DAY 36

MCA CET 2025

MATHS

SPEED & DISTANCE

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Relation between Speed, Time and Distance.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Distance} = \text{speed} \times \text{time}$$

$$\text{Time} = \frac{\text{distance}}{\text{speed}}$$

A man covered a distance of 12 km in 90 min by cycle. How much distance will he cover in 3 h, if he rides the cycle at a uniform speed?

(a) 36 km (b) 24 km (c) 30 km (d) 27 km

d =

d = 12km

t = 90m

1:30m.

x2

x2

24

A car runs at the speed of 40 km/h when not serviced and runs at 65 km/h when serviced. After servicing, the car covers a certain distance in 5 h. How much approximate time will the car take to cover the same distance, when not serviced?

(a) 10h (b) 7h (c) 12h (d) 8 h

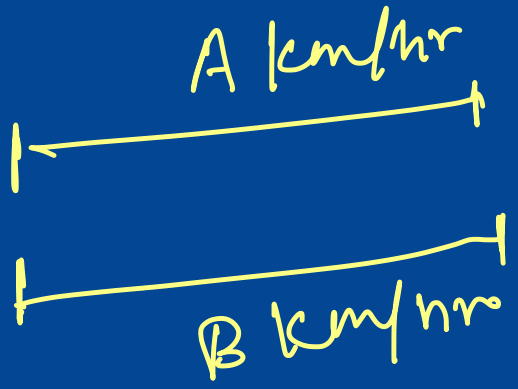
distance = speed × time.

= 65 × 5 = 325 km

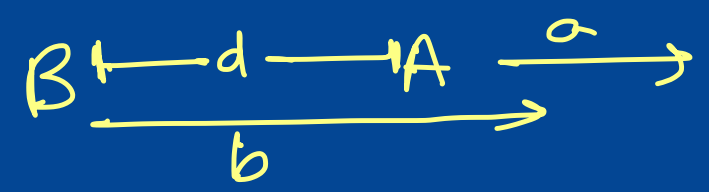
$\frac{325}{40} = 8...$

When a certain distance is covered at speed A and same distance is covered at speed B, then average speed of whole journey is ——

$$= \frac{2AB}{A+B}$$



CHASE CASE TRICK.



A is moving with speed 'a'. B starts to chase A with speed 'b' when he is at a distance 'd' away from him.

b > a

Then the distance covered by A when B meets him is —

$$= d\left(\frac{a}{b-a}\right) = \frac{da}{b-a}$$

TRAIN BASED PROBLEMS.

Rule 1:

The distance covered by a train in crossing a pole, or man or a signal is equal to the length of train.

Speed of a train is 20 m/s. It can cross a pole in 10 sec. What is the length of train?

(a) 100 m (b) 200 m (c) 300 m (d) 400 m

$s = 20\ m/s.$

$t = 10\ sec.$

$d = s \times t = 20 \times 10 =$

$200\ m.$

TRAIN BASED PROBLEMS.

Rule 2:

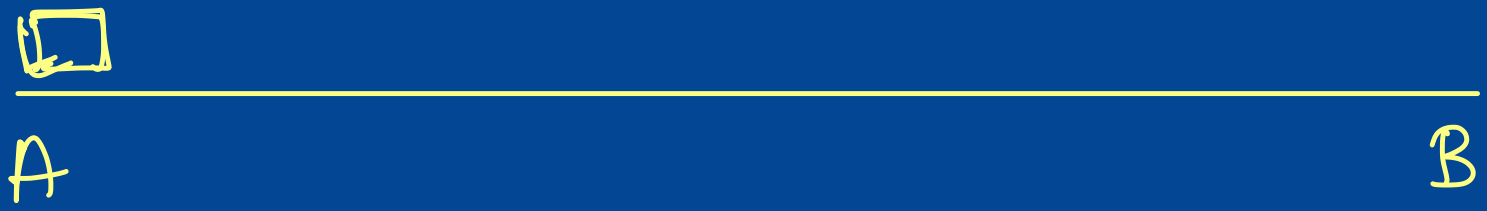
If a train passes a stationary object (bridge, platform, etc.) having some length than the distance covered by train is equal to the sum of length of train and that particular object which is passing.

$$\text{distance} = (\text{train} + \text{object})$$

↓ point object

A person riding a bike crosses a bridge with a speed of 54 km/h. What is the length of the bridge, if he takes 4 min to cross the bridge?

(a) 3600 m (b) 2800 m (c) 3500 m (d) 4500 m



distance = speed × time

$= \frac{54}{60} \times \frac{4}{1} = \frac{54}{15}$

3.6 km

= 3600

A train moving with uniform speed crosses a pole in 2 sec and a 250 m long bridge in 7 sec. Find the length of the train.

(a) 150 m (b) 120 m (c) 100 m (d) 80 m

train = (x) m

$t_p = 2$ sec. $\Longrightarrow$ speed $= \frac{d}{t} = \frac{x}{2}$

$t_b = 7$ sec $\quad l_b = 250$ m.

$d = (x + 250)$

Speed $= \frac{x+250}{7}$

$$\frac{x}{2} = \frac{x+250}{7}$$

$$\Rightarrow 7x = 2x + 500$$

$$5x = 500$$

$$x = 100$$

$d_t = 110\,m$ ↓

Speed = 90 km/hr

A train that is 110 m in length is running at 90 km/h. How much time will the train take to cross a bridge that is 180m in length?

$d_b = 180$

(a) 11.6 sec

(b) 9.6 sec

(c) 10.6 sec

(d) 7.6 sec

$90\ km/hr \Rightarrow 90 \times \frac{10^{5}\,\cancel{0}}{36^{2}\,\cancel{0}}$

$\Rightarrow 90 \times \frac{5}{18} = \frac{450}{18}$

60×60

5.8

$t = \frac{d}{s} = \frac{290}{\frac{450}{18}} = \frac{290 \times 18^{2}}{450_{5}}$

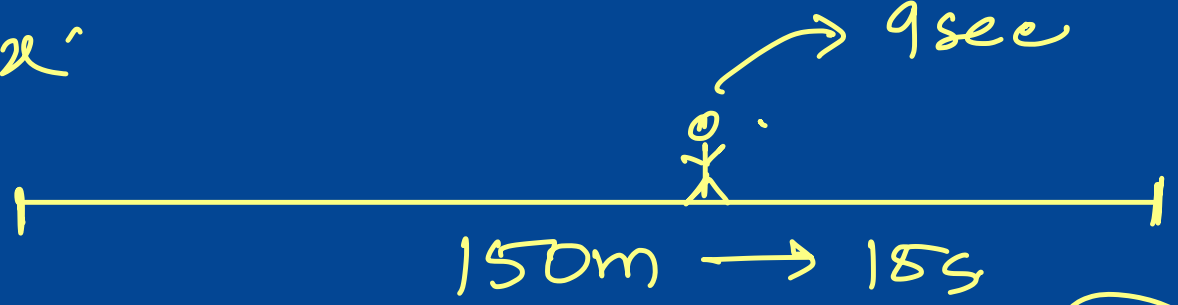
$= 11.6\ sec$

$d_b = 150m \quad t = 15$ sec.

A train crosses a bridge of length 150 m in 15 sec and a man standing on it in 9 sec. The train is travelling at a uniform speed. Length of the train is

(a) 225 m (b) 200 m (c) 135 m (d): 90 m

$d_t = 'x'$



Person: $\text{speed} = \frac{x}{9}$

bridge: $\text{speed} = \frac{x + 150}{15}$

$\frac{x}{9} = \frac{x+150}{15}$

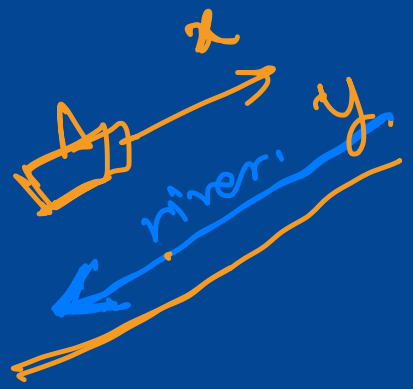
$15x = 9x + 1350$

$6x = 1350$

$x = \frac{1350}{6} = 225$

BOAT and STREAM

If the speed of boat is x km/hr and speed of stream is y km/hr, then



1. Speed in downstream $= (x+y)$ km/hr
2. Speed in upstream $= (x-y)$ km/hr
3. Speed of boat $(x) = \frac{1}{2}$ (downstream speed + upstream speed)
4. Speed of stream $(y) = \frac{1}{2}$ (downstream speed − upstream speed)

A car reached Raipur from Sonagarh in 35 min with an average speed of 69 km/h. If the average speed is increased by 36 km/h, how long will it take to cover the same distance?

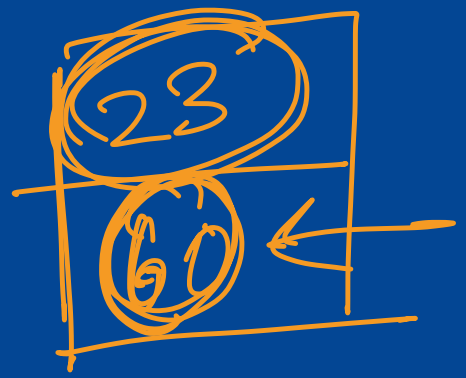
(a) 24 min (b) 27 min (c) 23 min (d) 29 min

$m \rightarrow \frac{m}{60}$

$69 + 36 = 105$ km/hr

distance $= 69 \times \frac{35}{60}$

$= \frac{69 \times 35}{60 \times 104} = \frac{23 \quad 7}{4}$



$0.\_\_ \text{ hr}$

$= \frac{23 \times 7}{4 \times 105} = \frac{1}{15}$

A boat can travel with a speed of 16 km/h in still water. If the rate of stream is 5 km/h, then what is the time taken by the boat to cover distance of 84 km downstream?

(a) 4h

(b) 5h

(c) 6h

(d) 7h

$x = 16$

$y = 5$

$x + y$

$= 21$

$\frac{84}{21} = 4h$

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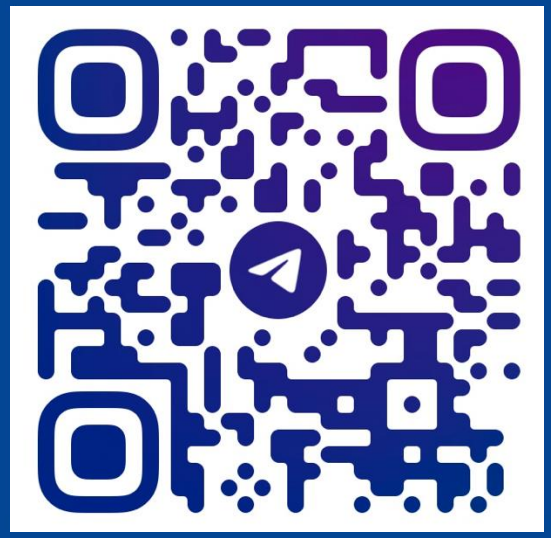

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