19 Nov 2024 Live Classes Schedule

Time	Class	Instructor
8:00AM	19 NOVEMBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	19 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

NDA 1 2025 LIVE CLASSES

Time	Class	Instructor
11:30AM	GK - ECONOMICS - CLASS 2	RUBY MA'AM
1:00PM	GS - CHEMISTRY MCQ - CLASS 10	SHIVANGI MA'AM
4:30PM	ENGLISH - PREPOSITIONS & DETERMINERS - CLASS 1	ANURADHA MA'AM
5:30PM	MATHS - MATRICES & DETERMINANTS - CLASS 1	NAVJYOTI SIR

CDS 1 2025 LIVE CLASSES

Time	Class	Instructor
11:30AM	GK - ECONOMICS - CLASS 2	RUBY MA'AM
1:00PM	GS - CHEMISTRY MCQ - CLASS 10	SHIVANGI MA'AM
4:30PM	ENGLISH - PREPOSITIONS & DETERMINERS - CLASS 1	ANURADHA MA'AM
7:00PM	MATHS - SPEED DISTANCE TIME - CLASS 1	NAVJYOTI SIR

SSBCrack
EXAMS

CALL US: 080-69185400

GET IT ON Google Play | DOWNLOAD THE APP NOW

BASIC CONCEPT

- **Speed** − The rate at which any moving body covers a particular distance is called a speed.

$$Speed(s) = \frac{Distance(d)}{Time(t)} ✓$$

$$Time = \frac{Distance}{Speed} ✓$$

$$Distance = Speed \times Time ✓$$

- SI unit of speed is meter per second (mps). It also measured in kilometer per hour (km/h). $(kmph)$

CONVERSION OF UNITS

• 1 $hour = 60 \times 60 \ seconds$ ✓

• 1 $km = 1000 \ m$ ✓

• 1 $km/h = \frac{5}{18} \ m/\sec$

• 1 $m/\sec = \frac{18}{5} \ km/h$

• 1 $yard = 3 \ feet$

• 1 $foot = 12 \ inches$

• 1 $km = 0.625 \ mile$

Distance — km   Time — hours
Speed — km/h

Distance — m   Time — seconds
Speed — m/s

CONSTANT CASES

- **Case 1**: if $d = constant$, then $s \propto \dfrac{1}{t}$ or $t \propto \dfrac{1}{s}$

$D = S_1 T_1$ and $D = S_2 T_2$, then $\dfrac{S_1}{S_2} = \dfrac{T_2}{T_1}$

- **Case 2**: if t $= constant$, then D $\propto S$,

$D_1 = S_1 T$ and $D_2 = S_2 T$, then then $\dfrac{D_1}{D_2} = \dfrac{S_1}{S_2}$

- **Case 3:** if s $= constant$, then D $\propto T$,

$D_1 = S T_1$ and $D_2 = S T_2$, then then $\dfrac{D_1}{D_2} = \dfrac{T_1}{T_2}$

$$speed = \frac{Distance}{Time}$$

AVERAGE SPEED

- Average Speed = $\frac{Total\ distance}{Total\ time}$

- If certain distance(d) is covered from A to B in $a\ km/h$, and same distance is covered from B to A in $b\ km/h$, then the average speed during the whole journey is given by :

Average speed = $\frac{2ab}{a+b}\ km/h$

$$\frac{d+d}{\frac{d}{a} + \frac{d}{b}} = \frac{2d}{d\left(\frac{1}{a}+\frac{1}{b}\right)} = \frac{2}{\frac{1}{a}+\frac{1}{b}}$$
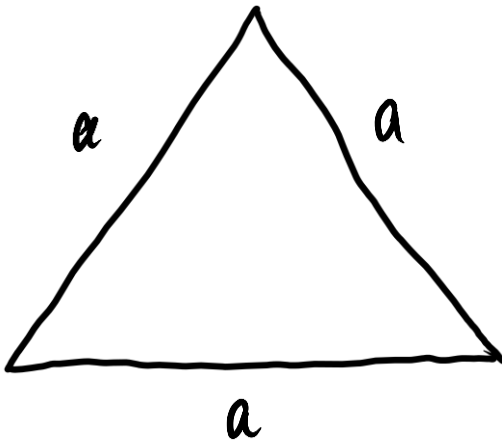
$$= \frac{2ab}{a+b}$$

QUESTION

A train has to cover a distance of $900 km$ in 25 $hours$. What should be the speed in meter per second.

$$Speed = \frac{900}{25} = \underline{36} \; km/h = \overset{2}{\cancel{36}} \times \frac{5}{\cancel{18}} = \boxed{10 \; m/s}$$

QUESTION

If a person covers equilateral triangle shaped field at speed of $10, 20, 40$ km/h on first,

second and third side and reaches back to starting point. Find his average speed.

$$\frac{\text{Total distance}}{\text{Total time}} = \frac{a+a+a}{\frac{a}{10} + \frac{a}{20} + \frac{a}{40}}$$

$$= \frac{3a}{a\left(\frac{4+2+1}{40}\right)} = \frac{3\times 40}{7} = \frac{120}{7}$$

$$= 17 \cdot 14 \ km/h$$

QUESTION

A taxi goes from A to B at average speed of $84 km/h$ and return at speed of $24 km/h$.

Find the average speed of taxi.

$$\frac{2ab}{a+b} = \frac{2 \times 84 \times 24}{84 + 24} = \frac{2 \times \overset{7}{84} \times \overset{8}{24}}{\underset{\underset{3}{9}}{108}} = \frac{112}{3}$$

$$= 37\frac{1}{3} \ km/h$$
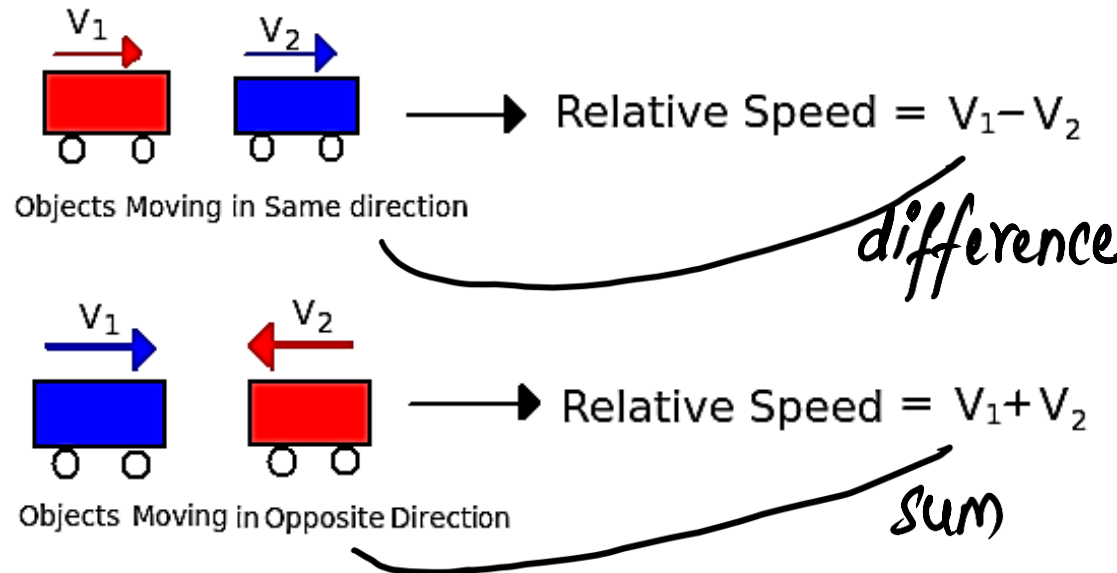
$$\approx 37.33 \ km/h$$

QUESTION

A person covers $900 km$ by train at $180 km/h$, $1200\ km$ at $240 km/h$, $300 km$ at $50 km/h$.

Find the average speed of whole journey.

$$\frac{Total\ distance}{Total\ time} = \frac{900 + 1200 + 300}{\frac{900}{180} + \frac{1200}{240} + \frac{300}{50}} = \frac{2400}{5 + 5 + 6}$$

$$= \frac{2400}{16} = 150\ km/h$$

RELATIVE SPEED

- When two bodies are moving with speeds S_1 and S_2 in same direction, their relative speed is $S_1 - S_2$. ✓

- When two bodies are moving with speeds S_1 and S_2 in opposite direction, their relative speed is $S_1 + S_2$. ✓

V_1 V_2

Relative Speed = $V_1 - V_2$

Objects Moving in Same direction

difference

V_1 V_2

Relative Speed = $V_1 + V_2$

Objects Moving in Opposite Direction

sum

QUESTION

A train starts at $8.00 AM$ from point A towards point B at $55 km/h$ while another train starts at $9.00 AM$ from point B towards A at $72 km/h$. Distance between A and B is $944 km$. At what time will they meet?
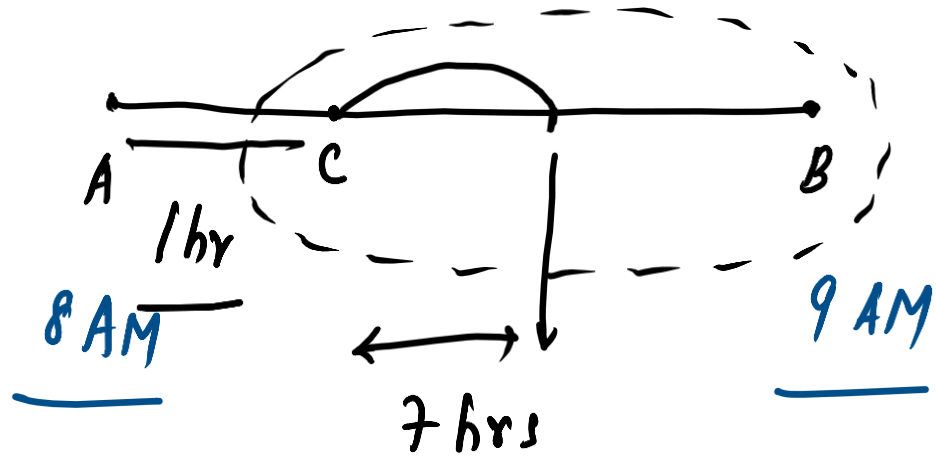
$55 km/h$ ⟶   ⟵ $72 km/h$

C

A   9 AM   B

$8:00 AM$ $9:00 AM$

$55 km$

$944 km$ ⟶

$944 - 55$
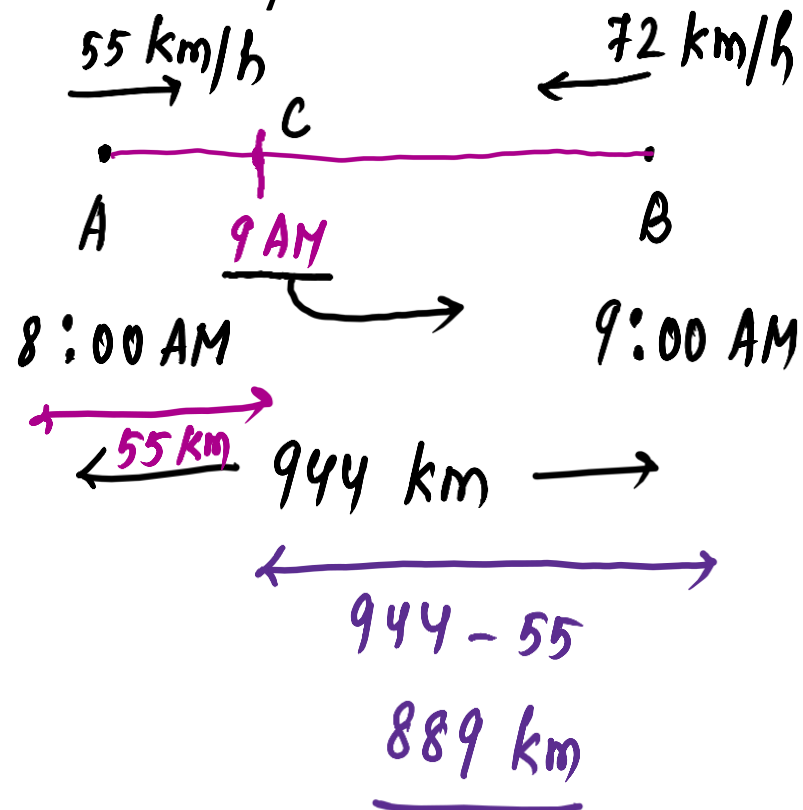
$889 km$

Distance travelled by first train by $9:00 AM$ $= 55 \times 1$

$= 55 km$

Time to meet $= \dfrac{Distance}{Relative\ speed}$

$$= \frac{889 \ km}{(55+72) \ km/h} = \frac{\cancel{889}^{7}}{\cancel{127}} = \underline{7 \ hrs}$$

A ____ C ⌒ B

1 hr

8 AM

7 hrs

9 AM

$8+1+7 \quad \Big/ \quad 9+7 \ = \ \boxed{4 \ PM}$

TIME TO CROSS

1. STATIONARY OBJECTS

- Time taken by train to cross a pole/standing man $= \dfrac{\text{Length of train}}{\text{Speed of train}}$

- Time taken by train to cross a Bridge/Platform =

$$\dfrac{\text{Length of train} + \text{Length of Bridge/Platform}}{\text{Speed of train}}$$

length — insignificant
(very very small
as compared to
length of train)

TIME TO CROSS

2. MOVING OBJECTS (with respect to train)

- When they are moving in same Direction, time taken by faster train to cross the

  slower train $= \dfrac{\text{Sum of length of train}}{\text{Difference of their speed}}$

- When they are moving in opposite Direction, time taken by trains to cross each

  other $= \dfrac{\text{Sum of length of train}}{\text{Sum of their speed}}$ *Relative speed*

TRAIN CASES

3. MOVING OBJECTS (with respect to man)

- When they are moving in same Direction, time taken by train to cross the man =

$$\frac{\text{Length of train}}{\text{Difference of their speed}}$$

- When they are moving in opposite Direction, time taken by train to cross man =

$$\frac{\text{Length of train}}{\text{Sum of their speed}}$$

QUESTION

How long does a train $90\ m$ long running at the rate of $54\ km/h$ take to cross

(a) a Mahatma Gandhi's statue?

(b) a platform $120\ m$ long?

(c) another train $150m$ long, standing on another parallel track?

(a) $\dfrac{90\ m}{\left(54 \times \dfrac{5}{18}\right)} = \dfrac{90}{15\ m/s} = 6\,s$

(b) $\dfrac{90 + 120}{15} = \dfrac{210}{15} = 14\,s$

(c) $\dfrac{90 + 150}{15} = \dfrac{240}{15} = 16\,s$

QUESTION

How long does a train $90\ m$ long running at the rate of $54\ km/h$ take to cross

(a) another train $160\ m$ long running at $36\ km/h$ in same direction?

$$54 \times \frac{5}{18} = 15\ m/s$$

$$10\ m/s$$

(b) another train $160\ m$ long running at $36\ km/h$ in opposite direction?

(c) a man running at $6\ km/h$ in same direction?

$$6 \times \frac{5}{18} = \frac{5}{3}\ m/s$$

(d) a man running at $6\ km/h$ in opposite direction?

$$(a) \left(\frac{90 + 160}{15 - 10} \right) = \frac{250}{5} = \boxed{50\,s}$$

$$(c)\ \frac{90}{15 - \frac{5}{3}} =$$

$$(b)\ \frac{90 + 160}{15 + 10} = \frac{250}{25} = \boxed{10\,s}$$

$$(d)\ \frac{90}{15 + \frac{5}{3}} =$$

QUESTION

Two trains of equal lengths are running on parallel tracks in the same direction at

108 km/h and 36 km/h, respectively. The faster train passes the slower train in 36 sec .

What is the length of train?

Let trains be of length 'L' m.

$* \text{(time to cross)} *$

$108 \ km/h = 108 \times \dfrac{5}{18} = 30 \ m/s$

$36 \ km/h = 36 \times \dfrac{5}{18} = 10 \ m/s$

$36 = \dfrac{L+L}{30-10}$

$\dfrac{36 \times 20}{2} = L$

$L = 360 \ m$

QUESTION

A train $110\ m$ in length travels at $60\ km/h$. How much time does the train take in passing a man walking at $6\ km/h$ against the train ?

$$\frac{110\ m}{(60+6)\ \frac{5}{18}} = \frac{\cancel{110}^{\,2}}{\cancel{66}^{\,1} \times \cancel{5} / \cancel{18}_{3}} = 2 \times 3 = \boxed{6\ s}$$

QUESTION

The speeds of four cars are 2u, 3u, 4u and xu and the time taken by them to cover the same distance is xt, 4t, 3t and 2t respectively, where x, u, t are real numbers. What is the value of x?

PYQ – 2024 - I

(a)   8

(b)   6 ✓

(c)   5

(d)   2

$$2u \times xt = 3u \times 4t$$

$$x = \frac{12}{2} = 6$$