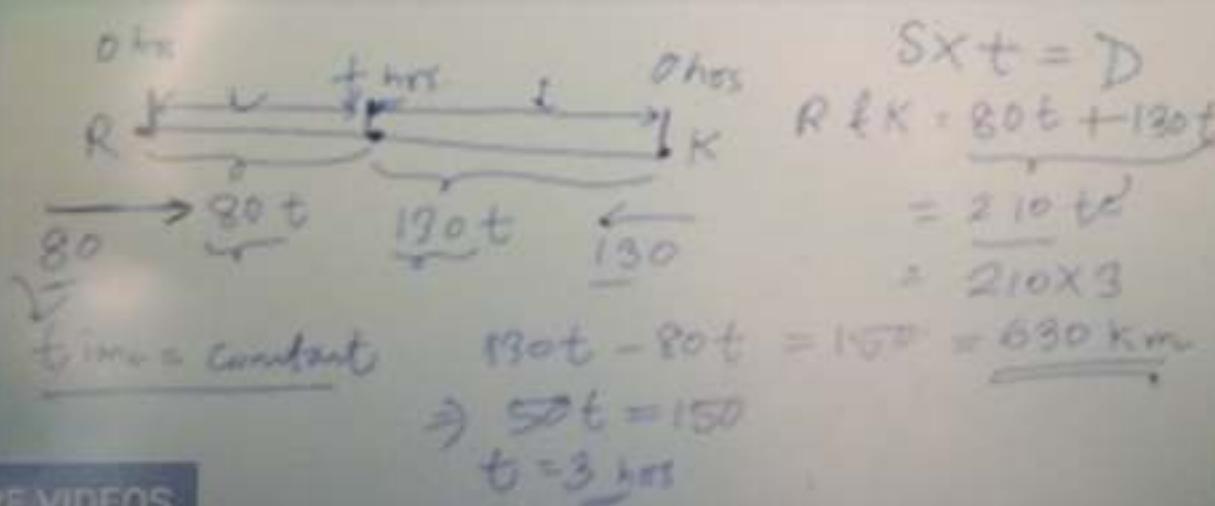


MORE VIDEOS

Speed time and distance

Two cars start simultaneously from Ranchi and Kolkata and travel towards one another at speeds 80 kmph and 130 kmph respectively. When they met, one car travelled 150 km more than the other. Find the distance between Ranchi and Kolkata.

- A. 1050 km C. 630 km
 B. 1250 km D. 350 km



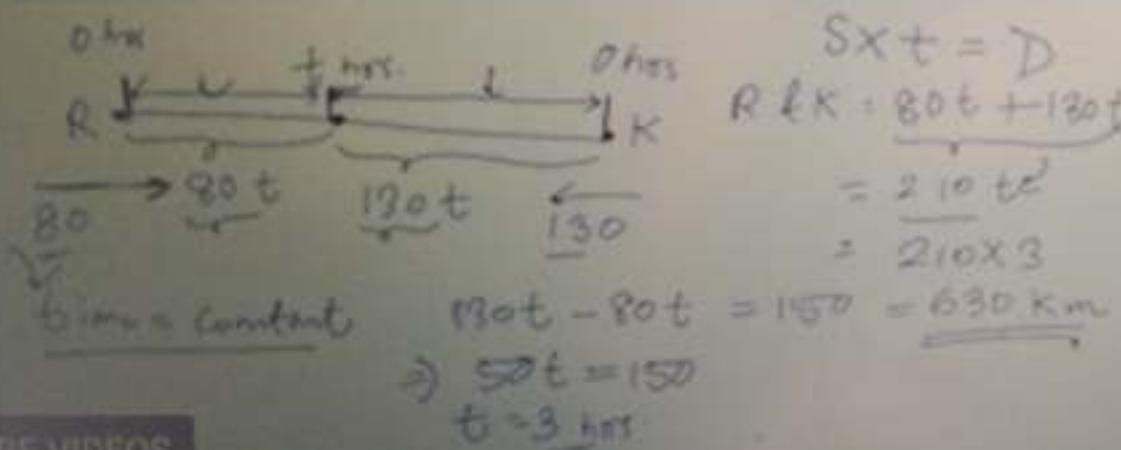
MORE VIDEOS

Verified Speed time and distance Saurav

Two cars start simultaneously from Ranchi and Kolkata and travel towards one another at speeds 80 kmph and 130 kmph respectively. When they met, one car travelled 150 km more than the other. Find the distance between Ranchi and Kolkata.

A. 1050 km C. 630 km

B. 1250 km D. 350 km



$$\begin{aligned}S \times t &= D \\R \& K & 80t + 130t \\&= 210t \\&= 210 \times 3 \\&= 630 \text{ km}\end{aligned}$$

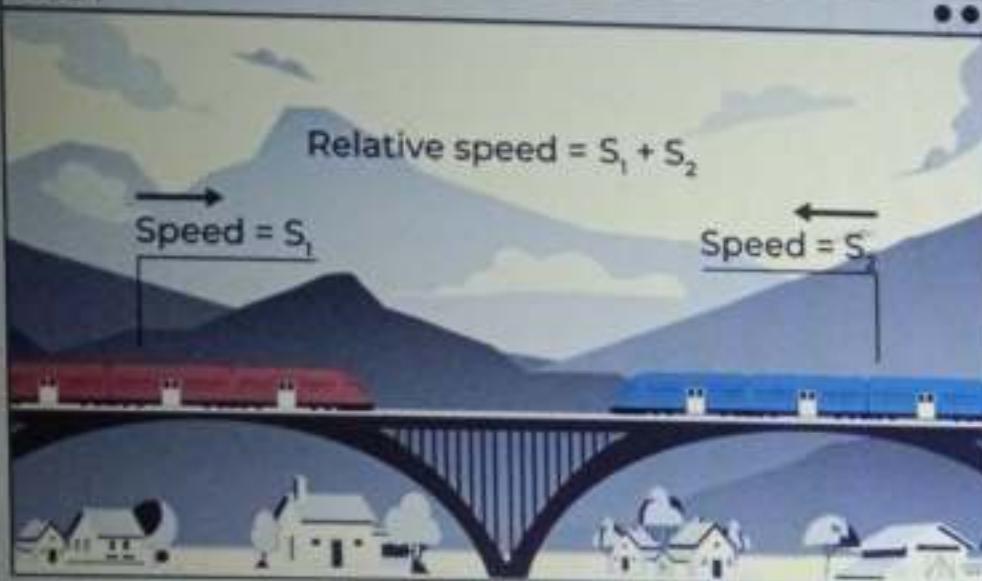
MORE VIDEOS

Speed time and distance

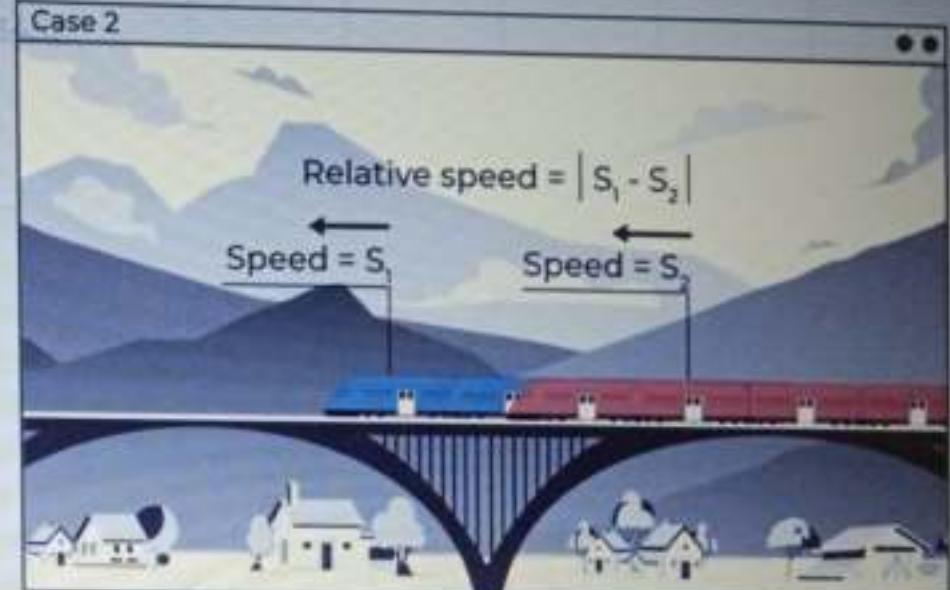


YouTube

Case 1



Case 2



MORE VIDEOS

Speed time and distance



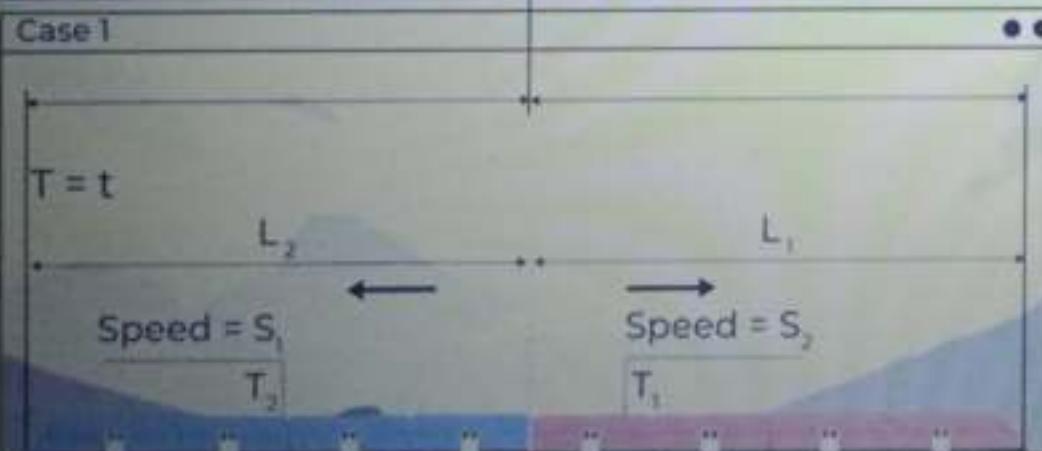
YouTube

What is the time taken by a train to pass the another train, when they are moving in opposite direction?

Case 1



Case 1



Time (t)	Speed	Distance
----------	-------	----------

$$\text{Relative speed} = S_1 + S_2$$

$$\text{Distance} = L_2 + L_1$$

$$\text{Time} = \frac{L_1 + L_2}{S_1 + S_2}$$

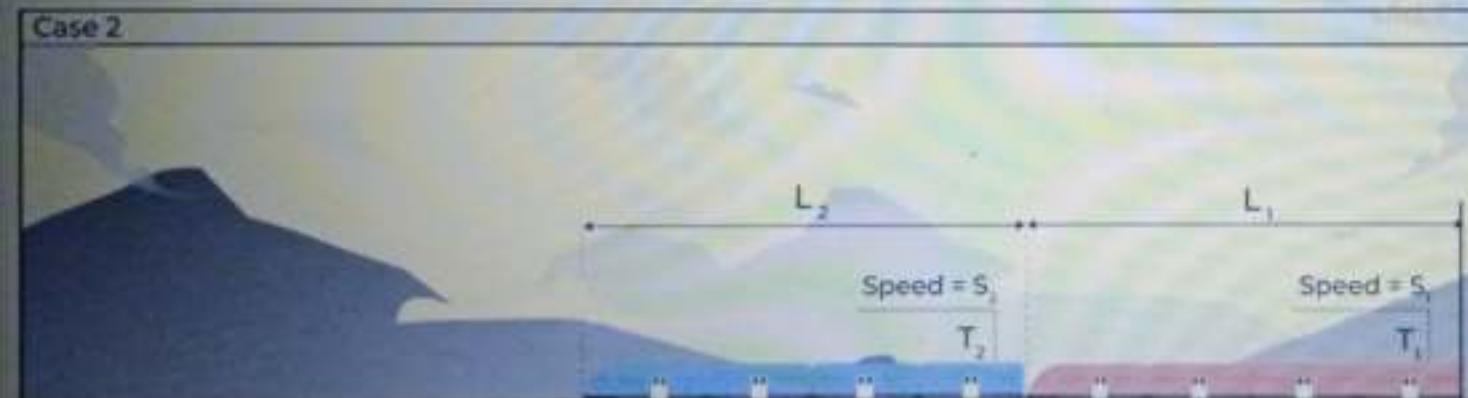
Speed time and distance

•

•

What is the time taken by a train to pass the another train, when they are moving in opposite direction?

Case 2

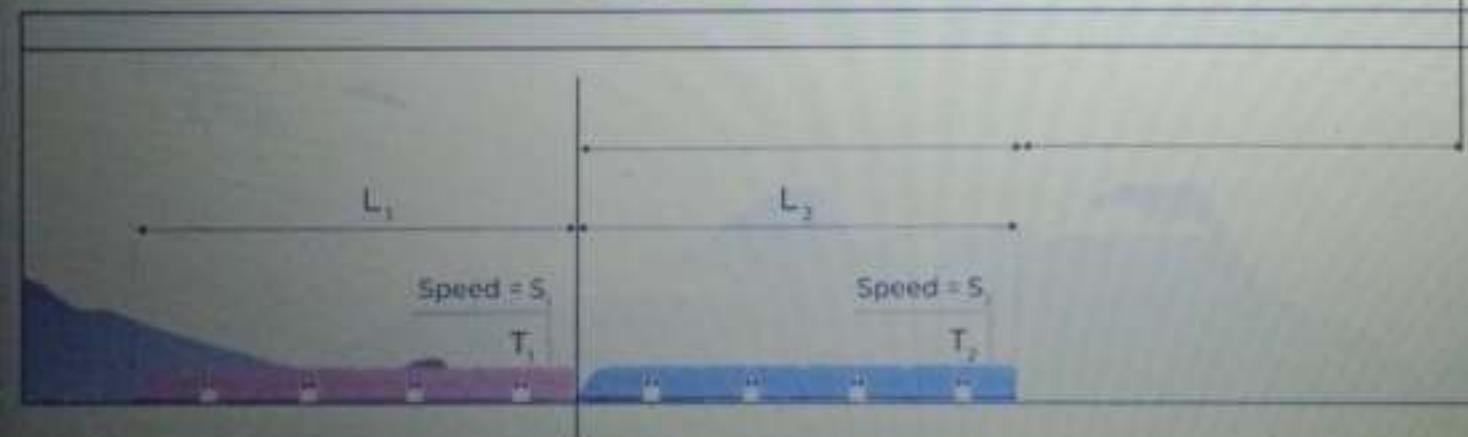


Relative speed

$$= S_1 - S_2$$

$$\text{Distance} = L_1 + L_2$$

$$\text{Time} = \frac{L_1 + L_2}{S_1 - S_2}$$



Speed time and distance



What is the time taken by a train to pass an object which is completely stationary, like a tree or a man?

Case 3

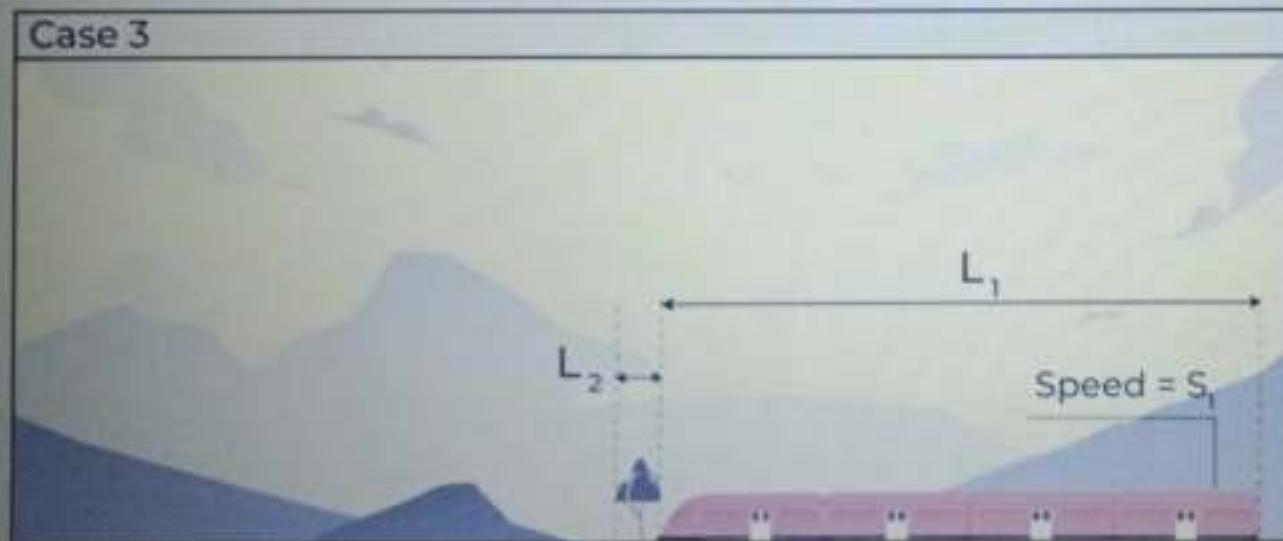


$$\text{Time} = \frac{L_1 + L_2}{S_1}$$

$$\text{Time} = \frac{L_1}{S_1}$$

What is the time taken by a train to pass an object which is completely stationary, like a tree or a man?

Case 3



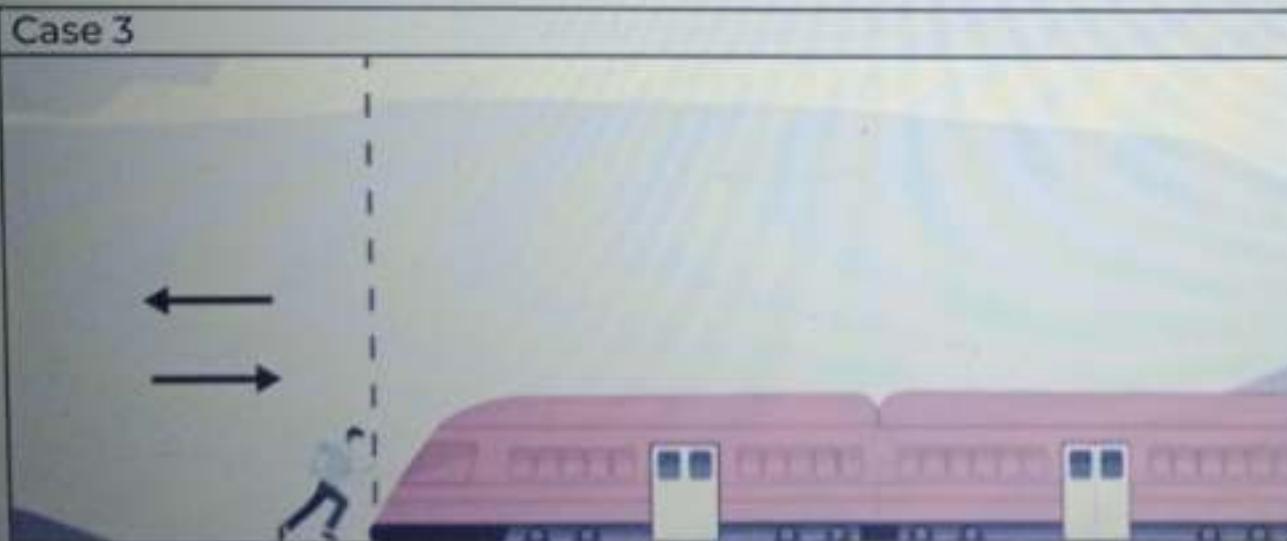
$$\text{Time} = \frac{L_1 + L_2}{S_1 + S_2}$$

$$\text{Time} = \frac{L_t}{S_t}$$

••

What is the time taken by a train to pass a man, who is running with any speed in opposite direction to the train movement?

Case 3



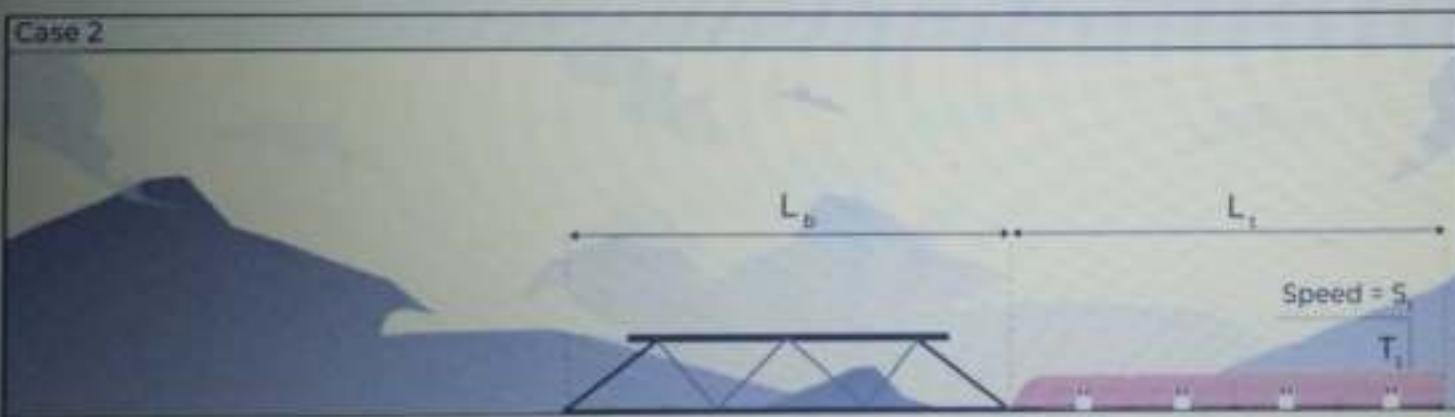
$$\text{Time} = \frac{L_1 + L_2}{S_1 \pm S_2}$$

Speed time and distance

• •

What is the time taken by a train to pass a railway bridge, which comes in its path while travelling with speed S_t ?

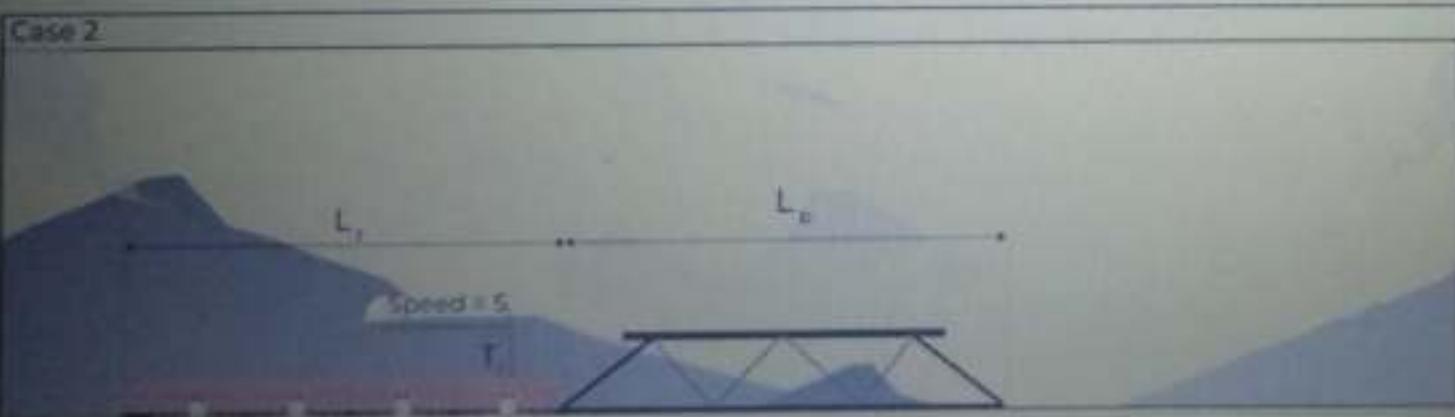
Case 2



$$\text{Time} = \frac{L_1 + L_2}{S_1 + S_2}$$

$$\text{Time} = \frac{L_t + L_b}{S_t}$$

Case 2:



Speed time and distance

Verified Speed time and distance Saurav



Question

A train 150 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:

- A. 59 km/h
- C. 58 km/h
- B. 60 km/h
- D. 57 km/h

$$t = \frac{L_1 + L_2}{S_1 - S_2}$$

$$t = \frac{L}{S_t - S_m} = \frac{150}{S_t - 5}$$

$$S_t - S_m = \frac{L}{t} \Rightarrow S_t - 5 = \frac{150}{10/3600}$$

$$\Rightarrow S_t = 59 \text{ km/hr}$$

MORE VIDEOS



Speed time and distance

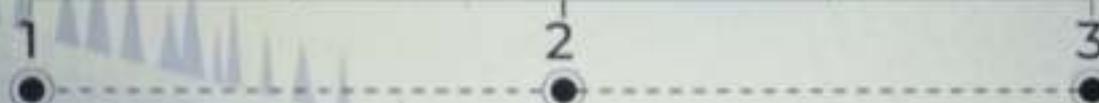




What is the average speed of this person from point A to point B?

Case: Time is equally distributed

For first 30 min, Speed = 50 Km/h(A) For last 30 min, Speed = 60 Km/h(B)



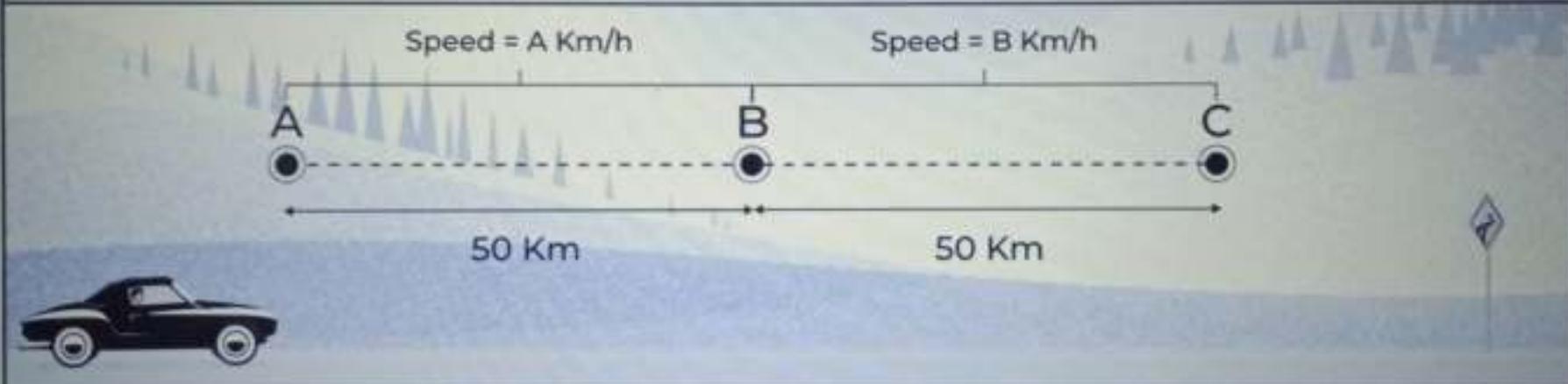
$$\text{Average speed} = \frac{A + B}{2} = 55 \text{ Km/h}$$

Speed time and distance



What is the average speed of this person from point A to point B?

Case: Distance is equally distributed



$$\text{Average Speed} = \frac{2AB}{A+B}$$

Speed time and distance

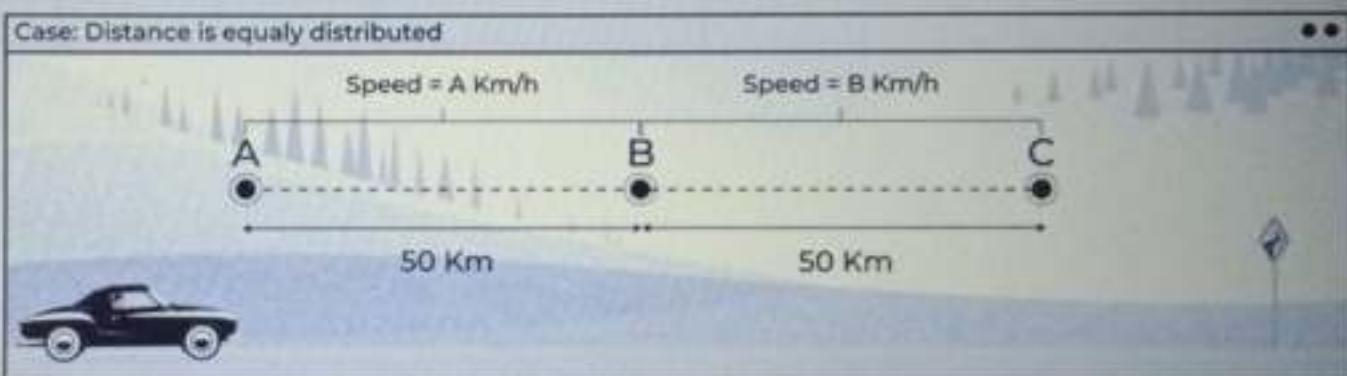
What is the average speed of this person from point A to point B?

Total distance = 100 Km

$$\text{Time} = \frac{50}{A} + \frac{50}{B}$$

$$\text{Time} = \frac{50B + 50A}{AB}$$

$$\text{Average speed} = \frac{\frac{100}{2}}{\frac{50(A+B)}{AB}} = \frac{2AB}{A+B}$$



Speed time and distance

Case 1



Walking at p/q of your usual speed you will reach your home 't' min late.

What is the usual time taken by you to reach your home ?

Formula

$$\text{Usual time (T)} = \frac{(t_{\text{lag or lead}} \times p)}{(q - p)}$$

Speed time and distance





Question

••

Watch Later Share

Walking at $\frac{3}{5}$ of your usual speed you will reach your home 14 min late.

What is the usual time taken by you to reach your home ?

A. 21 min C. 28 min

B. 25 min D. 20 min

$$\frac{t \times p}{q-p} = t + 14$$
$$\frac{3}{5} = p = 3$$
$$q = 5$$
$$\frac{14 \times 3}{5-3} = 21 \text{ min}$$



MORE VIDEOS

Speed time and distance

YouTube

Case 2



If 'A' rides a car at ' S_1 ' km/hr and reaches house ' t_1 ' min late.

If he walks at ' S_2 ' km/hr, he can reach ' t_2 ' min early.

How far is his house from his starting position.

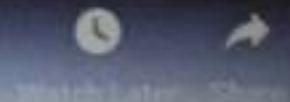
Formula

$$\text{Distance} = \frac{(t_1 + t_2) (S_1 \times S_2)}{(S_2 - S_1)}$$



Verified Speed time and distance Saurav

Question



If Ravi walks from his house at 5 km/h, he reaches school 5 min early, and if he walks at 4 km/h he reaches it 5 min late. What is the actual distance between Ram's house and his school?

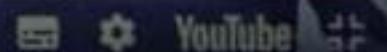
- A. 3.33km
- C. 43 km
- B. 33 km
- D. 33.33km

$$\frac{(t_1 + t_2)(s_1 \times s_2)}{s_2 - s_1} =$$
$$\frac{(5+5)(5 \times 4)}{(5-4)60} = \frac{10 \times 20}{60} = \frac{20}{6}$$
$$= 3.\underline{\underline{33}} \text{ km}$$

MORE VIDEOS



Speed time and distance



Walking $\frac{6}{9}$ th of his usual speed, a man is 12 minutes late. The usual time taken by him to cover that distance is:

A. 24 min C. 34 min

B. 26 min D. 36 min

$$S \rightarrow t \rightarrow D = S \times t \quad \text{---(1)}$$

$$\frac{6}{9}S \rightarrow t+12 \rightarrow D = \frac{6}{9}S \times (t+12) \quad \text{---(2)}$$

$$S \times t = \frac{6}{9}S(t+12)$$

$$\frac{9t}{6} = t+12$$

$$\frac{9t}{6} - t = 12$$

$$\frac{3t}{4} = 12$$

$$t = 24 \text{ min}$$

$$t \Rightarrow \frac{N_{\text{new}} \times t_{\text{usual}}}{D-N}$$

$$\Rightarrow 6 \times$$

Ravi & Mahesh travel the same direction at the speed of 10 & 15 km/hr respectively.
If Ravi takes 30 min longer than Mahesh, then the distance travelled is

- A. 15km
- C. 20km
- B. 25km
- D. 35km

$$S_R = 10 \text{ km/h}$$

$$S_M = 15 \text{ km/h}$$

$$T_d = T_R - T_M$$

$$\frac{30}{60} = \frac{d}{10} - \frac{d}{15}$$

$$\frac{1}{2} = d \left(\frac{1}{30} - \frac{1}{15} \right)$$

$$d \Rightarrow \frac{(t_1 + t_2)(S_1 \times S_2)}{S_2 - S_1}$$

$$\Rightarrow \frac{\frac{30}{60}}{\frac{1}{2}} \times \frac{15}{15 - 10}$$

$$\Rightarrow 15 \text{ min}$$

$$d = 15 \text{ Km}$$

A train leaves Delhi at 6.00 a.m. and reaches Meerut at 10.00 a.m. Another train leaves Meerut at 8.00 a.m. and reaches Delhi at 11.30 a.m. At what time do the two trains cross each other if the distance between Delhi and Meerut is 200 km?

A. 8.45 a.m. C. 8.56 a.m.

B. 9.20 a.m. D. 9.56 a.m.

$D \xrightarrow{6\text{ am}} \xrightarrow{10\text{ am}} M$

$D \xrightarrow{11:30\text{ am}} \xrightarrow{8\text{ am}} M$

200 km

$T_1(2\text{ hr}) \Rightarrow 100 \text{ km} \quad 8\text{ am} \rightarrow 56 \text{ min}$

$S_1 \Rightarrow \frac{200}{4} \Rightarrow 50 \text{ km/hr}$

$R_{\text{rel}} \Rightarrow 100 \text{ km}$

$T \Rightarrow \frac{100}{\frac{200}{4} + \frac{200}{3.5}}$

$S_2 \Rightarrow \frac{200}{3.5}$

$R_{\text{rel}} \Rightarrow S_1 + S_2$

$\Rightarrow \frac{100}{2 \times \left(\frac{7.5}{4} \times 2.5\right)}$

$= \frac{200 \times 2.5}{7.5 \times 2} \Rightarrow \frac{14}{15} \times 60 = 56$

Mani, on his bike, completes a journey in 18 hours. If it is known that he travels at 50 kmph for half the distance and at 70 kmph for the other half, then find the distance traveled.

A. 2050 km C. 2350 km

B. 1050 km D. 1350 km

$$T = 18 \text{ hrs}$$

$$T \Rightarrow \frac{d/2}{50} + \frac{d/2}{70}$$

$$18 = d \left(\frac{240}{(100)(140)} \right)$$

$$d \Rightarrow \frac{18 \times 140 \times 25}{240} \Rightarrow 1050 \text{ km}$$

$$\begin{aligned}S_1 &= 60 \text{ Km/h} \rightarrow R.S \Rightarrow S_2 \\S_2 &= 24 \text{ Km/h} \rightarrow 36 \times \frac{5}{18} = 10 \text{ m/sec} \\T &= 30 \text{ sec} \quad D = S \times t \\D &= L_1 + L_2 \quad L_1 + L_2 \Rightarrow 10 \times 30 \\&\Rightarrow 300 \text{ m}\end{aligned}$$

A train traveling at 60 kmph crosses another train traveling in the same direction at 24 kmph in 30 seconds. What is the combined length of both the trains?

A. 500m

✓ 300m

B. 400m

D. 700m

$$S_1 = 60 \text{ km/h} \rightarrow R.S \Rightarrow S_2$$
$$S_2 = 24 \text{ km/h} \rightarrow 36 \text{ km/h} = \frac{36 \times 5}{18} \rightarrow 10 \text{ m/sec}$$

$$T = 30 \text{ sec}$$

$$D = S \times t$$

$$D = L_1 + L_2$$

$$L_1 + L_2 \Rightarrow 10 \times 30$$

$$\Rightarrow 300 \text{ m}$$

When Sourav increases his speed from 20 Km/hr to 25 Km/hr, he takes one hour less than the usual time to cover a certain distance. What is the distance usually covered by him.

- A. 150km C. 160km
B. 165km D. 100 km

urdwse21903452

$$\begin{aligned}S_1 &= 20 \text{ Km/hr} \\S_2 &= 25 \text{ Km/hr} \\T_d &= 1 \text{ hr}\end{aligned}$$

$$1 = d \left(\frac{1}{100} \right)$$

$$d = 100 \text{ Km}$$

$$\begin{aligned}T_d &= T_1 - T_2 \\1 &= \frac{d}{20} - \frac{d}{25}\end{aligned}$$
$$\left. \begin{array}{l} \\ \end{array} \right\} d = \frac{1 \times 20 \times 25}{5}$$
$$\Rightarrow 100 \text{ m}$$

Two trains A and B are 100 m and 150 m long and are moving at one another at 54 Km/hr and 36 Km/hr respectively. Arun is sitting on coach B1 of train A. Calculate the time taken by Arun to completely cross Train B.

A. 5 sec C. 10 sec

B. 6 sec D. 8 sec

$$\left. \begin{array}{l} L_A = 100 \text{ m} \\ L_B = 150 \text{ m} \\ \rightarrow < \\ S_A = 54 \text{ km/hr} \\ S_B = 36 \text{ km/hr} \\ A \boxed{} \end{array} \right\} \begin{array}{l} D = 150 \text{ m} \\ R.S \Rightarrow 60 \text{ km/hr} \\ T = \frac{150}{810} \times 18 \\ T \Rightarrow 6 \text{ sec} \end{array}$$

A wheel makes 4000 revolutions to cover 88 km. Find the wheel's radius?

A. 7m

C. 3.5 m

B. 4.5 m

D. 7.d m

$$\textcircled{O} \quad 2\pi r$$

$$D = 88 \text{ Km} \checkmark$$

$$R = 4000 \times r$$

$$1 R \text{ or } \text{Cir} = \frac{88000}{4000}$$

$$\rightarrow 22 \text{ m}$$



$$2\pi r = 22 \text{ m}$$

$$r = \frac{22 \times 7}{22 \times 2}$$

$$\Rightarrow 3.5 \text{ m}$$

If you travel from your house to your office at a speed of 60km/hr and return home at a speed of 90km/h , then what is your average speed for the entire journey ?

- A. 70km/hrs C 72 km/hrs
- B. 75km/hrs D. 65km/hrs

d

$$\text{avg} = \frac{2xy}{x+y}$$
$$= \frac{2 \times 60 \times 90}{120}$$
$$\Rightarrow 72 \text{ Km/hr}$$

The snail takes 25 minutes to reach the destination.

what is the formula here



To generalize this type of problem, you can use the following approach:

Formula for Snail Climbing Problems:

Given:

- The snail climbs **A meters** in the first minute.
- It slips **B meters** in the second minute.
- The total distance to be covered is **D meters**.

Formula:



Can you simplify more?

What if D = 20?

The distance climbed in two minutes is:

0 | Message ChatGPT

ChatGPT can make mistakes. Check it.



what is the formula

- ⑤ The formula for solving problems where a snail climbs a certain distance but slips back at regular intervals is:

$$\text{Time to reach the destination} = \left(\frac{D - A}{A - B} \times 2 \right) + 1$$

Where:

- D is the total distance to be covered (in this case, 14 meters).
- A is the distance climbed in the first minute of each cycle (2 meters).
- B is the distance slipped in the second minute of each cycle (1 meter).
- $A - B$ is the net distance climbed every 2 minutes (2 meters up, 1 meter down = 1 meter gained every 2 minutes).

Explanation of Formula:

- ↓
1. Net Distance Covered Every 2 Minutes: The snail climbs A meters in the first minute and slips B meters in the second minute, resulting in a net gain per 2-minute cycle.



0 Message ChatGPT

Thus, the snail reaches the 14-meter mark in 25 minutes.

Share

why are u multiplying by 2



The reason for multiplying by 2 in the formula is because the snail's movement is calculated over two-minute cycles:

- 1st minute: The snail climbs up by A meters.
- 2nd minute: The snail slips back by B meters.

So, in every 2 minutes, the snail completes one full cycle where the net gain is $A - B$ meters.

Example of One Cycle (2 Minutes):

1. Minute 1: The snail climbs 2 meters.
2. Minute 2: It slips back 1 meter.

Thus, in these 2 minutes, the net progress is $A - B = 2 - 1 = 1$ meter. This means that to cover the total distance before the last climb, we can \downarrow how many of these 2-minute cycles are needed.

Why Multiply by 2: What if D changes? How to adjust formula?

0 Message ChatGPT

ChatGPT can make mistakes. Check important info.

29°C

my mood



Speed Time and Distance Questions

AK-47 and AK-101 were fired from the same place at an interval of 15 min, but a person in a Porsche approaching the place hears the second report 14 min and 30sec after the first. Find the speed of the Porsche, supposing that sound travels 330 m per sec.

 4.09 kmph 4.32 kmph 4.28 kmph 4.03 kmph

Explanation

Let the speed of the Porsche be x m/sec. Then distance traveled by Porsche in 14 min and 30 secs min = Distance traveled by sound in 30 sec.

$$x \cdot ((14 \cdot 60) + 30) = 330 \cdot 30$$

$$x \cdot 870 = 990$$

$$x = 99/87 = 1.14$$

$$\text{Speed of the Porsche} = 1.14 \cdot (18/5) = 4.09 \text{ Kmph}$$

Video solution:

Course Completion

Question 18/30

[◀ Prev](#)[Next ▶](#)

Rahul Gandhi is standing on a railway bridge which is 180 m long. He finds that a train crosses the bridge in 20 seconds but himself in 8 seconds. Find the length of the train and speed of Rahul Gandhi.

 64 kmph 54 kmph 58 kmph 44 kmph

Explanation

Let the length of the train be x metres.

Then, the train covers x metres in 8 seconds and $(x + 180)$ metres in 20 seconds.

Course Completion

Step 1: Calculate the speed of the train

Let L be the length of the train.

When the train crosses the bridge:

- Distance traveled = Length of the train + Length of the bridge = $L + 180$ meters
- Time taken = 20 seconds

Using the formula for speed:

$$\text{Speed of the train} = \frac{\text{Distance}}{\text{Time}} = \frac{L + 180}{20}$$

When the train crosses Rahul Gandhi:

- Distance traveled = Length of the train = L meters
- Time taken = 8 seconds

Using the formula for speed again:

$$\text{Speed of the train} = \frac{L}{8}$$

Step 2: Set the two expressions equal to each other.
↓
Find train's speed? Rahul's speed formula?



Since both expressions represent the speed of the same train,

0 Message ChatGPT

$$\text{Speed of the train} = \frac{L}{8}$$

Step 2: Set the two expressions for speed equal

Since both expressions represent the speed of the same train:

$$\frac{L + 180}{20} = \frac{L}{8}$$

Step 3: Cross-multiply to solve for L

$$8(L + 180) = 20L$$

$$8L + 1440 = 20L$$

$$1440 = 20L - 8L$$

$$1440 = 12L$$

$$L = \frac{1440}{12} = 120 \text{ meters}$$

Step 4: Calculate the speed of the train

Now that we know the length of the train is 120 meters, we can find the speed of the train:

$$\downarrow \quad L = 120$$

Find train's speed? \rightarrow using Rahul's speed formula? $1/\text{s}$

Step 4: Calculate the speed of the train

Now that we know the length of the train is 120 meters, we can find the speed of the train:

$$\text{Speed of the train} = \frac{L}{8} = \frac{120}{8} = 15 \text{ m/s}$$

Step 5: Calculate the speed of Rahul Gandhi

Since Rahul Gandhi takes 8 seconds to cross the train, and we can assume he is moving at a constant speed. If we let v be his speed, we can say:

$$\text{Distance crossed by Rahul Gandhi} = v \times 8$$

The distance crossed by the train is the same as the length of the train:

$$120 = v \times 8$$

$$\leftarrow v = \frac{120}{8} = 15 \text{ m/s}$$

Summary:

- Length of the train: 120 meters
- Speed of Rahul Gandhi

Find train's speed? Rahul's speed formula?



Speed Time and Distance Questions

Pre-Intro

A person travels his journey in two parts

- a. 2 hours with 20 km/hr.
- b. 3 hours with 30 km/hr

Find His average during the whole journey.

24 km/hr

28 km/hr

26 km/hr

none

Explanation

$$\text{Average speed} = \frac{\text{Total distance Travelled}}{\text{Total Time Taken}}$$

$$\text{Average speed} = \frac{2 \times 20 + 3 \times 30}{2 + 3} = \frac{130}{5} = 26 \text{ km/hr}$$

12 items | 4

2. Courses

Aptitude

1 Normal | 39

Number S

10 Normal | 61

Classic Ba

27 Normal | 40

Speed and

14 Normal | 39

Spec

72 min

Pract

27 min

Pract

10 min

Review

Speed Time and Distance Questions

Question 26/30

Prev

Next

2. C

Two trains, X and Y, start at the same time from stations A and B respectively towards each other. After passing each other, they take 27 hrs and 3 hrs to reach B and A respectively. If X is moving at 25 km/h, then after how much time from starting time they pass each other.

14 hours

15 hours

7 hours

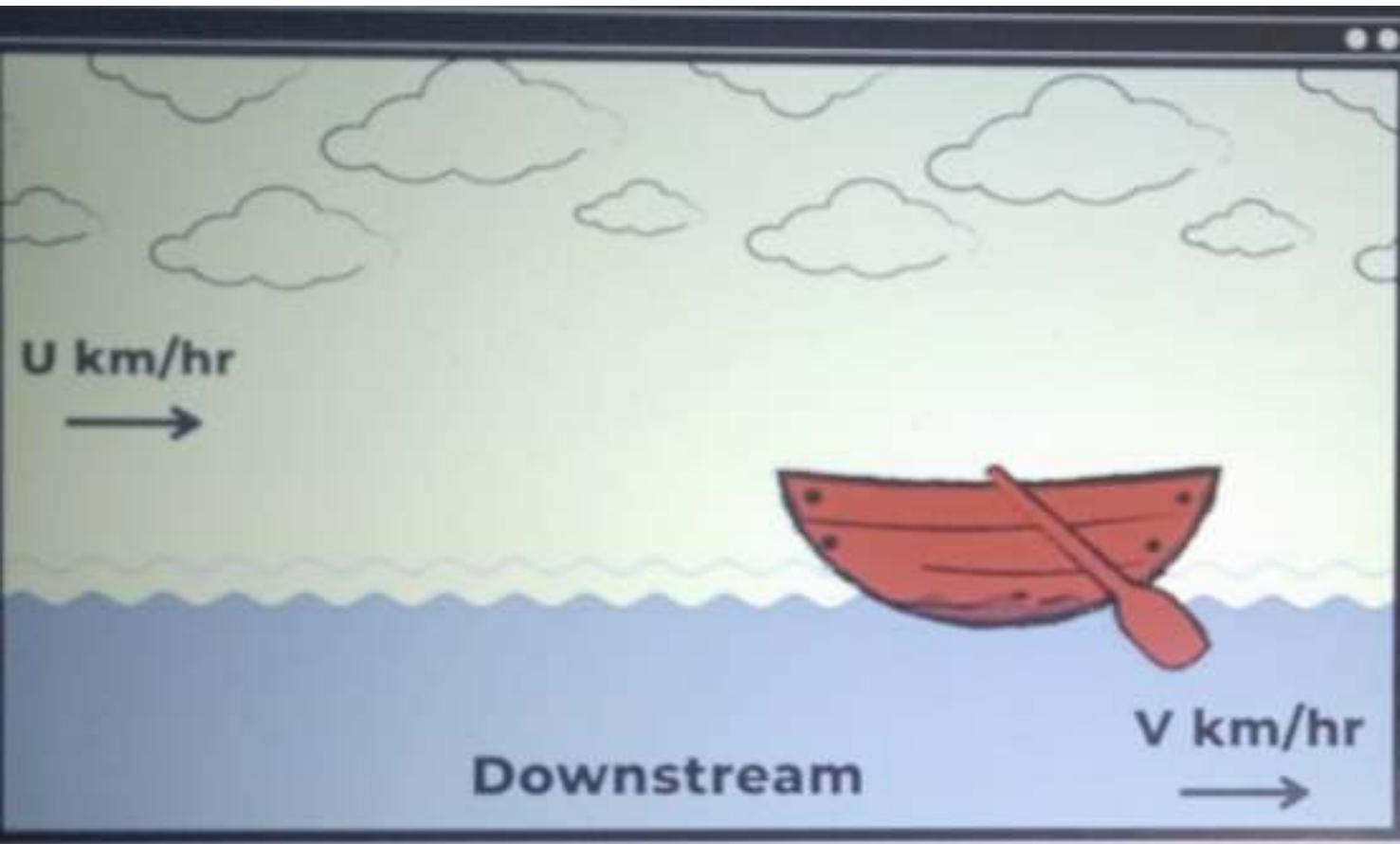
9 hours

Explanation

In this case, there is a standard result

Time will be the square root of time taken after crossing each other

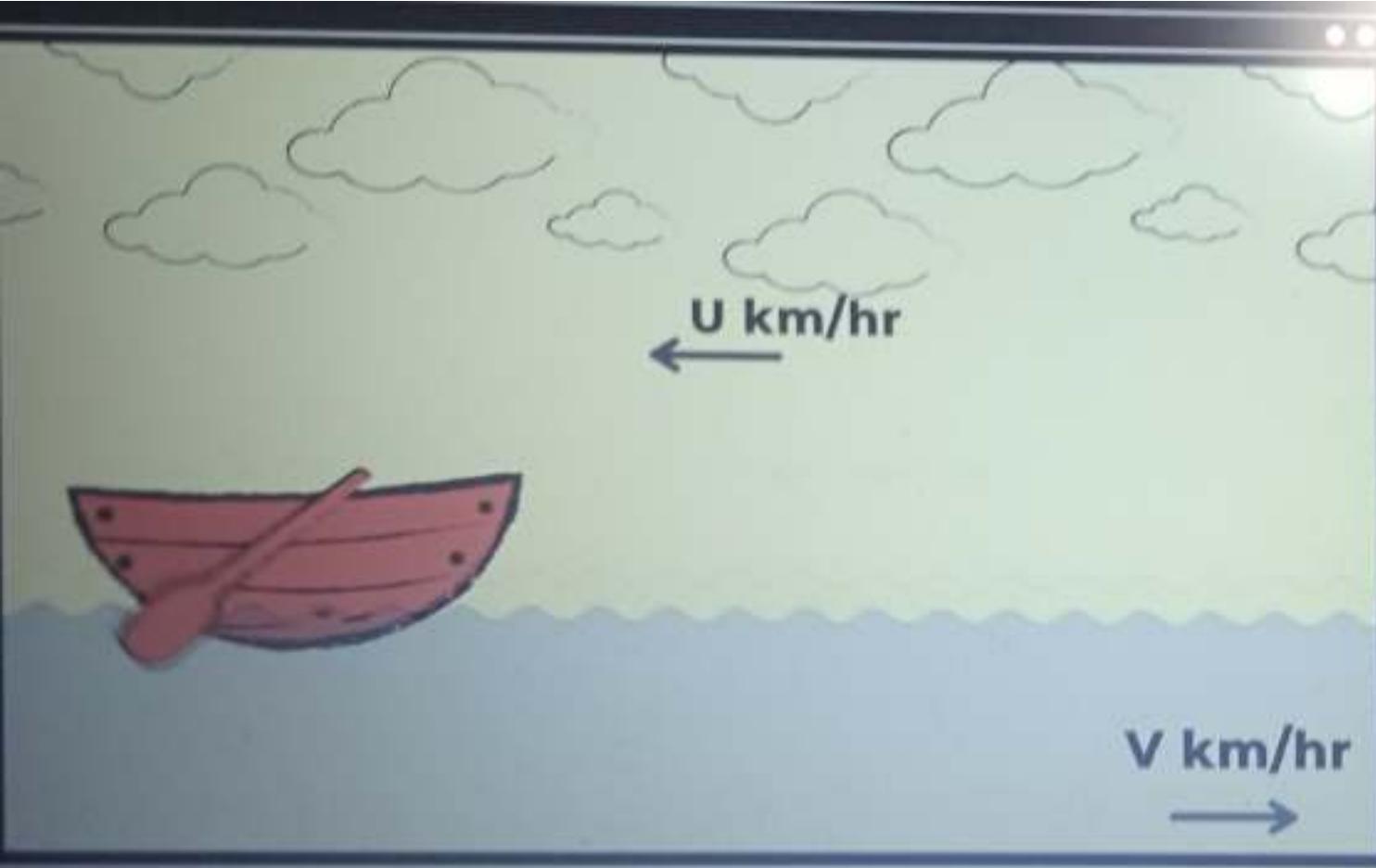
$$\text{Time} = \sqrt{27 \times 3} = 9 \text{ hours}$$



Speed of Boat = $U \text{ km/hr}$
Speed of Stream = $V \text{ km/hr}$

$$\text{Speed Downstream} = u + v$$

Boats and Streams



Speed of Boat = U km/hr
Speed of Stream = V km/hr
To sail Upstream = $U > V$

Speed Upstream = $u - v$

Boats and Streams



A boat can travel at a speed of 15kmph in still water. If the speed of the stream is 9 kmph. Find the time taken by boat to travel 120km downstream .

- A. 6hrs
- C. 4hrs
- B. 5hrs
- D. 7hrs

$$u = 15$$

$$v = 9$$

$$S_D = u + v = 15 + 9 = \underline{\underline{24}}$$

$$t = \frac{D}{S} = \frac{120}{24} = 5 \text{ hrs} \Rightarrow$$



Case 1

If the speed downstream is a km/hr and the speed upstream is b km/hr, then

$$\text{Speed in still water} = \frac{1}{2}(a+b)$$

$$\text{Rate of stream} = \frac{1}{2}(a-b)$$

$$\checkmark a = u + v \rightarrow ①$$

$$\checkmark b = u - v \rightarrow ②$$

$$① + ②$$

$$2u = a+b$$

$$u = \frac{1}{2}(a+b)$$

$$① - ②$$

$$2v = a - b$$
$$= \frac{1}{2}(a - b)$$



Case 2

Assume that a man can row at the speed of x km/hr in still water and he rows the same distance up and down in a stream which flows at a rate of y km/hr.

$$\text{Average speed} = \frac{(\text{Speed})_{\text{Downstream}} * (\text{Speed})_{\text{Upstream}}}{\text{Speed}_{\text{Still Water}}}$$



Case 3

Let the speed of a man in still water be x km/hr and the speed of a stream be y km/hr.
If he takes t hours more in upstream than to go downstream for the same distance,
the distance

$$\text{Distance} = \frac{(x^2 - y^2) * t}{2y}$$



Case 4

A man rows a certain distance downstream in t_1 hours and returns the same distance upstream in t_2 hours. If the speed of the stream is y km/hr, then the speed of the man in still water

$$\text{Speed} = \frac{y(t_2 + t_1)}{(t_2 - t_1)}$$



Case 5

A man can row a boat in still water at x km/hr in a stream flowing at y km/hr. If it takes him t hours to row a place and come back, then the distance between the two places is

4

$$\text{Distance} = \frac{(x^2 - y^2) * t}{2x}$$



A man can row 8 kmph in still water. If in a river running at 2kmph, it takes him 64 minutes to row a place and back, how far off is the place?

A. 5 km

C. 7 km

B. 4 km

D. 6 km

$$u = 8 \text{ km/h}$$

$$S_d = u + v$$

$$v = 2 \text{ km/h}$$

$$S_u = u - v$$

$$T = 64 \text{ min}$$

$$\rightarrow T \Rightarrow \frac{d}{u-v} + \frac{d}{u+v}$$

$$\frac{64}{60} = \frac{d}{6} + \frac{d}{10}$$

$$\frac{64}{60} = d \left(\frac{16}{60} \right) \quad d = 4 \text{ Km}$$

A boat goes 32 km upstream and 36 km downstream in 7 hrs. Again in 9 hrs it can go 40 km upstream and 48 km downstream. The speed of the boat in still water and the speed of the stream respectively in km/hr is.

A. 10, 2

C. 2, 10

B. 8, 6

D. 6, 8

$$7 = \frac{32}{x} + \frac{36}{y} - \textcircled{1}$$

$$9 = \frac{40}{x} + \frac{48}{y} - \textcircled{2}$$

Sub Qf O.

$$2 = \frac{8}{x} + \frac{12}{y} \quad \checkmark$$

$$2 = \frac{8}{u-v} + \frac{12}{u+v} \quad |+|$$

Sushil rows to a place 48 km distant and come back in 14 hours. He finds that he can row 4 km with the stream in the same time as 3 km against the stream. The rate of the stream is:

A. 1 km/hr

C. 2 km/hr

B. 2.5 km/hr

D. 3 km/hr

$$d = 48 \text{ km}$$

$$T = 14 \text{ hr}$$

$$t = \text{min}$$

$$S_d = \frac{4}{x} \quad \text{---(1)}$$

$$S_u = \frac{3}{x} \quad \text{---(2)}$$

$$\left\{ \begin{array}{l} 14 = \frac{48}{\frac{4}{x}} + \frac{48}{\frac{3}{x}} \\ 14 = 48 \left(\frac{x}{12} \right) \\ x = \frac{12 \times 14}{48} \\ x = \frac{1}{2} \end{array} \right. \quad \left\{ \begin{array}{l} S_d = 8 \text{ km/h} \\ S_u = 6 \text{ km/h} \\ R = \frac{1}{2} (4 - u) \\ = 1 \text{ km/h} \end{array} \right.$$

Quantitative Aptitude - Preinsta | ChatGPT

preinstaprime.com/course/quantitative-aptitude

PreInsta Job Board: Refer and Earn

What are you learning today?

Logout

Boats and Streams Questions

If Tom's rowing speed with the flow of the river is 31 kmph and the speed of the current is 8 kmph calculate his rowing speed against the flow?

18

15

23

20

Explanation

Explanation - Downstream Speed(a) = 31 km/hr
Speed of the current(v) = 8km/hr.

$$v = \frac{a - b}{2}$$
$$8 = \frac{31 - b}{2}$$

2. Course Contents

- Pre-Introduction
- Aptitude Basic
- Number System
- Classic Banking
- Speed and Work
- Speed Time & Distance Theory
- Practise Questions 1
- Practise Questions 2
- Speed Time and Distance Questions

Search

ITC Mumbai Mumbai

If the upstream speed is 65 km/hr and the speed of the stream is 5 km/hr. Then what is the time required to cover 245 km in still water?

4 hours

3 hours

3.5 hours

6 hours

Explanation

Speed of Stream in still water = $65 + 5 = 70$ km/hr

$$\text{Required Time} = \frac{245}{70} = 3.5 \text{ hours}$$

Course Completion

Boats and Streams Questions

Time required to go Ravi in 40 meters upstream direction and 60 meters downstream direction is 6 hours. And the time required to go Ravi in 50 meters upstream direction and 90 meters downstream direction is 8 hours. Then find the upstream velocity.

10 km/hr

20 km/hr

15 km/hr

25 km/hr

Explanation

Let upstream velocity = x

Downstream velocity = y

According to question

$$\frac{40}{x} + \frac{60}{y} = 6$$

$$\frac{50}{x} + \frac{90}{y} = 8$$

Solving both equation

20 km/hr

25 km/hr

Explanation

Let upstream velocity = x

Downstream velocity = y

According to question

$$\frac{40}{x} + \frac{60}{y} = 6$$

$$\frac{50}{x} + \frac{90}{y} = 8$$

Solving both equation

$$x=10, y=30$$

Upstream velocity = $x = 10$ km/hr

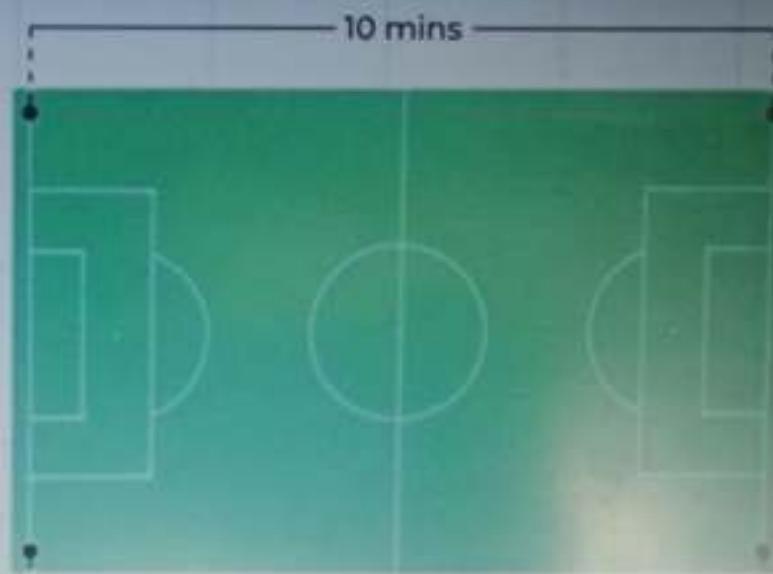


Watch Later

Work - 20 days



Time ↓ Work/Day ↑



Work - 30 days



20 mins

Work - 20 days

Work done in 1 day
 $= 1/20$



Time ↓ Work/Day ↑

Work - 30 days

Work done in 1 day
 $= 1/30$



Time ↑ Work/Day ↓



Time and Work Theory

Archana alone can do a piece of work in 10 days and Nishu alone can do it in 15 days. In how many days the work will get completed if they work together?

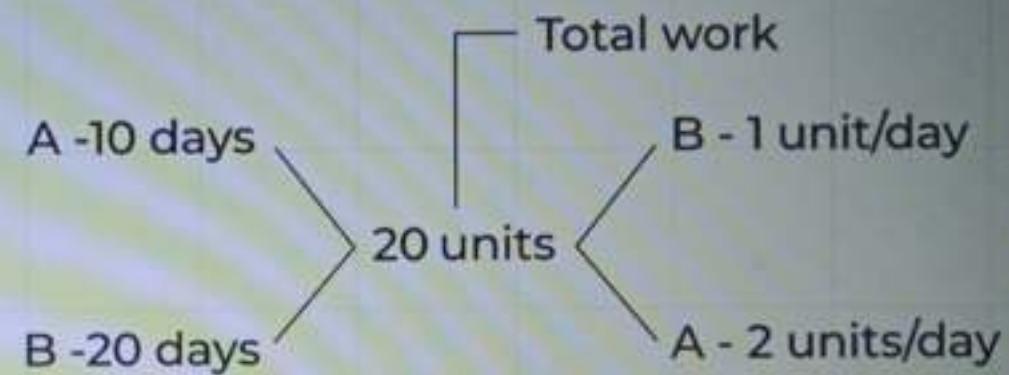
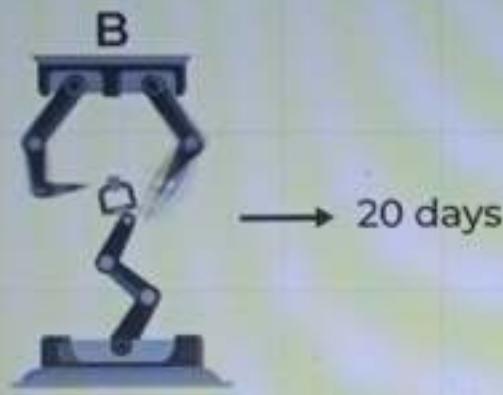
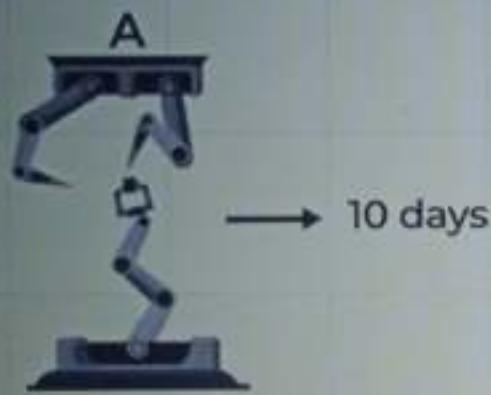
- A. 3 days
- C. 5 days
- B. 6 days
- D. 4 days

$A \rightarrow \frac{1}{10}$ days $N = 15$ days

As 1 day's work = $\frac{1}{10}$ $N 1D W = \frac{1}{15}$

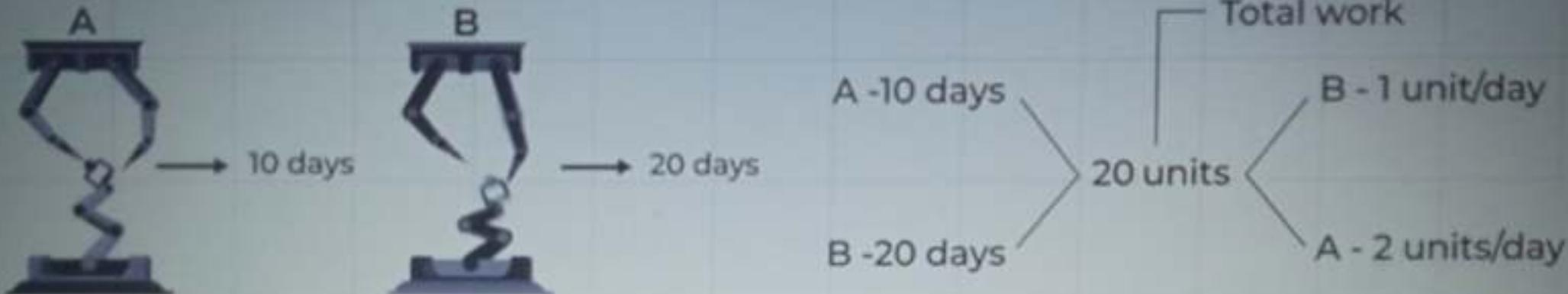
$$(A+N) \rightarrow \left(\frac{1}{10} + \frac{1}{15} \right) = \frac{\cancel{3+2}}{\cancel{30}6} = \frac{1}{6}$$

\downarrow days



$$\text{Total work} = A + B = (1 + 2) \text{ units/day} = 3 \text{ units/day}$$





$$\text{Total work} = A + B = (1 + 2) \text{ units/day} = 3 \text{ units/day}$$

$$\text{Total no of days required} = \frac{\text{Total unit of work}}{\text{Total unit of work done per day}} = 20/3 = 6.66 \text{ days}$$

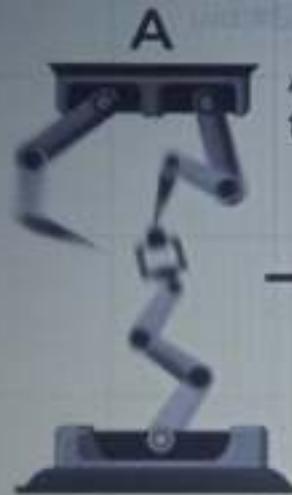
Archana alone can do a piece of work in 10 days and Nishu alone can do it in 15 days. In how many days the work will get completed if they work together?

- A. 3 days
- C. 5 days
- B. 6 days
- D. 4 days.

$$\begin{array}{ccc}
 A - 10 & & = N \rightarrow 2 \text{ u/d} \\
 N - 15 & \nearrow 30 \text{ units} & \\
 & & A \rightarrow 3 \text{ u/day} \\
 \sum \text{u/day.} & \frac{30}{S} = \frac{\text{Total unit}}{\text{units/day}} = \text{no. of days}
 \end{array}$$



Total work = 100



A can complete 10% of
the work in one day

→ 10 days

$$\text{Efficiency} = \frac{100}{10} \\ = 10\%$$



B can complete 5% of
the work in one day

→ 20 days

$$\text{Efficiency} = \frac{100}{20} \\ = 5\%$$

Combined efficiency = 15%
(per day)

Days required for completion = $\frac{100\%}{15\%}$ = 6.66 days
(A & B combined)

Time and Work Theory



Archana alone can do a piece of work in 10 days and Nishu alone can do it in 15 days. In how many days the work will get completed if they work together?

- A. 3 days
- C. 5 days
- B. 6 days
- D. 4 days

$$A - 10 \rightarrow \frac{100}{10} = 10\% / \text{day}$$

$$N - 15 \rightarrow \frac{100}{15} = 6.\underline{6}6\% / \text{day}$$

$$(A+N) = 16.\underline{6}6\% / \text{day} \rightarrow \frac{100\%}{16.\underline{6}6} = \underline{\underline{6}} \text{ day}$$



Question

A can do a piece of work in 20 days. He works at it for 5 days and then B finishes it in 10 more days. In how many days will A and B together finish the work?

- | | |
|------------|------------|
| A. 8 days | C. 12 days |
| B. 10 days | D. 6 days. |

$$A - \underline{20} \text{ days} \rightarrow \frac{100}{20} = 5\%/\text{day}$$

$$5 \times 5\% = \underline{\underline{25\%}} \quad A + B = 12\frac{5}{2}\%$$

$$\left| \begin{array}{l} \underline{\underline{75\%}} - 10 \text{ days} \\ 10 = \underline{\underline{75\%}} \end{array} \right. \quad \left. \begin{array}{l} \frac{100\%}{12.5} = 8 \text{ days} \\ \xleftarrow{\hspace{1cm}} \end{array} \right.$$



Aman can do a piece of work in 20 days, Aman and Chandrakant together can do the same work in 15 days. Aman, Bharat and Chandrakant together can complete the same work in 10 days. In how many days Bharat and Chandrakant together can complete the work?

- A. 25 days
- C. 20 days
- B. 27 days
- D. 15 days

$$A - 20 \rightarrow 5\% \rightarrow ①$$

$$A+C - 15 - 6.66\%$$

$$A + \cancel{B} + C = 10\% \rightarrow ②$$

$$\cancel{B+C} = 5\%$$

$$\frac{100}{5} = 20 \text{ days}$$

MORE VIDEOS



Question

A and B alone, can dig a hill in 10 days and 20 days respectively. They have been digging the same hill together for 5 days. If the total amount of hill is for 300 units then what is the amount (in units) is left to dig?

A. 125

C. 50

B. 66.66

D. 75

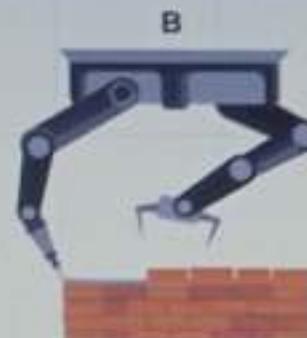
$$\begin{array}{l} A - 10\% \\ B - 5\% \end{array} \left. \begin{array}{l} \\ \end{array} \right\} 15\% \text{ / day}$$
$$\begin{array}{rcl} 5 \times 15\% & = & 75\% \\ \underline{300 \text{ units}} & & \downarrow \\ \underline{= \quad \quad \quad} & & 25\% \quad 300 \\ & & \frac{25}{100} \times 300. \quad \sim \end{array}$$

Time and Work Theory

In how many days would a wall be built if all three of these machines work on the same wall simultaneously?



10 days to build
Efficiency - 10%



20 days to build
Efficiency - 5%



25 days to break
Efficiency - (-4%)

$$\text{Combined efficiency} = 10 + 5 - 4 = 11\%$$

$$\text{Days required} = 100/11 \text{ days}$$



A can build a wall in 10 days and B can build it in 5 days, while C can completely destroy the wall in 20 days. If they start working at the same time, in how many days will the work be completed.

- A. 3 days
- C. 5 days
- B. 6 days
- D. 4 days

$$\begin{aligned}A &- 10 \rightarrow 10\% \\B &- 5 - 20\% \\C &- -20 - (-5\%) \end{aligned}$$

$$25\% = \frac{100}{25} - 4 \text{ days}$$



In how many days would machines A and B will be able to complete the work, when both of them work on it simultaneously?



→ X days
1 day's work = $1/X$



→ Y days
1 day's work = $1/Y$

(A + B)'s combined work of 1 day

$$= \frac{1}{X} + \frac{1}{Y}$$

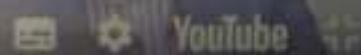
$$= \frac{X+Y}{XY}$$

Days required for completion

$$= \frac{XY}{X+Y}$$

RE VIDEOS

Time and Work Theory





Case 2

If A can do a work in 'x' days, B can do the same work in 'y' days, C can do the same work in 'z' days, then total time taken by

Formula

$$\text{A, B and C to complete the work together} = \frac{xyz}{xy + yz + zx}$$

MORE VIDEOS

Time and Work Theory



Verified Time and Work theory Saurav

Case 3



Watch later Share

If A alone can do a certain work in 'x' days and A and B together can do the same work in 'y' days, then

Formula

$$B \text{ alone can do in} = \frac{xy}{x - y}$$

MORE VIDEOS

Time and Work Theory



Case 4

If A and B can do a work in 'x' days, B and C can do the same work in 'y' days, C and A can do the same work in 'z' days. Then total time taken, when

Formula

A, B and C work together =

$$\frac{2xyz}{xy + yz + zx}$$

MORE VIDEOS

Time and Work Theory



Case 5

(I) If A can do a work in 'x' days and B can do the same work in 'y' days and when they started working together, B left the work 'm' days before completion then total time taken

Formula

$$\text{to complete work is} = \frac{(y + m)x}{x + y}$$

MORE VIDEOS

Time and Work Theory

Verified Time and Work theory Saurav

Case 6

If A and B together can finish a certain work in 'a' days. They worked together for 'b' days and then 'B' (or A) left the work. A (or B) finished the rest work in 'd' days, then,

Formula

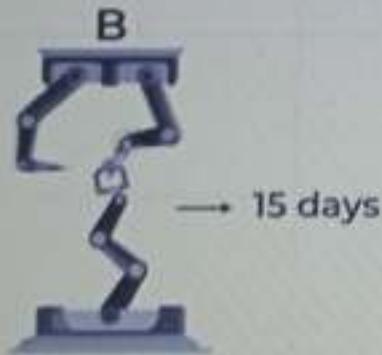
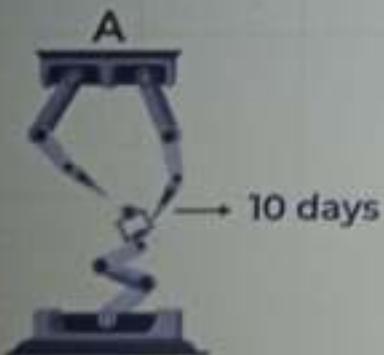
$$\text{Total time taken by A (or B)} = \frac{ad}{a - b} \quad \text{OR} \quad \frac{bd}{a - b}$$

MORE VIDEOS

Time and Work Theory

In how many days will the work be completed?

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
A 3	B 2	A 3	B 2	A 3	B 2	A 3	B 2	



One cycle - $2 + 3 = 5$ units

A - 10 days

B - 15 days

30 units

B - 2 units/day

A - 3 units/day

Number of cycles for completion - $30/5 = 6$ cycles

12 days

Time and Work Theory

Verified Time and Work theory Saurav

P and Q can do a piece of work in 50 and 40 days. If they work at it an alternate days with P beginning in how many days, the work will be finished ?

A. 22.5 days C. 55.5 days
B. 46 days D. 44.5 days

$$\begin{array}{l} P=50 \quad Q=40 \quad \text{Total work} = 200 \text{ units} \\ \left(\frac{P+Q}{2} \right) = \frac{90}{2} = 45 \text{ units per cycle} \\ \text{Number of cycles} = \frac{200}{45} = 4 \text{ cycles with } 20 \text{ units left} \\ \text{Remaining work} = 20 \text{ units} \\ \text{Time taken by Q to finish remaining work} = \frac{20}{40} = 0.5 \text{ days} \\ \text{Total time} = 4 \times 2 \text{ days} + 0.5 \text{ day} = 8.5 \text{ days} \end{array}$$



A Civil Engineer estimates that he will finish the road construction project in 200 days by employing 100 men. However, at the end of the 100th day, when as per his estimation half the work should have been completed, but he finds that only 40% of his work is done.

- (a) How many more days will be required to complete the work?
- (b) How many more men should he employ in order to complete the work in time?

$$\begin{aligned}
 & \text{200 days} \\
 & \text{100 men} \\
 & \text{200} \times 100 \quad \text{MD} \\
 & \frac{100}{40\%} \rightarrow \frac{100 \times 100}{50} \quad \text{MD} \\
 & \frac{100 \times 100}{50} \times 60 = 12000 \quad \text{MD} \\
 & \frac{\text{Speed} \times t = \text{Dist}}{\substack{\uparrow \\ \text{Men}}} \quad \frac{\downarrow}{\text{time}} \quad \frac{\downarrow}{\text{work}} \\
 & \frac{150}{= \circlearrowleft 50} \\
 & \underline{15000 \text{ MD}}
 \end{aligned}$$



Verified Time and Work theory Saurav

Case 1

If M_1 men can finish W_1 work in D_1 days and M_2 men can finish W_2 work in D_2 days
then, Relation is

$$5 \text{ men, } 100 \text{ hrs, } 2 \text{ hrs} \quad | \quad 10, 50 \text{ hrs, ? hrs}$$

44d FSE21905452

Formula

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

$$\frac{5 \times 2}{100} = \frac{10 \times ?}{50} \quad \frac{1}{2} \text{ hrs}$$

RE VIDEOS



If M_1 men finish W_1 work in D_1 days, working T_1 time each day and M_2 men finish W_2 work in D_2 days, working T_2 time each day, then



$$\frac{M_1 D_1 T_1}{W_1} = \frac{M_2 D_2 T_2}{W_2}$$

Verified Time and Work theory Saurav

Watch Later Share

4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?

- A. 35
- C. 50
- B. 40
- D. 45

$$\begin{aligned} [4M + 6W] &\xrightarrow{1/8} \textcircled{1} \times 3 \\ [3M + 7W] &\xrightarrow{1/10} \textcircled{1} \times 4 \\ W \rightarrow & \left[\begin{array}{l} 12M + 28W = 4/10 \\ 12M + 18W = 3/8 \\ \hline 10W = \end{array} \right] \end{aligned}$$

MORE VIDEOS

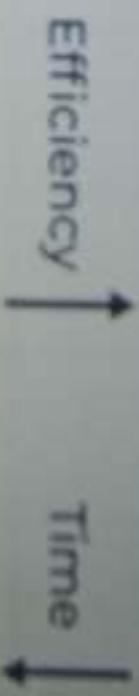
Time and Work Theory

YouTube

A is twice as efficient as B

A can complete a work in - X days

B can complete the same work in - $2X$ days



Question

A is twice as good as B and is therefore able to finish a piece of work in 30 days less than B. In how many days they can complete the whole work, working together?

- A. 30 days
- C. 15 days
- B. 20 days
- D. 25 days

$$\begin{aligned}B &\rightarrow 2x \text{ days} - 60 & \frac{xy}{x+y} \\A &\rightarrow x \text{ days} - 30 \\(2x - x) &= 30 \text{ days} & \frac{60 \times 30}{90} \\x &= 30 \text{ days} \\&\frac{1800}{90}\end{aligned}$$

Verified Time and Work theory Saurav

A can do a job in 52 days. B is 30% more efficient than A. How many days can B alone do the same job?

- A. 40 days
- C. 36 days
- B. 48 days
- D. 46 days

$$\begin{array}{l} B \text{ } 30\% \text{ } \uparrow \text{ } A \\ \cancel{100} \quad 130 \text{ Days} \quad 100 \\ \quad \quad \quad 52 \end{array}$$

MORE VIDEOS

P and Q work together and get a payment of Rs. 1400. P can complete the work alone in just 30 days. But Q takes 40 days to complete the work alone. What is P's share out of the wages they get?

- A. ₹ 800 C. ₹ 1000
B. ₹ 600 D. ₹ 700

$$\begin{array}{l} \boxed{1400} \left[\frac{P}{Q} - \frac{30}{40} \right] \uparrow \uparrow \\ P : Q \\ w/t \quad 4 : 3 \\ D/t \quad 3 : 4 \end{array}$$
$$\begin{aligned} & \frac{4}{7} \times 1400 \\ & \frac{3}{7} \times 1400 \end{aligned}$$



12 boys can do a piece of work in 24 days. How many boys are needed to do the work in 36 days.

=

- A. 6 C. 10

- B. 9

~~D. 8~~

$$\text{work done}_1 = w_1 - \text{done}_2$$

$$\frac{12 \times 24}{=} = \frac{x \times 36}{=}$$

$$x = 8$$

$$\frac{M_1 T_1 D_1}{w_1} = \frac{M_2 T_2 D}{w_2}$$

Abhishek alone can complete a piece of worksheet in 28 days. Anudeep alone can complete it in 32 days. If the total payment to complete the worksheet is Rs. 450. How much should Abhishek be paid if they work together for the worksheet?

- A. 320
- C. 240
- B. 280
- D. 210

Payments Ratio = per day work ratio //

240

$$A \rightarrow \frac{1}{28} \text{ (per day)}$$

$$A : A_n = \frac{1}{28} : \frac{1}{32}$$

$$A_n \rightarrow \frac{1}{32} \text{ (per day)}$$

$$A : A_n = 32 : 28$$

$$A : A_n = 8 : 7$$

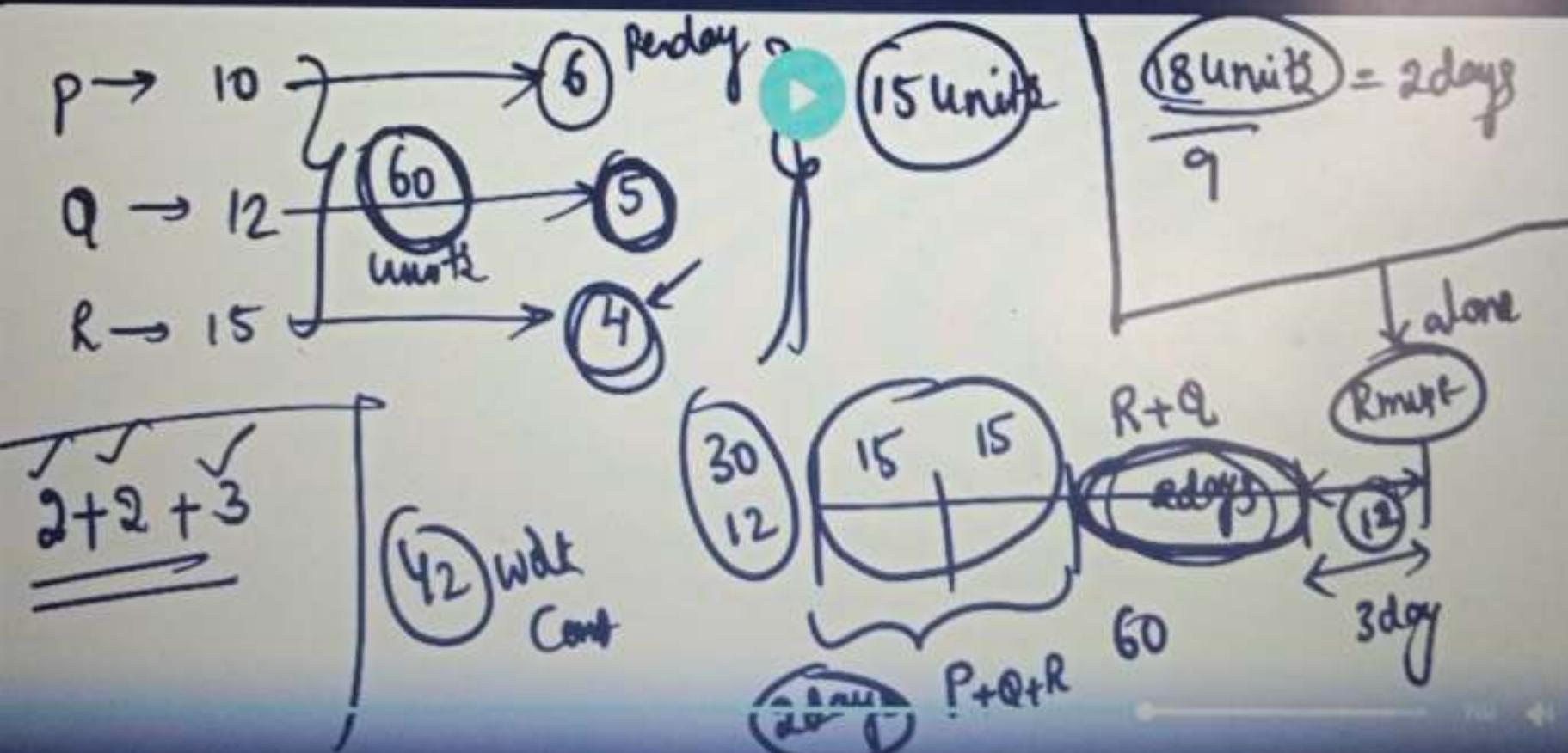
$$\frac{30}{450} \times 8$$

P can do a piece of work in 10 days, Q in 12 days and R in 15 days. They all start the work together, but P leaves after 2 days and Q leaves 3 days before the work is completed. In how many days is the work completed?

- A. 5 days C. 6 days

D. 7 days

- D. 8 days



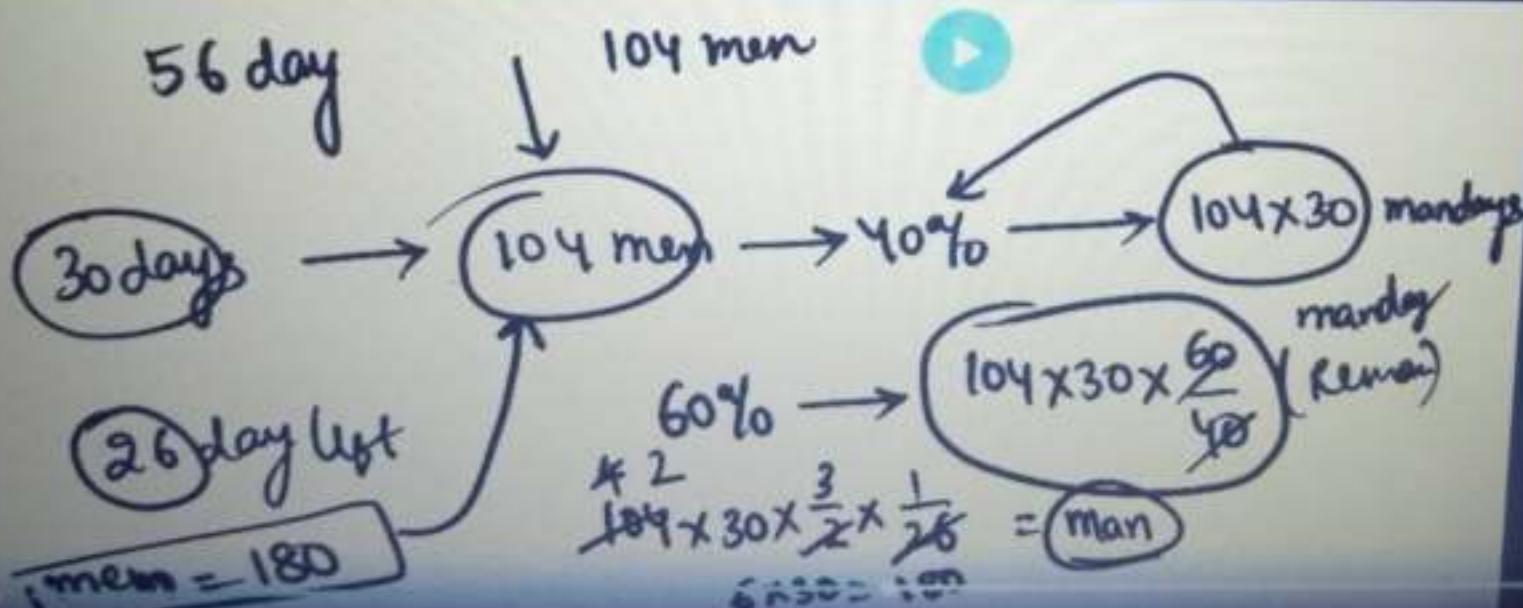
A house can be build in 56 days with help of 104 men, each working 10 hours a day. After 30 days, $\frac{2}{5}$ of the work is finished. How many additional men may be required so that work may be completed on time?

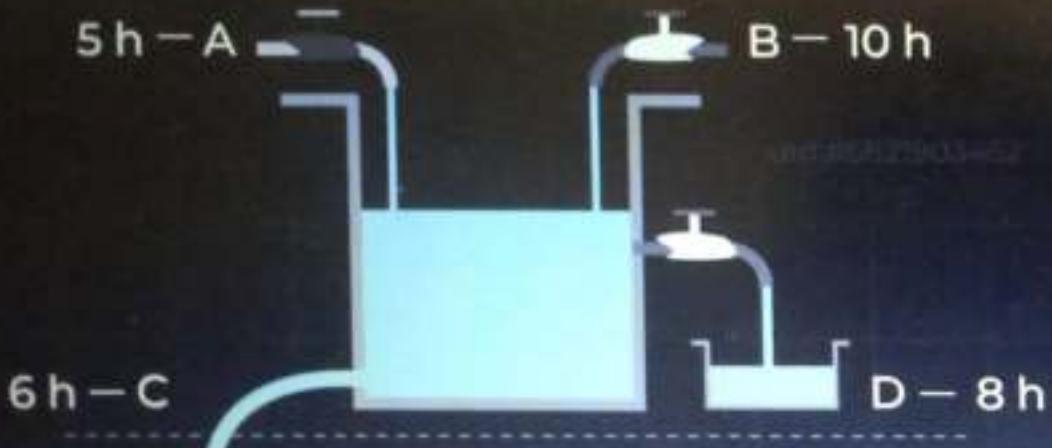
A. 108

C. 180

✓ B. 76

D. 96





Inlet - Which fills \rightarrow A - $\frac{1}{5}$

B - $\frac{1}{10}$

Outlet - Which empties \rightarrow C - $(-\frac{1}{6})$

\rightarrow D - $(-\frac{1}{8})$

Time required to fill the tank when all the streams are running simultaneously -

$$\frac{1}{5} + \frac{1}{10} - \frac{1}{6} - \frac{1}{8}$$

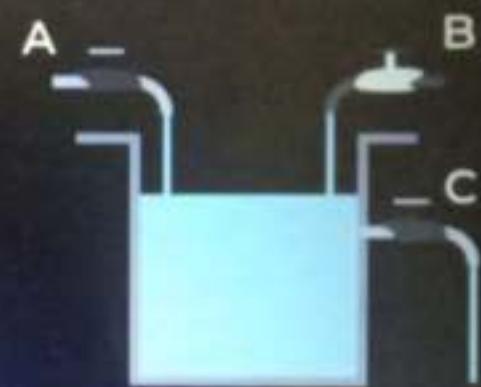
Pipe A - can fill the tank in - X hours - $\frac{1}{X}$

Pipe B - can fill the tank in - Y hours - $\frac{1}{Y}$

Pipe C - can empty the tank in - Z hours - $(-\frac{1}{Z})$

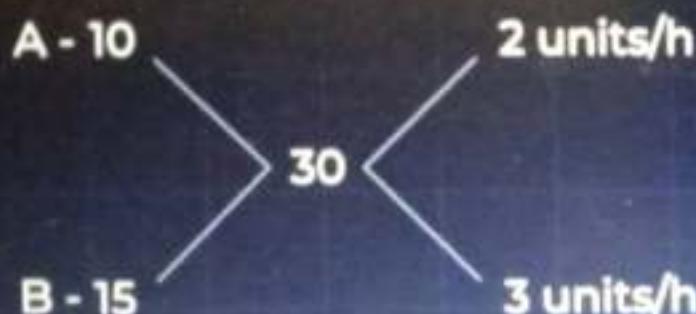
$$A + B + C = \frac{1}{X} + \frac{1}{Y} - \frac{1}{Z} = \frac{YZ + ZX - XY}{XYZ}$$

$$\text{Time required to fill the tank} = \frac{XYZ}{YZ + ZX - XY}$$



Pipe A - can fill the tank in - 10 h

Pipe B - can fill the tank in - 15 h



A & B's cumulative work of one hour =
 $(2 + 3) = 5 \text{ units/h}$

Total work is 30

Total time taken is = $\frac{30}{5} = 6 \text{ h}$

Pipe A - can fill a tank in - 10 hours

Pipe B - can fill a tank in - 15 hours

Pipe C - can empty the same tank in - 30 hours

$$\text{L.C.M } (A, B, C) = (10, 15, 30) = 30 \text{ units}$$

A can complete - 3 units/h

B can complete - 2 units/h

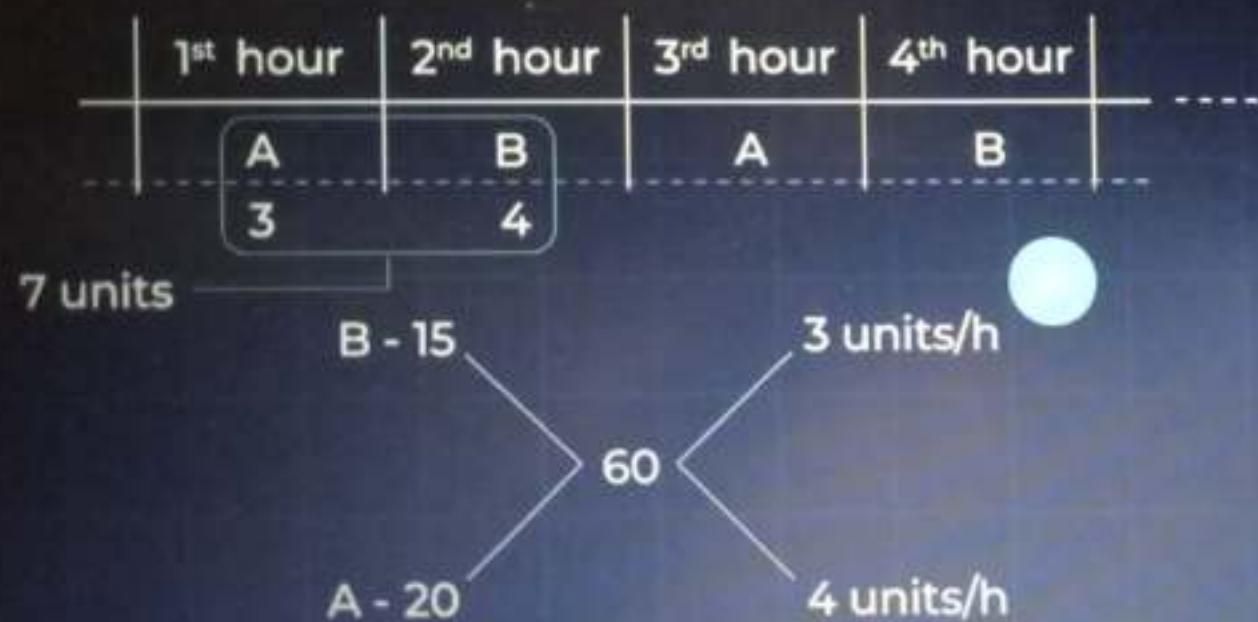
C can complete - (-1 units/h)

$$A + B + C = 3 + 2 - 1 = 4 \text{ units/h}$$

$$\text{Time required} = \frac{30}{4} = 7.5 \text{ h}$$

Pipe A - fills the tank own it's own in - 20 h

Pipe B - fills the tank own it's own in - 15 h



$$\begin{array}{r} & 8 \\ 7 & \overbrace{\quad\quad\quad}^{60} \\ & 56 \\ \hline & 4 \end{array}$$

16 h

$$7 \text{ units} \times 8 = 56 \text{ units} + 3 \text{ u} + 1 \text{ u}$$

$$\begin{aligned} \text{Time required} &= 16 \text{ h} + 1 \text{ h} + 15 \text{ min} \\ &= 17 \text{ hrs and } 15 \text{ mins} \end{aligned}$$



A - inlet pipe - X hours

B - inlet pipe - Y hours

C - outlet pipe - Z hours

$$A \& C - \frac{XZ}{X - Z}$$

$$A, B \& C - \frac{XYZ}{YZ + ZX - XY}$$

$$A \& B - \frac{XY}{X + Y}$$

$$B \& C - \frac{YZ}{Y - Z}$$



Pipes and Cisterns Questions

Question 12/30

◀ Prev

Next ▶

A tank of capacity 25 litres has an inlet and an outlet tap. If both are opened simultaneously, the tank is filled in 5 minutes. But if the outlet flow rate is doubled and taps opened the tank never gets filled up. Which of the following can be outlet flow rate in litres/min?

2

6

4

3

Explanation

The net inflow when both pipes are opened is 5 litres a minute.

The outlet flow should be such that if its rate is doubled the net inflow rate should be negative or 0.

Only an option greater than or equal to '5' would satisfy this condition. 6 is the only possible value from the option

Video solution:



given conditions.

Let:

- Inlet flow rate = I litres/min
- Outlet flow rate = O litres/min

Condition 1:

When both taps (inlet and outlet) are opened simultaneously, the tank is filled in 5 minutes.

- Tank capacity = 25 litres
- Time to fill = 5 minutes

This means that the net inflow rate is $\frac{25}{5} = 5$ litres/min.

So, we have the equation:

$$I - O = 5 \text{ litres/min} \quad (\text{Equation 1})$$

Condition 2:

When the outlet flow rate is doubled, the tank gets filled. This implies that the outlet flow rate becomes equal to or O' . More flow rate problems? How to solve equations?



$$I - O = 5 \text{ litres/min} \quad (\text{Equation 1})$$

Condition 2:

When the outlet flow rate is doubled, the tank never gets filled. This implies that the outlet flow rate becomes equal to or greater than the inlet flow rate, i.e.:

$$I - 2O \leq 0 \quad (\text{Equation 2})$$

Step 1: Solve Equation 1

From Equation 1:

$$I = O + 5$$

Step 2: Substitute into Equation 2

Substitute $I = O + 5$ into Equation 2.

$$(O + 5) - 2O \leq 0$$

$$5 - O \leq 0$$

$$O \geq \underset{\downarrow}{5} \text{ litres/min}$$

Step 3: Conclusion More flow rate problems? How to solve equations?



$$I = O + 5$$

Step 2: Substitute into Equation 2

Substitute $I = O + 5$ into Equation 2:

$$(O + 5) - 2O \leq 0$$

$$5 - O \leq 0$$

$$O \geq 5 \text{ litres/min}$$

Step 3: Conclusion

The outlet flow rate must be at least 5 litres/min for the tank to never fill up.

Among the options provided (2, 6, 4, 3), the only valid outlet flow rate is 6 litres/min.

Final Answer:

The outlet flow rate is 6 litres/min.



More flow rate problems? [How to solve equations?](#)



Time and Work Questions

Question 2/30

[◀ Prev](#)[Next ▶](#)

In a manufacturing company, Rakesh, Aman, and Ajay complete the task in 36 days. Rakesh and Aman together do twice as much work as Ajay alone and, Rakesh and Ajay together can do thrice as much work as Arman alone. Find the time taken by Ajay to do the whole work?

 1/180 108 109 1/38

Explanation

Let Rakesh, Aman and Ajay be A, B and C.

By the question

$$A + B = 2C$$

$$\text{Also, } (A+C) = 3B$$

$$36(A+B+C) = 1$$

Let the rates of Rakesh, Aman, and Ajay be R , A , and J , respectively.

Step-by-step solution:

1. Rakesh, Aman, and Ajay together:

$$R + A + J = \frac{1}{36}$$

2. Rakesh and Aman together do twice as much work as Ajay:

$$R + A = 2J$$

3. Rakesh and Ajay together do thrice as much work as Aman:

$$R + J = 3A$$

Now solve these equations:

- From equation (2):

$$R = 2J - A$$

- From equation (3):



How about Aman's time? $_$ Explain Rakesh's rate?



0 Message ChatGPT

Now solve these equations:

- From equation (2):

$$R = 2J - A$$

- From equation (3):

$$R = 3A - J$$

Equating the two expressions for R :

$$2J - A = 3A - J$$

Simplifying:

$$\begin{aligned} 2J + J &= 3A + A \\ 3J &= 4A \end{aligned}$$

$$J = \frac{4A}{3}$$

Substitute this value of J into equation (2):

How about Aman's time? A Explain Rakesh's rate?



Message ChatGPT

$$J = \frac{4A}{3}$$

Substitute this value of J into equation (2):

$$R + A = 2J$$

$$R + A = 2 \times \frac{4A}{3}$$

$$R + A = \frac{8A}{3}$$

$$R = \frac{8A}{3} - A = \frac{5A}{3}$$

Now substitute values of R and J in equation (1):

$$R + A + J = \frac{1}{36}$$

$$\frac{5A}{3} + A + \frac{4A}{3} = \frac{1}{36}$$

\downarrow

$$5A + 3A + 4A = 1$$

How about Aman's time? — Explain Rakesh's rate?



$$R = \frac{1}{3} - A = \frac{1}{3}$$

Now substitute values of R and J in equation (1):

$$R + A + J = \frac{1}{36}$$

$$\frac{5A}{3} + A + \frac{4A}{3} = \frac{1}{36}$$

$$\frac{5A + 3A + 4A}{3} = \frac{1}{36}$$

$$\frac{12A}{3} = \frac{1}{36}$$

$$4A = \frac{1}{36}$$

$$A = \frac{1}{144}$$

Now, find J :

$$J = \frac{4A}{3} = \frac{4}{3} \times \frac{1}{144} = \frac{4}{432} = \frac{1}{108}$$

Therefore, Ajay can complete the work alone in 108 days

How about Aman's time? Explain Rakesh's rate?

So, Time taken by Ajay to do the whole work is 108 days

$$R = \frac{1}{3} - A = \frac{1}{3}$$

Now substitute values of R and J in equation (1):

$$R + A + J = \frac{1}{36}$$

$$\frac{5A}{3} + A + \frac{4A}{3} = \frac{1}{36}$$

$$\frac{5A + 3A + 4A}{3} = \frac{1}{36}$$

$$\frac{12A}{3} = \frac{1}{36}$$

$$4A = \frac{1}{36}$$

$$A = \frac{1}{144}$$

Now, find J :

$$J = \frac{4A}{3} = \frac{4}{3} \times \frac{1}{144} = \frac{4}{432} = \frac{1}{108}$$

Therefore, Ajay can complete the work alone in 108 days
↓
How about Aman's time? Explain Rakesh's rate?

So, Time taken by Ajay to do the whole work is 108 days.



Message Unacademy

Question 8/30

◀ Prev

Next ▶

If 9 runners consume 24 grams of protein, when each is working 8 hours a day, how much protein will be required for 8 runners, each running 13 hours a day, it being given that 3 runners of the former type consume as much as 4 runners of the latter type?

26 grams

23 grams

24 grams

25 grams

Explanation

To solve this question, we can apply a short trick approach:

If M_1 persons can do W_1 work in H_1 hours and M_2 persons can do W_2 work in H_2 hours, $M_1 T_1 W_1 = M_2 T_2 W_2$

Given:

~ 4 runners latter type = 3 runners former type

~ 8 runners latter type = 6 runners former type

$M_1 = 9, H_1 = 8 \text{ hours/day}, W_1 = 24 \text{ grams}$

$M_2 = 8, H_2 = 13 \text{ hours/day}, W_2 = x \text{ grams}$

Course Completion

Question 9/30

[◀ Prev](#) [Next ▶](#)

4 women and 4 children can complete the task of bunching the woods in 8 days and 20 days respectively, if the same task is completed by 2 women and 15 children working together, how long will it take to complete the task.

 5 days 6 days 4 days 4.5 days

Explanation

4 Women takes 8 days = 32 women days

4 Children takes 20 days = 80 children days

1 Women day = $80/32$ Children Day

≈ 2.5 Children Days

2 Women and 15 Children are working together

1 women = 2.5 child

2 women = 5 child

Thus $5 + 15$ Child = 20 Children are working

Course Completion

Pre-Introduction

12 hours | 43 minutes

2. Course Contents

Aptitude Basic

11 items | 39 mins

Number System

19 items | 6 hours 16 mins

Classic Banking

27 items | 606 min

Speed and Work

14 hours | 229 min

Speed Time & Distar

33 min

Practise Questions 1

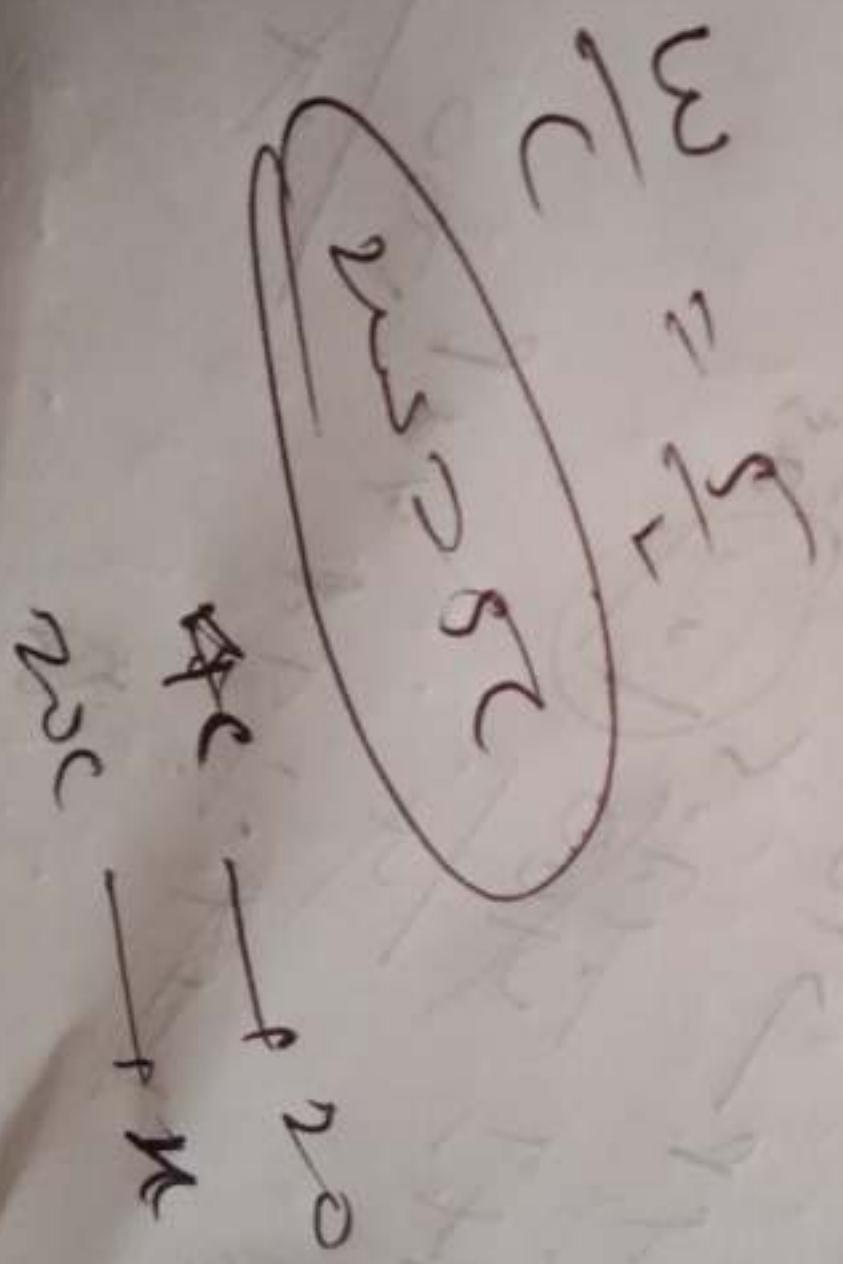
27 min

Practise Questions 2

30 min

Speed Time and Dist

10 min



$$\frac{40}{20} = \frac{8}{4}$$

A can do a bit of work in 10 days while B alone can do it in 15 days. They cooperate for 5 days and whatever remains of the work is finished by C in 2 days. On the off chance that they get Rs. 4500 for the entire work, by what means if they partition the cash?

Rs 1250, Rs 1200, Rs 550

Rs 2250, Rs 1500, Rs 750

Rs 1050, Rs 1500, Rs 750

Rs 650, Rs 700, Rs 500

Explanation

Explanation

$$(A+B)'s\ 5\ days\ work = 5(1/10 + 1/15) = (5 * 1/6) = 5/6$$

$$\text{Remaining work} = (1 - 5/6) = 1/6$$

$$C's\ 2\ days\ work = 1/6$$

(A's 5 day work), (B's 5 day work), (C's 2 days work)

$$= 5/10, 5/15, 1/6$$

$$= 15:10:5 = 3:2:1$$

$$A's\ offer = (4500 * 3/6) = \text{Rs. } 2250$$

Course Completion

Q Search



Pre-Introduct

12 items | 20 min

2. Course

Aptitude Ba

1 themes | 38 reso

Number Syst

10 themes | 18 reso

Classic Banki

22 themes | 608 reso

Speed and Wo

14 themes | 275 reso

Speed T

75 reso

Practise C

21 reso

Practise Q

30 reso

Speed Tim

10 reso

Time and Work Questions

Question 13/30

[◀ Prev](#)[Next ▶](#)

A job was assigned to Abhishek, Binay, and Cyrus. Now, to complete 40% of the task Abhishek takes 10 days and then he helps Binay and Cyrus. In how many days the assigned task will get complete. If the Binay is 50% productive as Abhishek is, and Cryus is 50% productive as Binay is?

 60/7 days 50/7 days 70/7 days 80/7 days

Explanation:

Let us assume Abhishek as A, Binay as B, and Cryus as C.

If A completes 40% task in 10 days, it means A completes 4% task in one day.

B is half (50%) as efficient as A, therefore B completes 2% task in one day.

C is half (50%) as efficient as B, therefore C completes 1% task in one day.

Course Completion

Q. 1/1



Time and Work Questions

70/7 days

80/7 days

Explanation

Let us assume Abhishek as A, Binay as B, and Cryus as C.

If A completes 40% task in 10 days, it means A completes 4% task in one day.

B is half (50%) as efficient as A, therefore B completes 2% task in one day.

C is half (50%) as efficient as B, therefore C completes 1% task in one day.

Together with A, B, and C complete 7% ($4+2+1$) tasks in one day.

As 40% of the task is getting completed by A.

The remaining task is 60% which will get completed in $60/7$ days.

Video solution:

Time and Work Questions

Question 17/30

◀ Prev Next ▶

A, b and c working together completed a job in 10 days. However, c only worked for the first three days when $\frac{37}{100}$ of the job was done. Also, the work done by a in 5 days is equal to the work done by b in 4 days. How many days would be required by the fastest worker to complete the entire work?

20 days

12 days

8 days

7 days

Explanation

Consider a, b, c be the efficiencies of workers A, B, C to complete the task respectively. Now given conditions, $3(a+b+c) = 37\%$...(1) Remaining work is $(100 - 37)\% = 63\%$. So, $7(a+b) = 63\%$ hence $a+b = \frac{63}{7} = 9\%$... (2) It is also given that $5a = 4b$... (3) Hence we can assume that $a = 4\%$, $b = 5\%$ hence the work a and b would do in 3 days is: $3 \times 9\% = 27\%$ of work in 3 days. Now putting values of a and b on equation (1) we get: Now to find out work done by C we do this: $(37\% - 27\%) / 3 = 3.33\%$ So Finally we get $a = 4\%$, $b = 5\%$, $c = 3.33\%$. Clearly B is the fastest among three. Number of days required for him to complete the job = $1/\text{efficiency} = 1/b = 1/5\% = 20 \text{ days}$. Fastest worker(B) will complete job in 20 days alone.

percentage

20 out of 50

20 of 50

percent
100

$$\frac{50}{100} = \frac{20}{x}$$

$$1 - \frac{20}{50}$$

$$100 - \frac{20}{50} \times 100$$

$$= \underline{\underline{40\%}}$$

MORE VIDEOS

$$\underbrace{\frac{3}{4}, \frac{5}{6}, \frac{1}{8}, \frac{1}{12}, \frac{1}{11}, \frac{1}{2}}$$

$$\cancel{25\% \text{ of } 100} \quad 6.25\%$$

$$\frac{1}{4} \frac{25}{100} \times 100 \quad 25\% \rightarrow \frac{1}{4} \text{ th} \quad \bigcirc \frac{1}{16}$$

$$25\% \text{ of } 600 \quad \cancel{\frac{1}{4} \times 600} \quad \bigcirc \frac{1}{16}$$

$$16.66 \cancel{\div 100} \quad \bigcirc \frac{1}{16}$$

77.5% } $\textcircled{200}$

65%

$100\% — 200$

$\frac{75\%}{50\%} \left\{ \begin{array}{l} 50\% — 100 \\ 25\% — 50 \end{array} \right.$

$\underline{2.5\% — 5}$

$77.5\% — 155$

Verified Percentages theory

Watch Later Share

$$77.5\% \text{ of } 200$$

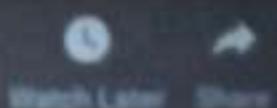
$$\begin{array}{r} 100\% = 200 \\ 50\% = 100 \\ 25\% = 50 \\ 2.5\% = 5 \\ \hline 77.5\% = 155 \end{array}$$

$$65\% \text{ of } 128$$

$$\begin{array}{r} 100\% \rightarrow 128 \\ 50\% \rightarrow 64 \\ 5\% \rightarrow 6.4 \\ 10\% \rightarrow 12.8 \\ \hline 83.2 \end{array}$$

MORE VIDEOS

Verified Percentages theory



$$57.65\% \text{ of } 5000 = 500\% \text{ of } 57.65$$

$$\frac{x}{100} \times y / \frac{y}{100} \times x = \frac{x}{100} \times x \quad \begin{array}{l} 100\% \text{ is } 57.65 \\ 1000\% \text{ is } (57.65) \times 5 \end{array}$$

$$= \frac{xy}{100}$$

$$= \frac{xy}{100}$$

MORE VIDEOS $y = y\% \text{ of } x$

Verified Percentages theory

Watch Later Share

$37.5\% \text{ of } 250$

$250\% \text{ of } 37.5$

$$\begin{array}{l} 100 - 37.5 \\ 200 - 75 \\ 50 / - 18.75 \\ \hline 93.75 \end{array}$$

MORE VIDEOS

Percentages

13:55 / 58:53

YouTube

MRP
Rs 100

Rs 100

Discount
5%
+ 10%

MORE VIDEOS

Percentages 58:53

Verified Percentages theory

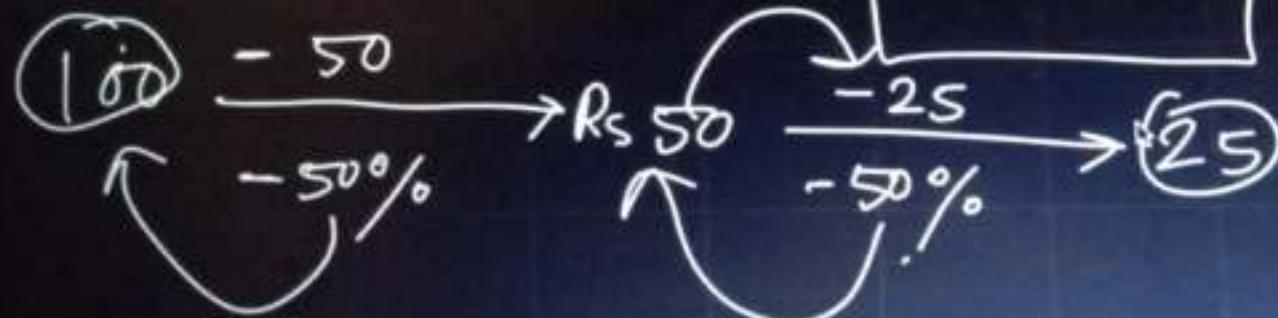


Watch Later

MRP

Rs 100

Rs ~~100~~



MORE VIDEOS

Q Verified Percentages theory

A's salary \rightarrow Rs 1000

Rate of 10% every month

1 → 1000

Q → 1100 ←

$$3 \rightarrow 1100 \quad | \quad 1100 + 110 \\ = 1210$$

[MORE VIDEOS](#)

If there are successive percentage increases of $a\%$ and $b\%$, the effective percentage increase is:

$$(\pm a) + (\pm b) + \frac{(\pm a)(\pm b)}{100}$$
$$(-50) + (-50) + \frac{(-50)(-50)}{100}$$
$$-100 + 50$$

MORE VIDEOS 75 %

Verified Percentages theory



..

If there are successive percentage increases of $a\%$ and $b\%$, the effective percentage increase is:

$$(\pm a) + (\pm b) + \frac{(\pm a)(\pm b)}{100}$$

$$\alpha = -70 \quad b = -50$$

$$(-70) + (-50) + \frac{(-70)(-50)}{100}$$

$$-100 + 50$$

more videos 75 %



Verified Percentages theory

Watch Later Share

If there are successive percentage increases of a % and b%, the effective percentage increase is:

$$(\pm a) + (\pm b) + \frac{(\pm a)(\pm b)}{100}$$

$a = -50$ $b = -50$

$$(-50) + (-50) + \frac{(+50)(+50)}{100}$$

$$-100 + 50$$

↳

MORE VIDEOS 75 %





If there are successive percentage increases of $a\%$ and $b\%$, the effective percentage increase is:

$$a + b + \frac{ab}{100}$$

$$a - b - \frac{ab}{100}$$

MORE VIDEOS

Percentages
2:56, 38:53



If the price of a commodity increases or decreases by R%, then the reduction in consumption so that the expenditure remains constant is .

$$\begin{array}{c} \text{For rice = Rs } 200/\text{month} \\ \text{Rs } 20/\text{kg} \leftarrow \text{Rice = Rs } 10/\text{kg} \rightarrow 5/\text{kg} \\ 10 \text{ kg.} \leftarrow \text{Consumption = } 20 \text{ kg.} \rightarrow 40 \text{ kg} \end{array}$$

If price increases by $R\%$, reduction in consumption
 $= \left(\frac{100}{100+R} \right) (100/100-R)$

MORE VIDEOS

Increased by $R\% \rightarrow$ 

If the price of a commodity increases or decreases by R%, then the reduction in consumption so that the expenditure remains constant is

For rice = Rs 200/month

$$\begin{array}{ccc} \text{Rs } 20/\text{kg} & \leftarrow & \text{Rice } = \text{Rs } 10/\text{kg} \rightarrow 5/\text{kg} \\ \underline{10 \text{ kg}} & \leftarrow & \underline{\text{Consume } = 20 \text{ kg}} \rightarrow 40 \text{ kg} \end{array}$$

If price increases by R%, reduction in consumption

$$= \left(\frac{100}{100+R} \right)$$

$$(100/100-R)$$

MORE VIDEOS

Decreased by R% →



If A is R% more than B, then B is less than A by

If A is R% less than B, then B is more than A by

$$\begin{aligned} A &\text{ is } \underline{\underline{20\%}} \text{ more than } B \\ 120 &\quad \leftarrow \frac{200\%}{100} \quad \downarrow \quad -\left(\frac{20}{100}\right) \times 100 \\ &\quad \left(\frac{20}{120}\right) \times 100\% = \end{aligned}$$

MORE VIDEOS

If A is R% more than B, then B is less than A by

vid:e5821903452

If A is R% less than B, then B is more than A by

$$80 \quad \xleftarrow{B\%} \quad 100$$

$$\frac{20}{80} \times 100\%$$

MORE VIDEOS



Watch Later Share

If A is R% more than B, then B is less than A by

→ If A is R% less than B, then B is more than A by

$$\frac{B - 100}{100} = \frac{-A + 120}{120}$$

$$\left[\frac{\frac{20}{100+20}}{100+20} \right] = \frac{R}{100+R}$$

$$\frac{R}{100-R}$$

MORE VIDEOS

Let the population of a town be P now and suppose it increases at the rate of $R\%$ per annum, then:

$$\text{Pop after } n \text{ years} = P \left(1 + \frac{R}{100}\right)^n$$

MORE VIDEOS



If the initial value of object is P. If it depreciated at a rate of r% per annum. How much the object worth after n years?

After n yrs = $P(1 - \frac{r}{100})^n$

MORE VIDEOS



Watch Later Share

If the initial value of object is P. If it depreciated at a rate of r% per annum. How much the object worth after n years?

After n yrs = $P\left(1 - \frac{r}{100}\right)^n$

MORE VIDEOS

Percentages

36:59 / 38:53

Verified Percentages theory

Watch Later Share

Deepak spends 25% of his salary on house rent, 20% of the rest he spends on his children's education and 10% of the total salary he spends on clothes. After his expenditure, he is left with Rs. 15,600. What is Deepak's salary?

- A. 30000
- C. 31200
- B. 32000
- D. 32500

Salary = Expenditure + Savings.

↓
100
100
10%
- 25
75
- 10
31200

100 - 50 Ex,
50 Savings

MORE VIDEOS



Watch Later Share

Verified Percentages theory

A person increased the length and the breadth of a rectangular land by 15% and 20% respectively. Find the percentage change in the cost of the land assuming land prices are uniform throughout his plot.

- A. 42%
- C. 30%
- B. 38%
- D. 45%

$$b = 100$$

$$a = 100$$

$$120$$

$$115$$

$$10000$$

$$13600$$

$$100$$

$$138\%$$

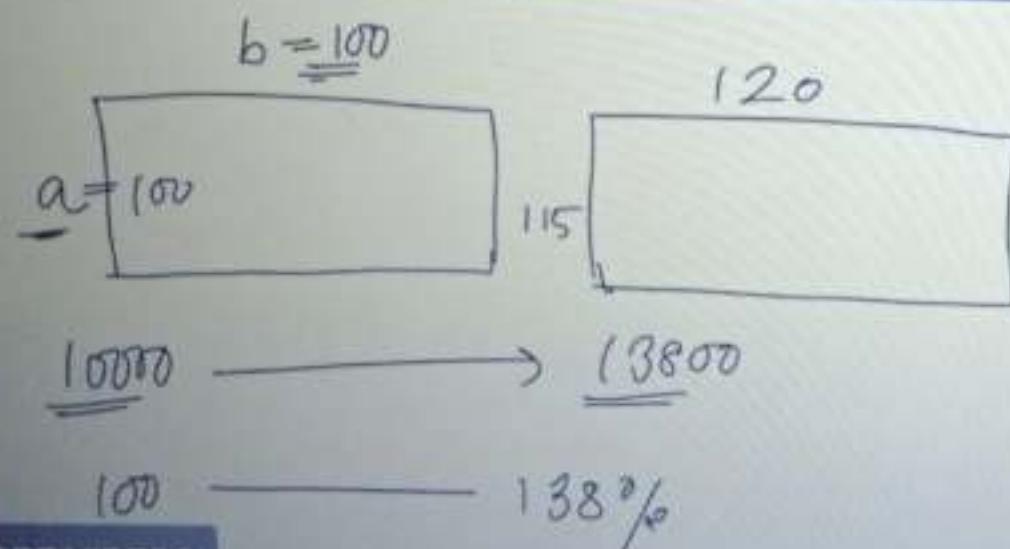
MORE VIDEOS

Verified Percentages theory

Watch Later Share

A person increased the length and the breadth of a rectangular land by 15% and 20% respectively. Find the percentage change in the cost of the land assuming land prices are uniform throughout his plot.

- A. 42%
- C. 30%
- B. 38%
- D. 45%



MORE VIDEOS

Verbalized Percentages theory

Watch Later Share

In an election contested by two parties, Party A secured 12 percentage of the total votes more than Party B. If party B got 13,200 votes and there are no invalid votes, by how many votes did it lose the election?

- A. 1600
- C. 2400
- B. 2500
- D. 3600

A $\underline{12\%}$ more than B

$$\begin{array}{rcl} \text{Total were } & 100 - 12 = 88 & \swarrow \\ \hline 88 & \cancel{50} & 44\% = 13200 \\ \hline 44 & 44 & 12\% = 3600 \\ \hline 12 & & 44\% \\ \hline 56\% & & \end{array}$$

MORE VIDEOS

✓ 10% of the voters did not cast their vote in an election between two candidates.
✓ 10% of the votes polled were found invalid. The successful candidate got 54% of
the valid votes and won by a majority of 3240 votes. The number of voters
enrolled on the voter list:

- A. 45000 C. 50000
B. 60000 D. 55000

✓ 54%.

$$TV \rightarrow 90\% \rightarrow$$

$$V \rightarrow 90\%$$

$$\hookrightarrow 54\% \left(90\% \text{ of } 90\% \right) - 46\% \left(90\% \text{ of } 90\% \right) \Rightarrow 3240$$

$$8\% \text{ of } 90\% \text{ of } 90\% x \Rightarrow 3240$$

$$\frac{8}{100} \times \frac{90}{100} \times \frac{90x}{100} x \Rightarrow \frac{3240 \times 100 \times 100}{8 \times 90 \times 90}$$

$$1 \rightarrow 50000$$

Averages

INTRODUCTION

$x_1, x_2, x_3, x_4, \dots, x_n$

$$\text{Avg} = \frac{x_1 + x_2 + x_3 + x_4 + \dots + x_n}{n}$$

$$\begin{aligned}\text{Avg} &= \frac{\text{Sum of all the items}}{\text{No of items}} \\ &= \frac{\Sigma n}{n}\end{aligned}$$

MORE VIDEOS



1:30 / 16:08

Averages

FACTS TO REMEMBER

10 numbers → by $\frac{1}{10}$

$$\text{Avg} = n + x$$

$$\begin{aligned} 10 &= D \\ \text{Avg} &= \left(\frac{D}{10} \right) \quad \text{Avg} \left(\frac{D + 10x}{10} \right) \\ &= \frac{D}{10} + x \end{aligned}$$

MORE VIDEOS

Averages

FACTS TO REMEMBER

10 numbers → by $\frac{1}{n}$

$$\text{Avg} = n + \frac{D}{10}$$

$$10 = D$$

$$\text{Avg} = \left(\frac{D}{10} \right) + n$$

MORE VIDEOS



3:52 / 16:08



Averages

FACTS TO REMEMBER

Decreasing by n

$$\text{avg} = \text{Avg} - n$$

Multiplying by n

$$\text{Avg} = \text{Avg} \times n$$

MORE VIDEOS



4:30 / 16:08



If the average age of a group of persons is x years today then after n years

$$\begin{aligned} \text{Avg} &= \underline{\underline{n}} + n \cdot \frac{\text{Sum of ages}}{N} \\ &= \frac{\text{Sum of ages}}{N} + \cancel{N} \times \underline{\underline{n}} \end{aligned}$$

Averages theory

Watch Later

Case 2

If the average age of a group of persons is x years today then n years ago

MORE VIDEOS



6:09 / 16:08

YouTube

Averages theory

Case 3

In case of an increase in average when a person joins the group¹⁺

Formula

Age of new member = Previous average + (Increase in average * Number of members including new member)

MORE VIDEOS

Averages theory

Case 4

In case of decrease in average when a person joins the group

Formula

Age of new member = Previous average - (Decrease in average * Number of members including new member)

Video ID: SEZ7903

MORE VIDEOS



6:54 / 16:08



Averages theory

Case 5

In case of increase in average, when a person left the group

Formula

Age of left member = Previous average - (increase in average * Number of remaining members)

uid #58239034

MORE VIDEOS



7:16 / 16:08



Case 5



In case of increase in average, when a person left the group



Formula



Age of left member = Previous average - (increase in average * Number of remaining members)

MORE VIDEOS



7:16 / 16:08

Case 6

In case of decrease in average when a person left the group

Formula

Age of left member = Previous average + (Decrease in average * Number of remaining members)

uid:#5821903

MORE VIDEOS



7:31 / 16:08



If the average is increased, when a person replaces another person then

Formula



Age of new person = Age of person who left + (Increase in average * total number of persons)



uid: #582190

MORE VIDEOS



7:46 / 16:08

If the average is decreased, when a person replaces another person then

Formula

Age of new person = Age of person who left - (Decrease in average * total number of persons)

The average of a batsman after 10 matches was 46 runs per innings. If after the 11th match his average increased by 2, then what was his score in the 11th match?

A. 65

C. 66

B. 68

D. 76

$$\begin{array}{r} 46 \times 10 = 460 \\ \hline 11 \times 48 = \end{array}$$

The average of a batsman after 10 matches was 46 runs per innings. If after the 11th match his average increased by 2, then what was his score in the 11th match?

- A. 65
- C. 66
- B. 68
- D. 76

$$46 \times 10 = 460$$
$$\underline{11 \times 48} = \swarrow$$

EOS

9:24 / 16:08

$$\begin{array}{r} \downarrow \\ \rightarrow \underline{46} \quad \underline{46} \quad \underline{46} : \dots \quad 46 \leftarrow \\ \hline 48 \quad 48 \quad 48 \quad - \quad - \end{array}$$

$$\textcircled{1} \rightarrow \underline{\underline{4}}8 + (\underline{\underline{2}} + \underline{\underline{2}} + \underline{\underline{2}} \cdots \underline{\underline{10}}) \quad \underline{\underline{48}}$$

Averages

CONSECUTIVE NUMBERS

97, 99, 101, 103, 105, ..., 111

$$\frac{97 + 111}{2}$$

1st term + last term
2

uid:#5821903452

MORE VIDEOS



11:46 / 16:08

Averages

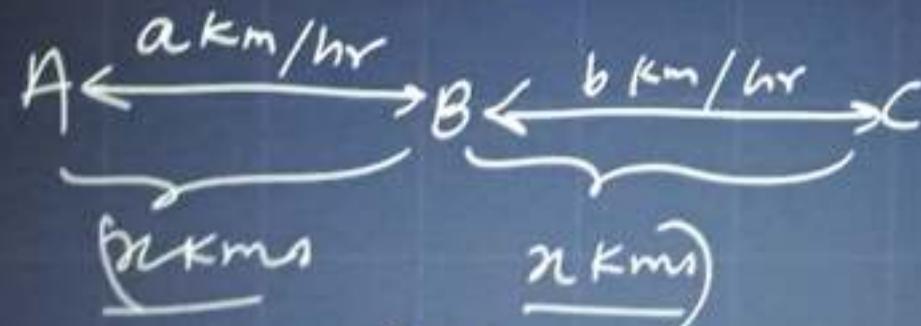
AVERAGE SPEED

①

$$\frac{a \text{ km/hr}}{x \text{ min}} \quad | \quad \frac{b \text{ km/hr}}{x \text{ min}}$$

$$\text{Avg Speed} = \frac{a+b}{2}$$

②



MORE VIDEOS

$$\text{Avg speed} = \frac{2ab}{a+b}$$



Averages

WEIGHTED AVERAGE



$$\text{Weighted Avg} = \frac{n_1 x_1 + n_2 x_2 + \dots + n_n x_n}{n_1 + n_2 + \dots + n_n}$$

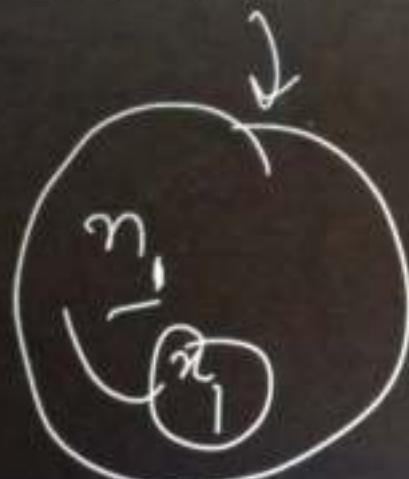
Above the equation, the term "Avg" is written next to a circled "Sum" divided by "n".



MORE VIDEOS

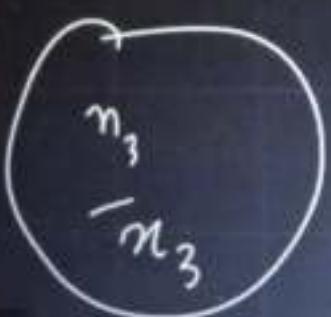
Averages

WEIGHTED AVERAGE



$$\text{Weighted Avg} = \frac{n_1 x_1 + n_2 x_2 + \dots + n_n x_n}{n_1 + n_2 + \dots + n_n}$$

$$\text{Avg} = \frac{\text{Sum}}{n}$$



MORE VIDEOS

The average of the marks obtained in an examination by 16 students was 49 and by 18 other students was 66. The average marks of all students was :

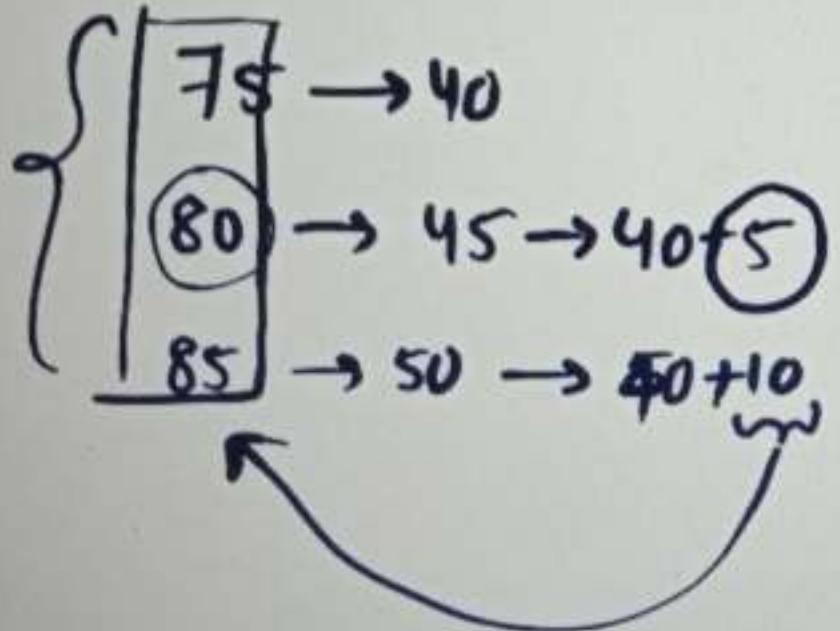
- A. 60
- C. 56
- B. 58
- D. 54

$$\text{Avg} = 49 + \frac{17 \times 18}{34}$$

$$\text{Avg } x, y \Rightarrow \frac{ax+by}{a+b}$$

$$= 56 \frac{1}{2}$$

Avg :-



$$= 40 + \frac{80 \times 5}{240} + \frac{10 \times 85}{240}$$

$$= 40 + 1.66 + 3.54$$

$$= \underline{\underline{45.2}}$$

The average temperature for Monday, Tuesday, Wednesday and Thursday was 24° . The average temperature for Tuesday, Wednesday, Thursday and Friday was 12° . If the temperature on Monday was 28° , then the temperature on Friday was (in degrees)

A. -25° C. -22°

B. -20° D. -18°

$$\cancel{M} + \cancel{T} + \cancel{W} + \cancel{Th} = 24 \times 4$$

$$\cancel{T} + \cancel{W} + \cancel{Th} + \cancel{F} = 12 \times 4$$

$$\underline{\underline{m = 28^\circ}}$$

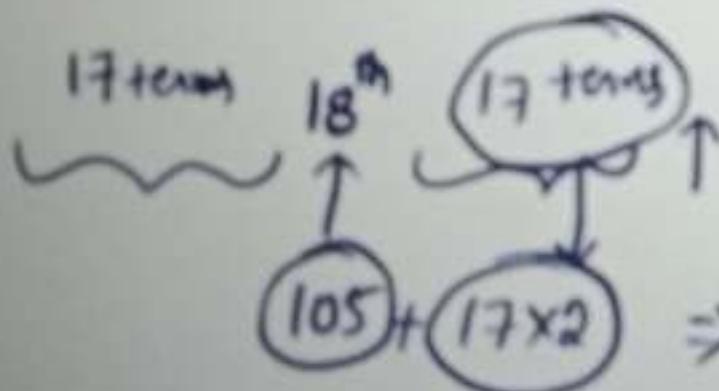
$$M - F = 4(12)$$

$$M - F = 48 \Rightarrow 28 - F = 48 \Rightarrow \boxed{F = -20^\circ}$$

The average of 35 consecutive odd integers is 105. The highest of these integers is

- A. 141
- C. 175
- B. 139
- D. 173

Conse $\xrightarrow{\text{avg}}$ middle



$$105 + 34 = 139 - \underline{35^{\text{th}} \text{ term}}$$

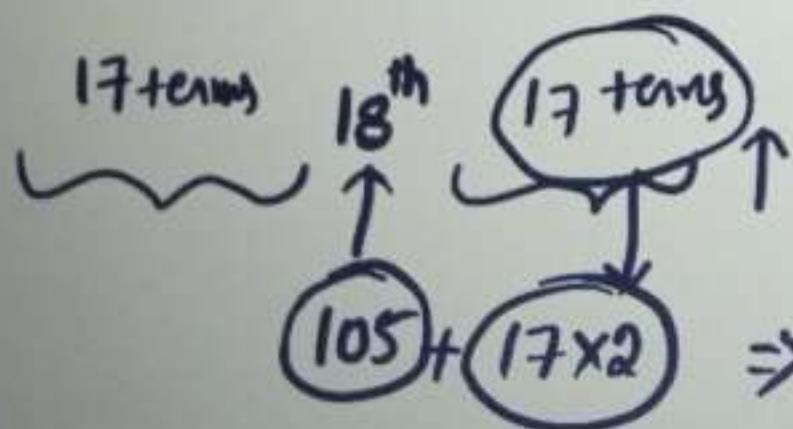
$$\frac{35+1}{2} = \text{middle}$$

(18)

The average of 35 consecutive odd integers is 105. The highest of these integers is

- A. 141 C. 175
B. 139 D. 173

Conse $\xrightarrow{\text{avg}}$ middle



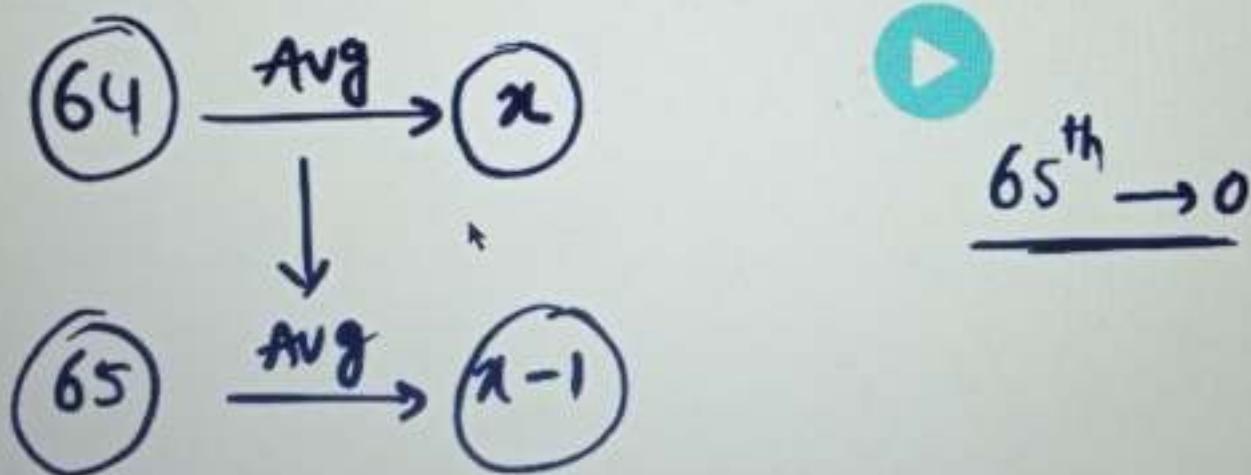
$$\frac{35+1}{2} = \text{middle}$$

(18)

$$105 + 34 = 139 - \underline{\text{35th term}}$$

A cricketer had a certain average of runs for his 64 innings. In his 65th innings, he is bowled out for no score on his part. This brings down his average by 1 runs. His new average of runs is

- A. 128
- C. 64
- B. 63
- D. 65



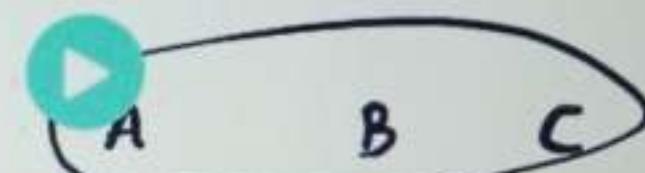
$$64x = 65(x-1)$$

$$64x = 65x - 65 \Rightarrow x = 65$$

The average weight of 40 men of a office is 36.2 kg. When three more men with weight 42.3 kg, 39.7 kg and 39.5 kg join the office, the average weight of the 43 men in the office is

- A. 39.2 kg
- C. 37.5 kg
- B. 36.5 kg
- D. 37 kg

$$\Rightarrow 40 \longrightarrow 36.2 \text{ kg}$$



$$\begin{array}{ccc} 42.3 & 39.7 & 39.5 \\ \downarrow & \downarrow & \downarrow \\ 36.2 & 36.2 & 36.2 \end{array}$$

$$43 \longrightarrow 36.2 \text{ kg}$$

$$+6.1 \quad +3.5 \quad +3.3$$

$$36.2 + \frac{0.3 + 2.9}{43} = 36.2 + 0.3 = 36.5 \text{ kg}$$

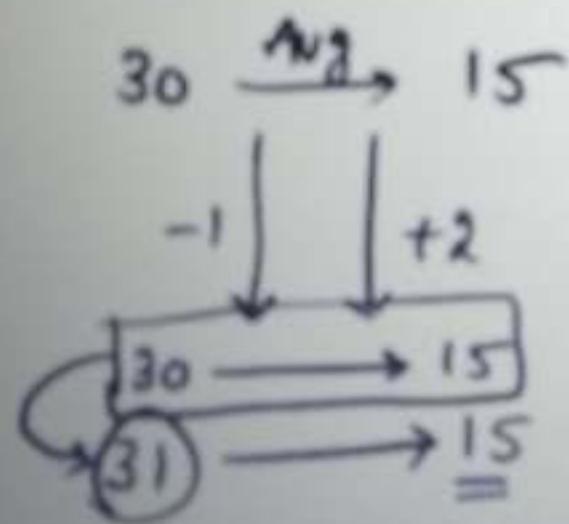
The average age of 30 boys in a class is 15 years. One boy aged 20 years, left the class, but two new boys came in his place whose ages differ by 5 years. If the average age of all the boys now in the class still remains 15 years, the age of the younger newcomer is :

A. 20 years

20 years

B. 10 years

D. 8 years



Left = 20

Joined B = 20+15

$A + B = 35$

B = 15

$A - B = 5$

A = 20

20 - 15 = 5

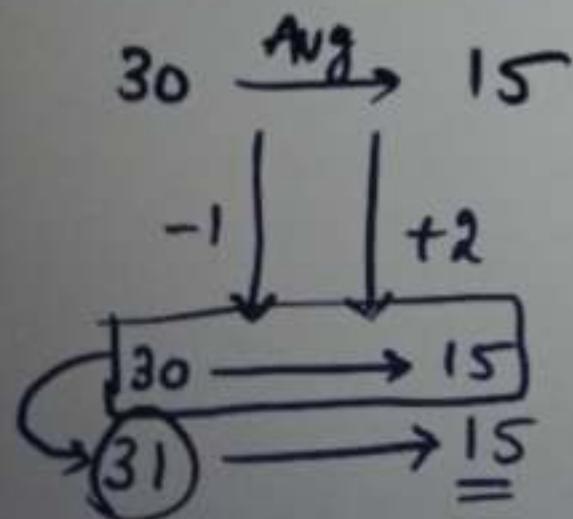
The average age of 30 boys in a class is 15 years. One boy aged 20 years, left the class, but two new boys came in his place whose ages differ by 5 years. If the average age of all the boys now in the class still remains 15 years, the age of the younger newcomer is :

A. 20 years

~~15 years~~

B. 10 years

D. 8 years



$$\text{Left} = 20$$

$$\text{Joined B} = 20 + 15$$

$$A + \beta = 35$$

$$\beta = 15$$

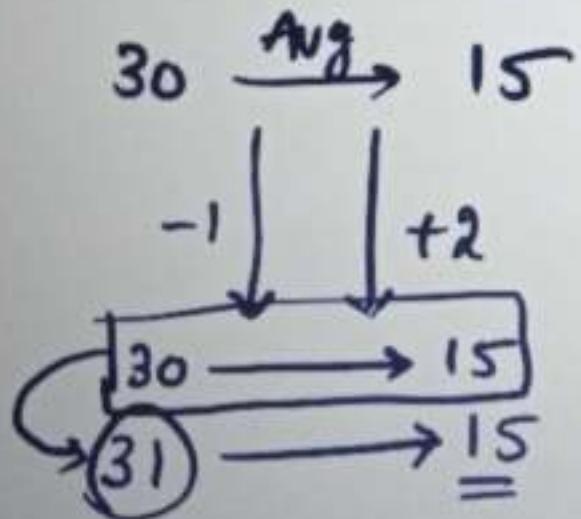
$$A - \beta = +5$$

$$A = 20$$

$$2 \times 15 = 30$$

The average age of 30 boys in a class is 15 years. One boy aged 20 years, left the class, but two new boys came in his place whose ages differ by 5 years. If the average age of all the boys now in the class still remains 15 years, the age of the younger newcomer is :

- A. 20 years ~~15 years~~
- B. 10 years
- C. 15 years
- D. 8 years



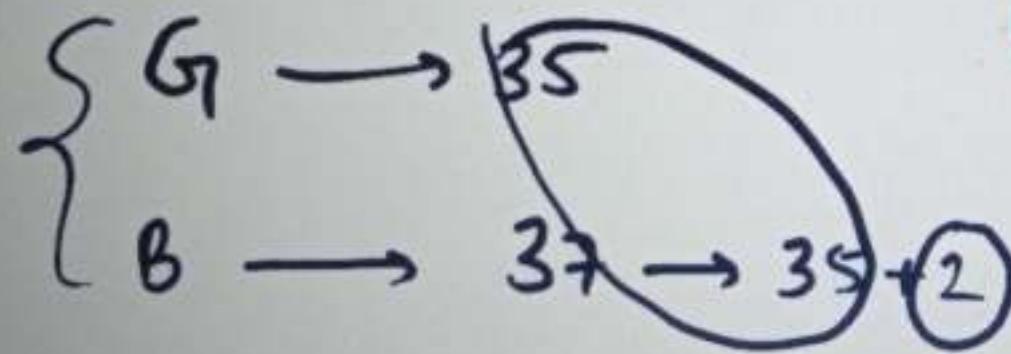
Left = 20
 Joined B = $20 + 15$

$$A + B = 35 \quad B = 15$$

$$\begin{aligned} A - B &= 5 \\ A &= 20 \end{aligned}$$

In an examination average marks obtained by the girls of a class is 35 and the average marks obtained by the boys of the same class is 37. If the girls and boys are in the ratio 4 : 5, average marks of the whole class (approximately) is closest to

- A. 36.75
- C. 37.5
- ~~B. 36.1~~
- D. 36.5



$$G:B = 4:5$$

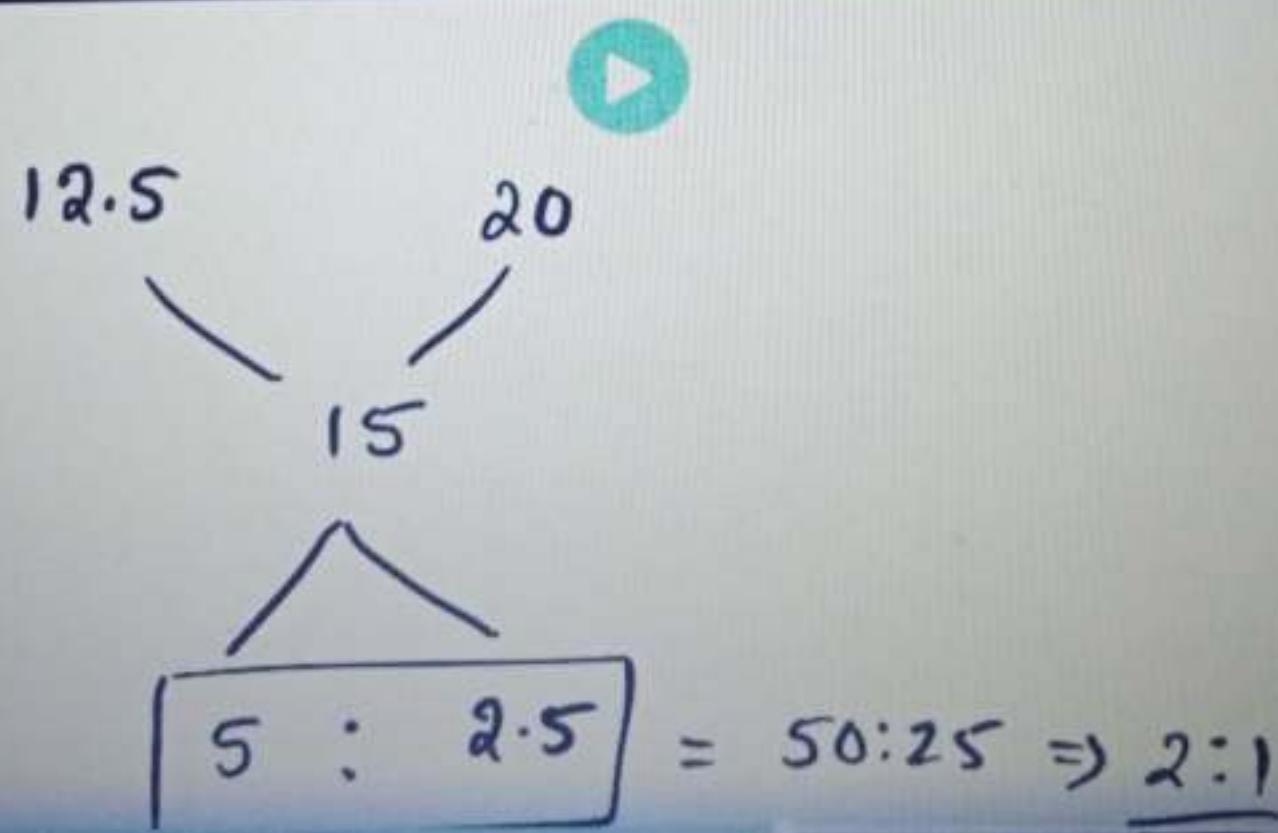
$$35 + \frac{2 \times 5}{9} = 36.11$$

$$\Rightarrow 35 + 1.11 = \underline{\underline{36.1}}$$

On mixing two classes A and B of students having average marks 12.5 and 20 respectively, the overall average obtained is 15. Find the ratio of the students in the classes A and B.

- A. 2:1
- C. 5:6
- B. 5:8
- D. 3:4

Alligation



Ratio

- A process of comparing values
- How small a number is from the other

$$A = 10$$

$$B = 20$$

$$A:B = 10:20$$

If $A = 1$, then $B = 2$

Antecedent

Consequent



Case 1

If, $xA = yB = zC$ then $A : B : C = ?$

$xA = yB = zC = k$ (Let's assume)

$$A = \frac{k}{x} \quad B = \frac{k}{y} \quad C = \frac{k}{z}$$

$$A : B : C = \frac{k}{x} : \frac{k}{y} : \frac{k}{z} = \frac{1}{x} : \frac{1}{y} : \frac{1}{z}$$



Case 2



If, $A/x = B/y = C/z$ then $A : B : C = ?$

$$\frac{A}{x} = \frac{B}{y} = \frac{C}{z} = K \text{ (Let's assume)}$$

$$A = xK \quad B = yK \quad C = zK$$

$$A : B : C = xK : yK : zK = x : y : z$$

Case 4

If the ratio between two numbers is A : B and x is added to both of them then the ratio becomes C : D. Find the numbers

$$\frac{A \times (C - D)}{AD - BC}$$

$$\frac{B \times (C - D)}{AD - BC}$$

Case 5



If the ratio between two numbers is A : B , then what is the number that has to be added to both to make their ratio C : D

$$\frac{AD - BC}{C - D}$$



uid #5B21903452



Case 6



The incomes of two persons are in the ratio of A : B and their expenditures are in the ratio C : D. Savings of each one of them is N. Find their incomes.

Income are in the ratio of A : B

Expenditures are in the ratio of C : D

Savings = N

Their incomes are -
$$\frac{A N (D - C)}{AD - BC} \quad \frac{B N (D - C)}{AD - BC}$$

x, y $x:y$

$$x+y = 45 \rightarrow ①$$

$$x-y = 11 \rightarrow ②$$

$$\begin{array}{l} \textcircled{1} \quad 2x = 56 \quad \frac{2x}{2y} = \frac{56}{34} \overset{28}{17} \\ \textcircled{2} \quad 2y = 34 \end{array}$$

 $S+P : S-P$

$$45+11 : 45-11$$

$$56 : 34$$

$$28 : 17$$

Ratio and proportions

The incomes of two persons are in the ratio of A : B and their expenditures are in the ratio C : D. Savings of each one of them is N. Find their incomes. Find their expenditures as well.

Their incomes are - $\frac{A N (D + C)}{AD - BC}$ $\frac{B N (D - C)}{AD - BC}$

Their expenditures are - $\frac{C N (B - A)}{AD - BC}$ $\frac{D N (B - A)}{AD - BC}$

Combined Ratio

$$A:B = 2:3 \quad } \times 2 = 4:6$$

$$B:C = 2:6 \quad } \times 3 = 6:12$$

$$A:B:C = 4:6:12$$

What is a Mean Price?



The cost of a unit quantity of a mixture is called the mean price

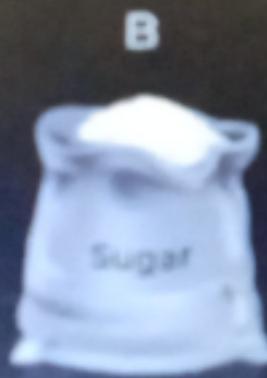


What is a Mean Price?

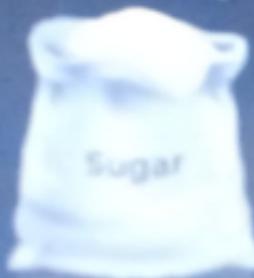
The cost of a unit quantity of a mixture is called the mean price



Weight - 10 Kg
Price - Rs 10 / Kg
Cheaper



Weight - 14 Kg
Price - Rs 13 / Kg
Costlier / Dearer



Weight - 24 Kg
Mean price -

What is a Mean Price?



The cost of a unit quantity of a mixture is called the mean price

A



Weight - 10 Kg

Price - Rs 10 / Kg

Cheaper

B



Weight - 14 Kg

Price - Rs 13 / Kg

Costlier / Dearer



Weight - 24 Kg

Mean price -





C - Cost of cheaper quantity

D - Cost of dearer quantity

$$\frac{Q_d}{Q_c} = \frac{D - M}{M - C} \rightarrow \frac{10}{14} = \frac{13 - M}{M - 10}$$



Weight - 10 Kg
Price - Rs 10 / Kg
Cheaper



Weight - 14 Kg
Price - Rs 13 / Kg
Costlier / Dearer



Weight - 24 Kg
Mean price -

C

- Cost of cheaper quantity

D - M

M

D

- Cost of dearer quantity

M - C

C

- Cost of cheaper quantity

D

- Cost of dearer quantity

$$\frac{Q_c}{Q_d} = \frac{D - M}{M - C} \rightarrow \frac{10}{14} = \frac{13 - M}{M - 10}$$

A



Weight - 10 Kg
Price - Rs 10 / Kg
Cheaper

B



Weight - 14 Kg
Price - Rs 13 / Kg
Costlier / Dearer



Weight - 24 Kg
Mean price -

Two varieties of rice at Rs. 100 per kg and Rs. 120 per kg are mixed together in the ratio 3 : 2. Find the average price of the resulting mixture.

A. Rs. 110 per kg

C. Rs. 108 per kg

B. Rs. 90 per kg

D. Rs. 105 per kg

$$c = \text{Rs } 100$$

$$d = 120$$

$$m = ?$$

$$\varrho_c : \varrho_d = 3 : 2$$

$$100$$

$$120$$

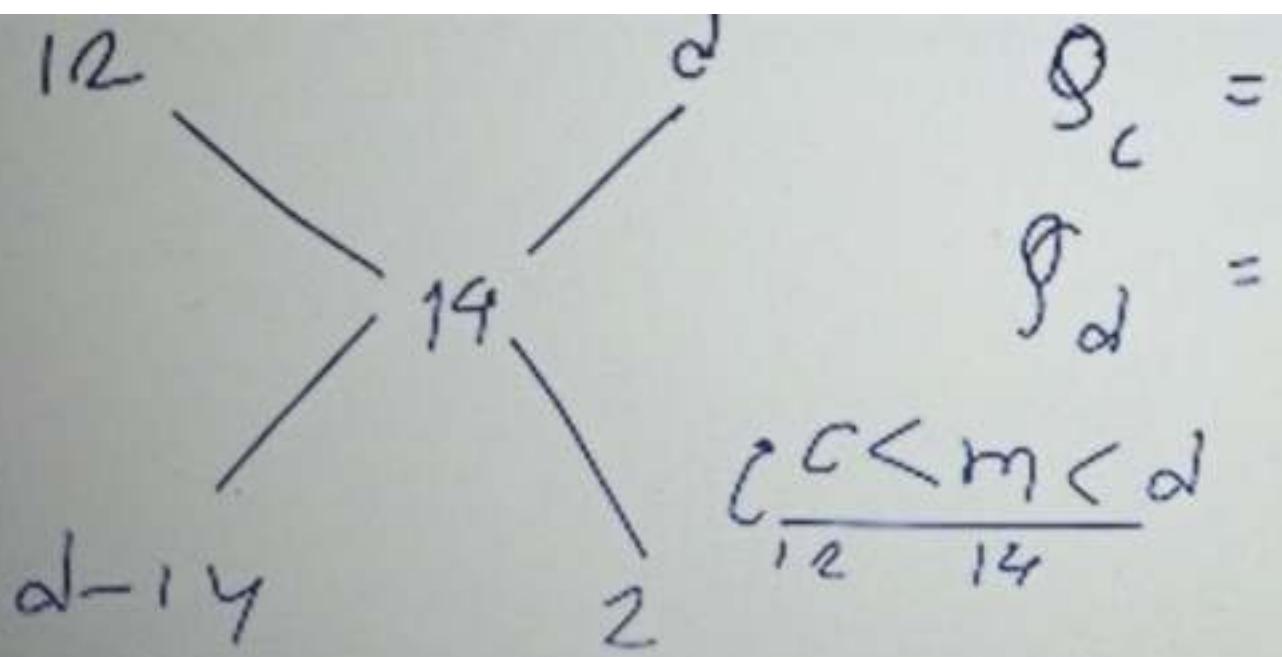
$$\frac{\varrho_c}{\varrho_d} = \frac{d-m}{m-c}$$

$$m$$

$$120 - m$$

$$m - 100$$

$$\left[\frac{3}{2} = \frac{120 - m}{m - 100} \right]$$



$$\frac{\varphi_c}{\varphi_d} = \frac{d-14}{2} = \frac{10}{84} \Rightarrow 4d - 56 = 10 \\ \Rightarrow 4d = 66 \Rightarrow d = 16.$$

10 kg of rice at Rs. 12 per kg is mixed with 8 kg of rice to get a mixture costing Rs. 14 per kg. Find the price of the costlier rice

- A. Rs. 18 per kg
- C. Rs. 16 per kg
- B. Rs. 16.5 per kg
- D. Rs. 20 per kg

$$\begin{array}{ccccc} 12 & & d & = & \varnothing_c = \\ & \searrow & \swarrow & & \varnothing_d = \\ & 14 & & & \\ & \swarrow & \searrow & & \\ d-14 & & 2 & & c < m < d \\ & & & & \frac{12}{14} \quad \frac{14}{14} \end{array}$$
$$\frac{\varnothing_c}{\varnothing_d} = \frac{d-14}{2} = \frac{10}{2} \Rightarrow 4d - 56 = 10$$
$$\Rightarrow 4d = 66 \Rightarrow d = 16.5 \text{/kg}$$

Mixtures and Alligations

Case 1

• •

A girl buys 80 Kg of chocolate powder at Rs. 10 / Kg and 120 kg of chocolate powder at 15 / Kg. Find out the average cost price.



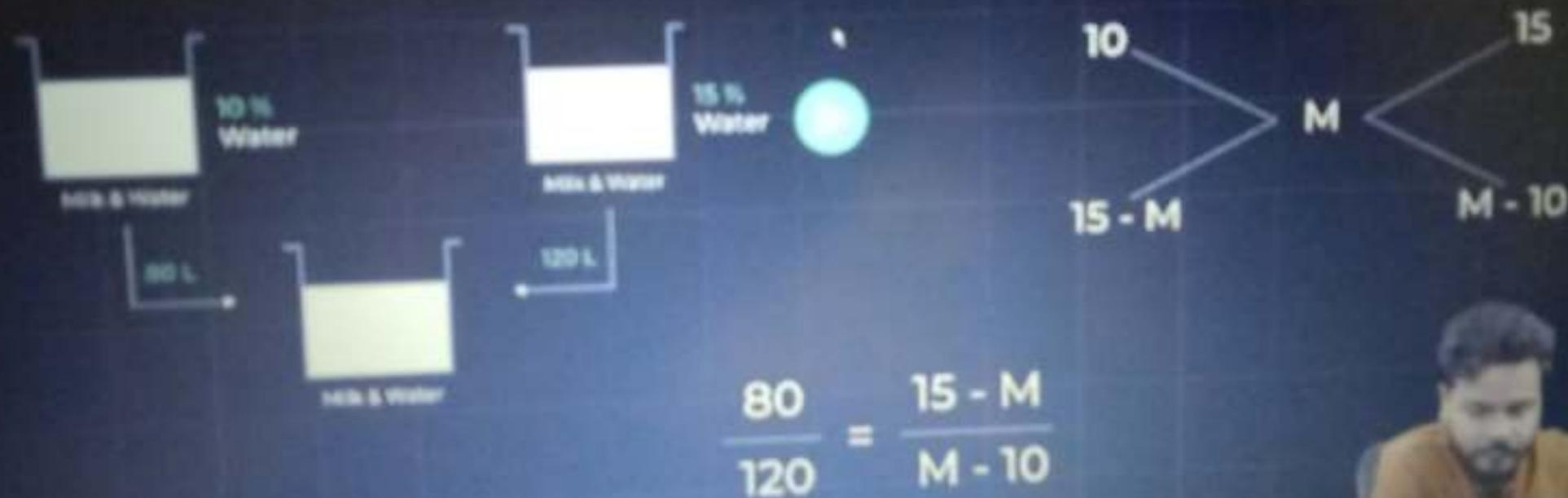
$$\frac{80}{120} = \frac{15 - M}{M - 10}$$



Case 2



Monika mixes two mixtures of milk and water. She mixes 80 litres of the first containing 10 % water and 120 litres of the second containing 15 % water. Find the percentage of water in the final mixture.



Case 2

Monika mixes two mixtures of milk and water. She mixes 80 litres of the first containing 10 % water and 120 litres of the second containing 15 % water. Find the percentage of water in the final mixture.



$$\frac{80}{120} = \frac{15 - M}{M - 10}$$



Case 3



The first group having 80 interns scored an average of 10 marks on a test, while the other group having 120 interns scored an average marks of 15 in the same test. Two groups are combined to form a larger group. What was the average score of the combined group on the test.



$$\frac{80}{120} = \frac{15 - M}{M - 10}$$



Case 4



A shopkeeper earns a profit of 10 % on 60 % of his grocery sold while he earns a profit of 15 % on 40 % of his goods sold. Find her percentage profit on the whole.

$$\frac{60}{40} = \frac{15 - M}{M - 10}$$

tions



Case 5



A bike travels at 10 Km/h for 80 minutes and 15 Km/h for 120 minutes. Find the average speed of the bike for the whole journey.

Alligations



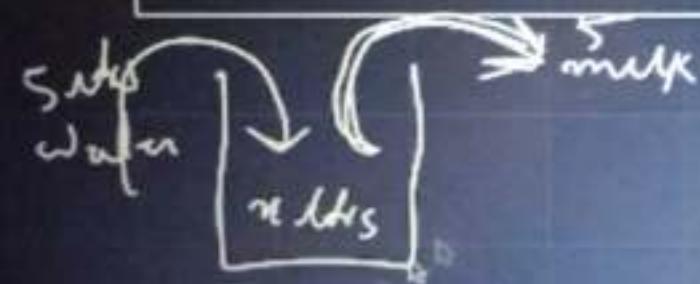
Replacement Based

Suppose a container contains x units of pure liquid from which y units are taken out and replaced with water , then

Q342

Formula

After n operations, the Quantity of pure Liquid = $x(1 - y/x)^n$



Mixtures and Alligations

A bottle has a capacity of 20 liters and is full of milk. 4 liters of milk are drawn out and the bottle is again filled with water. This process is repeated 5 times. Find out how much milk is left in the resulting mixture finally?

- A. $\frac{4096}{625}$ liters
- C. $\frac{3346}{625}$ liters
- B. $\frac{3346}{3125}$ liters
- D. $\frac{4096}{3125}$ liters

$$x(1 - \frac{y}{x})^n$$

$$\begin{aligned}x &= 20 \\y &= 4\end{aligned}$$

$$n = 5$$

$$20 \left(1 - \frac{4}{20}\right)^5$$

Two equal capacity bottles are full of a mixture of milk and water. In the first, the ratio of milk to water is 2 : 5 and in the second it is 3 : 11. Now both the mixtures are mixed in a bigger container. What is the resulting ratio of milk to water?

A. 1:1

C. 1:3

B. 3:1

D. 1:2

$$\begin{array}{|c|} \hline M:W \\ \hline 2:5 \\ \hline \end{array}$$

$$\begin{array}{|c|} \hline M:W \\ \hline 3:11 \\ \hline \end{array}$$

$$\frac{7}{14}, \frac{21}{14}$$



Equal

Equal

$$7:21$$

$$\frac{2}{7}, \frac{5}{7}$$

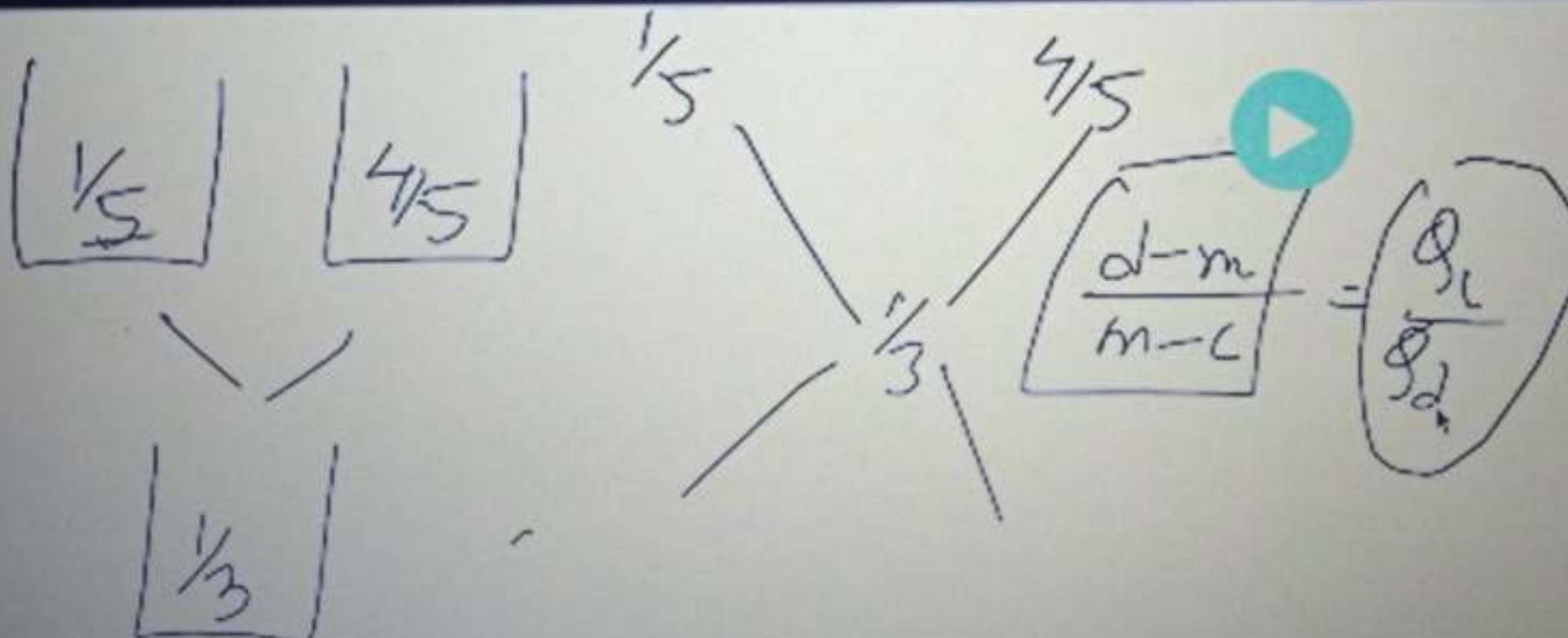
$$\frac{3}{14}, \frac{11}{14}$$

$$(1:3)$$

$$\frac{4}{14}, \frac{10}{14}$$

Two tanks contain spirit and water mixed respectively in the ratio of 1:4 and 4:1
Find the ratio in which these are to be mixed to get a new mixture in which the
ratio of spirit to water is 1:2?

- A. 1:1
- C. 7:2
- B. 2:7
- D. 3:4



A mixture of some quantity of juice with 8 litres of water is worth 90 paise per litre. If pure Juice be worth Rs 1.08 per litre, how much juice is there in the mixture.

A. 60 ltrs

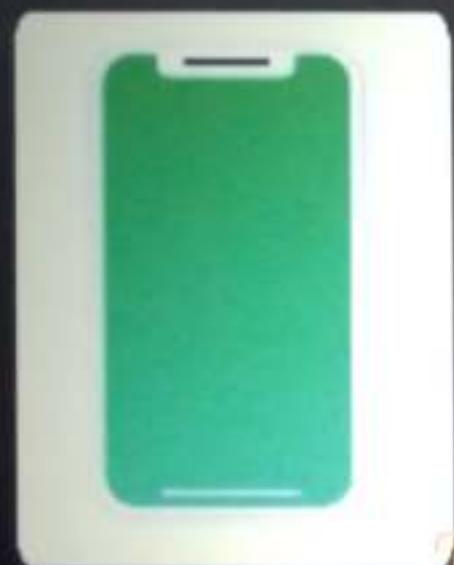
C. 75 ltrs

B. 40 ltrs

D. 88 ltrs

$$\begin{array}{ccccc} & 1.08 & 90 & 1.08 & \\ & \swarrow & \downarrow & \searrow & \\ 1.08 & & 90 & & \\ \hline & 18 & & 90 & \\ & & & & \\ & & & \frac{90 - 18}{1.08 - 90} = \frac{72}{-82} = \frac{36}{41} & \\ & & & 36 : 41 & \\ & & & 40 \text{ ltrs} & \end{array}$$

Profit & Loss



100



120

Cost Price (CP) = 100

Selling Price (SP) = 120

SP > CP

Gain = SP - CP

Profit



Profit & Loss

Gain = SP - CP



Cost Price (CP) = 100

Selling Price (SP) = 80

SP < CP

Loss = CP - SP

Loss



Profit & Loss

Gain = SP - CP

Loss = CP - SP

$$\text{Gain \%} = \frac{\text{SP} - \text{CP}}{\text{CP}} \times 100 \%$$

$$\text{Loss \%} = \frac{\text{CP} - \text{SP}}{\text{CP}} \times 100 \%$$

Profit & Loss

Case 1

..

If there is a profit/gain in a transaction.

CP = Rs. 100

Profit = 20% = Rs. 20

SP = Profit + CP = Rs. 120

SP = Rs. 120



Profit & Loss

Case 1

...

If there is a profit/gain in a transaction.

$$CP = \text{Rs. } 100$$

$$\text{Profit} = 20\% = \text{Rs. } 20$$

$$SP = \text{Profit} + CP = \text{Rs. } 120$$

$$SP = \text{Rs. } 120$$

$$\text{Profit} = 20\% = 20/100 \times CP$$

$$SP = \text{Profit} + CP$$

$$SP = (20/100 \times CP) + CP = 120$$

Profit & Loss

Case 1

..

If there is a profit/gain in a transaction.

$$CP = \text{Rs. } 100$$

$$\text{Profit} = 20\% = \text{Rs. } 20$$

$$SP = \text{Profit} + CP = \text{Rs. } 120$$

$$SP = \text{Rs. } 120$$

$$\text{Profit} = 20\% = 20/100 * CP$$

$$SP = \text{Profit} + CP$$

$$SP = (20/100 * CP) + CP = 120$$

$$SP = \frac{(100 + \text{Profit}\%)}{100} \times CP$$

$$CP = \frac{100}{(100 + \text{Profit}\%)} \times SP$$

Profit & Loss

Case 1

If there is a profit/gain in a transaction.

$$CP = \text{Rs. } 100$$

$$\text{Profit} = 20\% = \text{Rs. } 20$$

$$SP = \text{Profit} + CP = \text{Rs. } 120$$

$$SP = \text{Rs. } 120$$

$$\text{Profit} = 20\% = 20/100 \times CP$$

$$SP = \text{Profit} + CP$$

$$SP = (20/100 \times CP) + CP = 120$$

$$SP = \frac{(100 + \text{Profit}\%)}{100} \times CP$$

$$CP = \frac{100}{(100 + \text{Profit}\%)} \times SP$$



Profit & Loss

Case 2

If there is a loss in a transaction.

$$SP = \frac{(100 - \text{Loss}\%)}{100} \times CP$$

SP < CP

$$CP = \frac{100}{(100 - \text{Loss}\%)} \times SP$$



Profit & Loss

Case 3

When a seller sells two similar items one a% gain and another at same a% loss, the seller always incurs a loss in the deal which is given by

$$CP = 100$$

$$\text{Profit} = 5\%$$

$$SP = 105$$

$$CP = 100$$

$$\text{Loss} = 10\%$$

$$SP = 90$$

$$\text{Total Loss\%} = \frac{\text{Loss\%} * \text{Profit\%}}{100} \%$$

$$\text{Total CP} = 100 + 100 = 200$$

$$\text{Total SP} = 105 + 90 = 195$$



Profit & Loss

Some Quicker Methods

If there are two successive profits of X% and Y% in a transaction, the resultant profit is given by

$$CP = 100$$

$$\text{Profit } X = 10\%$$

$$\text{Profit } Y = 5\%$$

~~$$\text{Total profit} = 10\% + 5\% = 15\%$$~~



$$\text{Total Gain\%} = X + Y + \frac{XY}{100}$$

$$100 \overset{+10}{=} 50 \overset{+5}{=} 25$$

$$\text{Total Gain\%} = 10 + 5 + ((10 * 5) / 100) = 15.5\%$$



Profit & Loss

Some Quicker Methods

If there is a profit of X% and loss of Y% in a transaction, the resultant profit or loss is given by

$$\text{Total Gain\% or Loss \%} = X - Y - \frac{XY}{100}$$

= +ve = Profit

= -ve = Loss



Profit & Loss

Some Quicker Methods

A seller sells a product at X% Profit. If he sells it for Rs Y more, his profit would be Z%. In this case Cost Price is given by

$$CP = 100$$

$$SP = A$$

$$\text{Profit} = X\%$$

$$SP = A + Y$$

$$\text{Profit} = Z\%$$

$$CP = \frac{\text{More Gain} * 100}{\text{Difference in Profit\%}} = \frac{Y * 100}{Z - X}$$



Profit & Loss

Some Quicker Methods

...

If the cost price of A articles is equal to the selling price of B articles, the profit% or loss% is given by

10 Items' CP = Rs. 100

8 Items' SP = Rs. 100

$$\text{Total Gain\% or Loss \%} = \frac{A - B}{B} * 100\%$$

$$\frac{10 - 8}{8} * 100 = 25\% \text{ Profit}$$



A shopkeeper sold two smart phones at Rs. 4560 each. On selling first one he got a profit of 20% and on selling the second one he got a loss of 30%. What is the overall profit or loss percentage in the transaction?

- A. 11.5%
- C. 9.09%
- B. 12.5%**
- D. 6%

$$\begin{array}{c} \text{C.P} \quad \text{S.P} \quad \text{P} \\ [5 \quad 6 \quad 1] \times 7 \end{array}$$

$$= \frac{+7 - 18}{95}$$

$$\begin{array}{c} \text{C.P} \quad \text{S.P} \quad \text{L} \\ [10 \quad 7 \quad -3] \times 6 \end{array}$$

$$= \underline{\underline{60}} \quad \underline{\underline{42}} \quad -18$$

$$= \frac{-11}{95} \times 100\% = \frac{1100}{95}\%$$

$$\begin{array}{c} 100 \rightarrow 120 \\ 5 \quad 6 \\ 100 - \frac{120}{20} - \frac{20}{20} \\ 20 \quad 20 \\ 5 - 6 - 1 \\ \hline 100 \quad 70 \rightarrow 30 \\ 10 \quad 7 \quad -3 \end{array}$$



Case



After selling an article for Rs. A. The numerical value of profit or loss is equal to the cost price, then the cost price of article is:

$$CP = RSN$$

$$P = X\%$$

$$\frac{X}{100} n + n = A$$

$$\frac{X}{100} + 1 = \frac{A}{n}$$



After selling an article for Rs. 56. The numerical value of profit is equal to the cost price, then the cost price of article is:

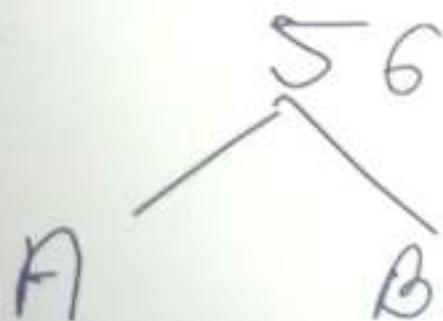
A. 46

C. 40

B. 44

D. 39

SP



$$\begin{array}{l} \textcircled{1} \quad A \times B = 56 \\ \textcircled{2} \quad A - B = 10 \end{array}$$

$$\begin{array}{r} 7^2 \longdiv{56} \\ 2 \end{array}$$

$$\begin{array}{r} 7^2 \longdiv{14} \\ 7 \end{array}$$

$$56 = 14 \times 4$$

$$14 = 7 + 7$$

50



After selling an article for Rs. 25. The numerical value of loss is equal to the cost price, then the cost price of article is:

- A. 45
- C. 55
- B. 50
- D. 60

$$\begin{array}{c} SP \\ \diagup \quad \diagdown \\ A \quad B \end{array}$$

- ① $A \times B = SP$
- ② $A + B = 10$

$$\begin{array}{c} 25 \\ A = 5 \\ \swarrow \quad \searrow \\ 25 \quad B = 5 \\ \hline 50 \end{array}$$



Case 1



A dishonest dealer claims to sell his goods at cost price, but he uses a weight of lesser weight. Find his Profit%.



Formula

$$\text{Profit \%} = \frac{\text{True Weight} - \text{False Weight}}{\text{False Weight}} * 100 \%$$

$$\text{Profit \%} = \frac{\text{Profit \% + Less Weight \%}}{100 - \text{Less Weight \%}} * 100 \%$$



$$\text{Profit \% OR Loss \%} = \frac{\text{Less Weight \%} - \text{Loss \%}}{100 - \text{Less Weight \%}} * 100 \%$$

Case 1

If A%, B% and C% are successive discounts on marked price

Formula

$$\text{Selling price} = \text{Marked Price} \times \left(\frac{100 - A}{100} \right) \left(\frac{100 - B}{100} \right) \left(\frac{100 - C}{100} \right)$$



Case 1



If A%, B% and C% are successive discounts on marked price

Formula



$$\text{Selling price} = \text{Marked Price} * \left(\frac{100 - A}{100} \right) \left(\frac{100 - B}{100} \right) \left(\frac{100 - C}{100} \right)$$



Case 2

Discount are offered on the marked price and selling an object still getting profit
then the relationship between CP and MP

Formula

$$\frac{\text{Marked Price}}{\text{Cost Price}} = \frac{100 + \text{Profit}}{100 - \text{Discount}} \%$$





Discount are offered on the marked price and selling an object with loss then the relationship between CP and MP

Formula



$$\frac{\text{Marked Price}}{\text{Cost Price}} = \frac{100 - \text{Loss}}{100 - \text{Discount}} \%$$

By selling 2 books for Rs. 360 each the publisher gains 20% on one and loses 20% on the other, find the value of the gain or loss.

Rs. 30

C. 15

B. 28.8

D. 14.4

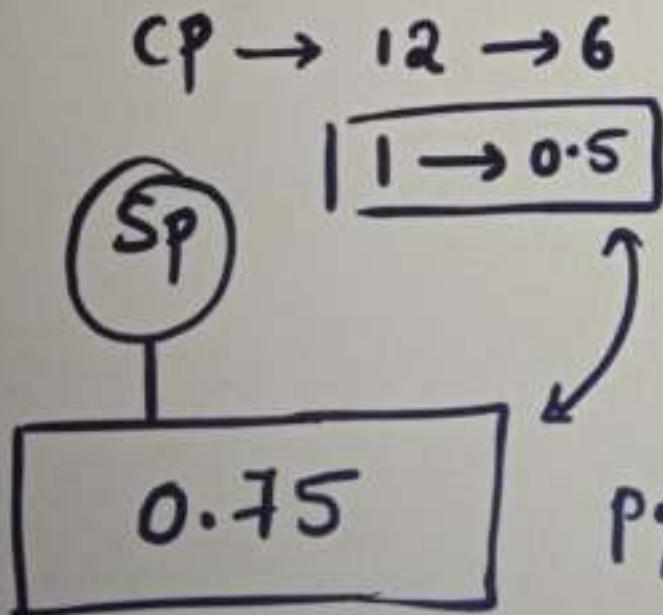
$$B_1 \rightarrow \underline{\underline{360}} \rightarrow \frac{SP}{120\%} \rightarrow \frac{CP}{100\%} \rightarrow \boxed{300}$$

$$B_2 \rightarrow 360 \rightarrow \frac{80\%}{100\%} \rightarrow \boxed{450}$$

$$\underline{\underline{Sp \rightarrow 720\%}}$$

$$\underline{\underline{CP \rightarrow 750\%}}$$

$$\text{Loss} \rightarrow \underline{\underline{30}}$$



$$P\% = \frac{0.25}{0.75} \times 100$$

Profit → 1

≈

A chocolate store owner bought 61480 gems at Rs. 6 per dozen. If he sold all of them at Rs. 0.75 each, what was his profit per cent?

- A. 33.33%
- C. 50%
- B. 25%
- D. 75%

CP → 12 → 6
| 1 → 0.5

Sp
0.75

Profit → 1
≈

$$P\% = \frac{0.25}{0.5} \times 100$$

SI and CI

Simple Interest

~Calculated on P.A. (Principal Amount)

Compound Interest

~Calculated on P.A. and Previous Interests.



SI and CI

You lent Rs.100 to a friend for 3 years at 10% per annum.

SI

Principal = 100

First Year = $\frac{10}{100} \times 100 = \text{Rs.10}$

Second Year = Rs.10

Third Year = Rs.10

Total SI = $10 + 10 + 10 = \text{Rs.30}$

CI

Principal = 100

First Year = Rs.10

Second Year = $\frac{10}{100} \times (100 + 10) = \text{Rs.11}$

Third Year = $\frac{10}{100} \times (100 + 10 + 11)$

= Rs.12.10

Total CI = Rs.33.10



SI and CI

Simple Interest

$$\text{First year} = \frac{r}{100} \times 100$$

$$\text{Second year} = \frac{r}{100} \times 100 = 3 \frac{r}{100} \times 100 = \frac{PRT}{100}$$

$$\text{Third year} = \frac{r}{100} \times 100$$

$$\text{Amount} = PA + SI$$

Interest

Hema makes a fixed deposit of Rs. 40,000 with the Bank of Bharath for a period of 5 years. If the rate of interest be 15% SI per annum charged half-yearly, what amount will she get after 54 months?

A. 67500 C. 68000

B. 70000 D. 67000 ↗

$$P = 40000$$

$$R = \frac{15\%}{2} \quad (7.5\% \text{ H.Y})$$

$$T = \frac{54 \text{ months}}{6} = 9 \text{ H.years}$$

$$\frac{PRT}{100} = \frac{40000 \times 7.5 \times 9}{100}$$
$$= 27000$$
$$+ 40000$$

Hema makes a fixed deposit of Rs. 40,000 with the Bank of Bharath for a period of 5 years. If the rate of interest be 15% SI per annum charged half-yearly, what amount will she get after 54 months?

- A. 67500
- C. 68000
- B. 70000
- D. 67000

$$P = 40000$$

$$R = \frac{15\%}{2} \quad \textcircled{7.5\% \text{ H.Y}}$$

$$T = \frac{54 \text{ months}}{6} = \underline{\underline{9 \text{ H.years}}}$$

$$\frac{PRT}{100} = \frac{40000 \times 7.5 \times 9}{100}$$

$$= \textcircled{27000}$$

$$+ 40000$$

Let principal = P, time = t years and rate = r% per annum, n= Number of cycles in year, and let A be the total amount at the end of t years, then

$$\underline{n = 1}$$

Amount (A) = $P \left(1 + \frac{r/n}{100}\right)^{nt}$

$$A = P + rI \quad CI = A - P$$

Case 1

The difference between the compound interest and the simple interest over two years is given by

Formula

$$\text{Difference} = P \left(\frac{r}{100} \right)^2$$

iPhone is available for \$1980, and under EMI scheme need to pay as 4 monthly equal installments. If the rate of interest is 25% p.a. SI, calculate the installment.

- A. \$600
- C. \$520
- B. \$580
- D. \$540

$$X = \frac{P \left[1 + \frac{nR}{100} \right]}{n + \frac{n(n-1)}{2} \times \cancel{R} / 100}$$

$$\begin{aligned} P &= 1980 \\ n &= 4 \quad \rightarrow R = \frac{(25\%)}{12} = \underline{\underline{52\%}} \end{aligned}$$

Number System

PRIME NUMBERS

Prime $\rightarrow 2, 3, 5, 7, 11, \dots$

which are only divisible by
& the no, itself

Co-prime pairs

$(9, 16)$, $(80, 81)$ etc

1 9 \rightarrow {3, 9}
16 \rightarrow {1, 2, 4, 8, 16}

Some Properties of Prime Numbers

(2) 3, 5, 7, 11, 13, 17, ...

⇒ 2 is the least and the only even prime number.

uid:#5821903452

⇒ The lowest odd prime number is 3.

⇒ For prime numbers $p > 3$, $p^2 - 1$ is divisible by 24.

(2, 3)

$$\frac{p^2 - 1}{24} = \frac{5^2 - 1}{24} = \frac{7^2 - 1}{24}$$

$$\begin{aligned} 5^2 - 1 &= 25 - 1 = 24 \\ &= 2808 \quad \text{Ans} \end{aligned}$$

$$\begin{array}{r} 117 \\ 24 \overline{)2808} \\ \underline{-24} \\ 40 \\ \underline{-24} \\ 16 \\ \underline{-16} \\ 8 \end{array}$$

2's Divisibility Rule:

If the last digit of a number is 0 or an even number then that number is divisible by 2.

20
—
4

37, 50

Number System

DIVISIBILITY RULES

7's Divisibility Rule:

Need to double the last digit of the number and then subtract it from the remaining number. If the result is divisible by 7, then the original number will also be divisible by 7.

..

Number System

DIVISIBILITY RULES

Rule

7's Divisibility Rule:

Need to double the last digit of the number and then subtract it from the remaining number. If the result is divisible by 7, then the original number will also be divisible by 7.

$$\begin{array}{r} 23625 \\ \cancel{2} \quad \cancel{3} \quad \cancel{6} \quad \cancel{2} \quad 5 \\ \times 2 \\ \hline 2362 \\ - 10 \\ \hline 2352 \end{array}$$

$\times 2$ is circled at the end of the multiplication line.

$\cancel{4}$ is circled at the end of the subtraction line.

$$\begin{array}{r} 235 \\ - 4 \\ \hline 231 \\ \cancel{0} \\ \times 2 \\ \hline 23 \\ - 2 \\ \hline 21 \end{array}$$

$\cancel{0}$ is circled at the end of the multiplication line.

$\cancel{2}$ is circled at the end of the subtraction line.

Number System

DIVISIBILITY RULES

9's Divisibility Rule:

If the sum of all digits of a number is divisible by 9, then that whole number will be divisible by 9.



Number System

DIVISIBILITY RULES

12's Divisibility Rule:

If a number is divisible by 3 and 4 both. Then the number is divisible by 12.



Number System

DIVISIBILITY RULES

13's Divisibility Rule:

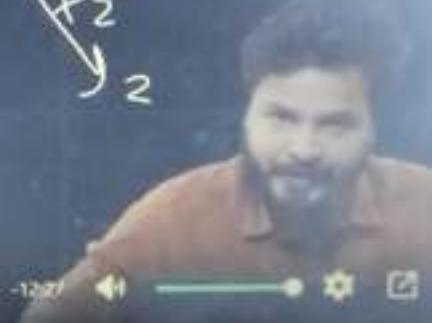
Truncate the last digit, multiply it by 4 and add it to the rest of the number.
The result is divisible by 13 if and only if the original number was divisible by 13.
This process can be repeated for large numbers.

$$\begin{array}{r} 1641 \\ \cancel{8} \quad \times 4 \\ \downarrow \quad + 4 \\ 464 \\ + 4 \\ \hline 468 \end{array}$$

$$\begin{array}{r} 468 \\ \cancel{8} \quad \times 4 \\ \downarrow \quad + 32 \\ 46 \\ + 32 \\ \hline 78 \end{array}$$

$$\begin{array}{r} 78 \\ \cancel{8} \quad \times 4 \\ \downarrow \quad + 32 \\ 32 \\ - 32 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 4641 \\ \cancel{1} \quad \times 2 \\ \downarrow \quad + 2 \\ 464 \\ - 464 \\ \hline 0 \end{array}$$



Number System

DIVISIBILITY RULES

14's Divisibility Rule:

If a number is divisible by 2 and 7 both then that number is divisible by 14.



Number System

DIVISIBILITY RULES

Rule

...

15's Divisibility Rule:

If a number is divisible by 3 and 5 both, then that number is divisible by 15.



Number System

DIVISIBILITY RULES

Rule

16's Divisibility Rule:

If last 4 digits of a number are divisible by 16, then whole number is divisible by 16.



ulid:05e21003452

Number System

DIVISIBILITY RULES

17's Divisibility Rule:

Subtract five times the last digit from the remaining leading truncated number. If the result is divisible by 17, then so was the first number. Apply this rule over and over again as necessary.

7x2 ⊖
| 3x4 ⊕
| 7x5 ⊖

Number System

DIVISIBILITY RULES

Rule

• •

17's Divisibility Rule:

Subtract five times the last digit from the remaining leading truncated number. If the result is divisible by 17, then so was the first number. Apply this rule over and over again as necessary.

$$\begin{array}{r} 4063 \\ - 15 \quad \times 5 \\ \hline 391 \end{array}$$
$$\begin{array}{r} 39 \\ - 5 \\ \hline 34 \end{array}$$

The diagram illustrates the 17's divisibility rule. It shows two subtraction steps. In the first step, 15 is subtracted from 406, and 5 is multiplied by the last digit (3) and then subtracted from the result. In the second step, 5 is multiplied by the last digit of the result (1) and then subtracted from the result. The final result of the second step, 34, is circled.

Number System

DIVISIBILITY RULES

18's Divisibility Rule:

If a number is divisible by 2 and 9 both, then that number is divisible by 18.

uid#58219c3e

Number System

DIVISIBILITY RULES

19's Divisibility Rule:

Add two times the last digit to the remaining leading truncated number. If the result is divisible by 19, then so was the first number. Apply this rule over and over again as necessary.

$$\begin{array}{r} \textcircled{4389} \\ \times 2 \\ \hline 438 \\ \underline{-18} \\ 456 \\ \hline \textcircled{12} \end{array}$$

$$\begin{array}{r} 45 \\ | 2 \\ \hline 57 \\ \times 2 \\ \hline 5 + 4 = 14 \\ \hline \underline{19} \end{array}$$

Number System

NUMBER OF FACTORS OF THE NUMBER

xyz ---

$$\begin{array}{r} 2 \mid 72 \\ 2 \mid 36 \\ 2 \mid 18 \\ 3 \mid 9 \\ \hline & 3 \end{array}$$

$$72 = \cancel{2^3} \times \cancel{3^2}$$

$$N = p^a \times q^b \times r^c \times$$

$$\text{No of factors} = (a+1)(b+1)(c+1) \dots$$

Number System

SUM OF ALL THE FACTORS OF THE NUMBER

$$N = p^a \times q^b \times r^c \times \dots$$

$$\text{Sum of all the factors} = (p^0 + p^1 + p^2 + p^3 + \dots + p^a) \times \\ (q^0 + q^1 + q^2 + q^3 + \dots + q^b) \times \\ (r^0 + r^1 + r^2 + r^3 + \dots + r^c)$$

Number System

COUNTING NUMBER OF ZEROS

$$\begin{array}{r}
 0 \quad 1 \quad 0 \quad 0 \quad 2 \quad 0 \\
 (8 \times 15 \times 23 \times 17 \times 25 \times 22) \\
 \left\{ \begin{array}{l} 5's = 3 \\ 2's, 4 \end{array} \right\} \\
 3 \text{ zeroes} \\
 \hline
 \end{array}$$

Number System

NUMBER OF ZEROS IN A FACTORIAL VALUE

6! → how many zeroes

$$6 \times 5 \times 4 \times 3 \times 2 \times 1$$



0

1 zero