Aptitude Practice

Time and Distance

Formula

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

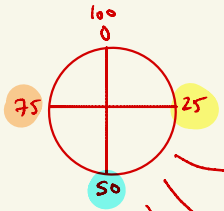
Time

÷60 : 1 min → Sec : ×60

×60 : 60 min → hrs : ÷60

1 hr → 60 min × 60 sec

= 3600 sec



→ 4hr 30 min → 4.50 hrs

→ 3hr 15 min → 3.25 hrs

→ 5hr 45 min → 5.75 hrs

Distance

1 km = 1000 m

Speed

km/hr & m/sec

18/5 : 90 km/hr ⇄ m/sec : 5/18

$90 \times \frac{5}{18} = 25$ m/sec

$\frac{25}{5} \times \frac{18}{5} = 90$ km/hr

60 km/hr ⇒ 60 km (per) 1 hr

In 5 hrs 60 × 5

= 300 km

60 km/hr

for 1/2 hr = 30 km

for 15 min = 15 km

60 km/hr

1 min → 1 km

120 km/hr

1 min → 2 km

120/2 km = 60 min ← 1 hr

2 km = 1 min

60 m/sec ⇒ 60 m (per) 1 sec

Note

60 km/hr

car speed is reduced

by 20 km/hr

40 km/hr

60 km/hr

car speed is reduced

to 20 km/hr

20 km/hr

Note ① Two car travelling in opposite direction

↳ then the speed should be added (+)

② Two car travelling in a same direction

↳ then the speed should be subtracted (−)

① The speed of a bus is 72 km/hr. The distance covered by the bus in 5 sec is,

→ $S = 72$ km/hr , $T = 5$ sec

$D = S \times T$

$= \frac{72}{4} \times 5 \text{ sec} \times \frac{5}{18}$ m/sec $\quad (\because 72 \text{ km/hr} \Rightarrow 72 \times \frac{5}{18}$ m/sec$)$

D = 100 m

② A man walking at the rate of 5 km/hr crosses a bridge in 15 min. The length of the bridge (in meters)

→ $S = 5$ km/hr , $T = 15$ min

$D = S \times T$

$= 5 \times 15 \text{ min} \times \frac{5}{18}$ m/sec $(\because 5 \text{ km/hr} \Rightarrow 5 \times \frac{5}{18}$ m/sec$)$

$= 5 \times (15 \times 60)^{5} \text{ sec} \times \frac{5}{18_{3}}$ m/sec

= 250 m

③ A car traveling at a speed of 40 km/hr can complete a journey in 9 hr. How long will it takes to travel the same distance at 60 km/hr?

→ $S = 40$ km/hr , $T = 9$ hr

$D = S \times T$

$= 40 \text{ km/hr} \times 9 \text{ hr}$

D = 360 km

S = 60 km/hr

$T = \frac{D}{S} = \frac{360 \text{ km}}{60 \text{ km/hr}}$ (6 hr)

T = 6 hr

Trick

40 km/hr × 9 = 360 km

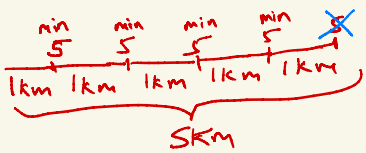
60 km/hr × (?) = 360 km

(?) = 6 hr

④ A man walking at a speed of 10 km/hr. After every km, he takes a rest of 5 min. How much time will he take to cover a distance of 5 km?

→ 1 hr → 10 km

30 min → 5 km



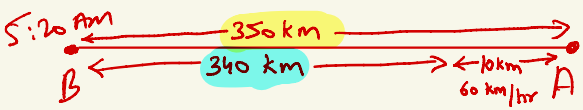
5 × 4 = 20 min break

30 min + 20 min

50 min

⑤ kamal left for the city A from city B at 5:20 Am. He traveled at a speed of 80 km/hr for 4 hours 15 min. After that, the speed was reduced to 60 km/hr. If the distance betn two cities is 350 km, at what time did kamal reach city A.

→



80 km/hr

4 hr 15 min

1 hr → 80 km

15 min → 20 km

80 × 4 → 320 km ← 4 hr

km hr +20 ← 15 min

340 km

1 hr = 60 km

60 min = 60 km

1 km = 1 min

∴ 10 km = 10 min

340 + 10 = 350 km

5:20 am start

4:15 → 340 km

10 → 10 km

9:45 AM

⑥ A Boy runs 20 km in 2.5 hr. How long will he take to run 32 km at double the previous speed?

→ D = 20 km, T = 2.5 hr

$S = \frac{20^{8}\ km}{2.5\ hr}$

S = 8 km/hr

2.5 → 2 hr 30 min

D = 32 km, S = 16 km/hr

1 hr → 16 km

∴ 2 hr → 32 km

⑦ Two friends started for a place one by motorcycle and other by car. The speed of the motorcycle is 30 km/hr and that of car 24 km/hr. The first one takes 6hr 12 min to reach the destination. find the time of reaching of the second one.

→ 30 km/hr

1 hr → 30 km

60 min = 30 km

2 min = 1 km

×6 → 12 min ; ×6 → 6 km

6 hr 12 min

∴ 6 × 30 = 180 km

+ 6 km

186 km

24 km/hr ; 186 km

$T = \frac{186}{24}$ hr

$T = \frac{93}{12}$ hr

$T = 7.75$ hr

⑧ The distance bet^n places A and B is 999 km. A car leaves place A at 6am and runs at a speed of 55.5 km/hr. The car stops on the way for 1 hr 20 min. It reaches B at.

→ D = 999 km, S = 55.5 km/hr

$T = \frac{999}{55.5}$ hr

$T = \frac{9990}{555}$ hr

$T = 18$ hr

18 hr + 1 hr + 20 min (rest)

12 hr + 6 hr + 1 hr + 20 min

car start 6:00 am —12 hr→ 6:00 pm —6 hr→ 12:00 am —1 hr 20 min→ 1:20 am

(9) A Boy goes to his school from his house at a speed of 3 km/hr and returns at a speed of 2km/hr. If he takes 5hr in going and coming, the distance betn his house and school is,

→ $S = \frac{D}{T}$ $\quad T = \frac{D}{S}$

$$5\,hr = \frac{x}{3} + \frac{x}{2}$$

$$5\,hr = \frac{5x}{6}$$

$\therefore x = 6\,km$

(10) A and B travel the same distance at speed of 9km/hr and 10 km/hr resp. If A takes 36 min more than B, the distance traveled by each is

→ $T_1 \sim T_2 = 36\,min$

$$\frac{D}{S} - \frac{D}{S} = 36\,min$$

$$\frac{x}{9} - \frac{x}{10} = \frac{36}{60}$$ ($\because \frac{36}{60}$ bez we want to convert min into hrs.)

$$\frac{x}{90} = \frac{36}{60}$$

$x = 54\,km$

Late / early / usual time

Late / Early } (+) Time
Early / Late }

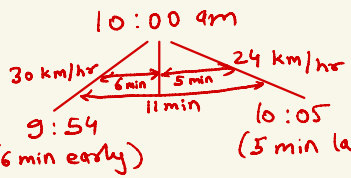
Late / Late } (−) Time
Early / Early }

- Normal method
- formula method

$$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2} \quad (\Delta t \rightarrow \text{time Diff.})$$

① A man goes to his office by scooter at a speed of 30 km/hr and reaches 6 min earlier. If he goes at a speed of 24 km/hr, he reaches 5 min late. The Distance of his office is,

→ Time chart



$T_1 \sim T_2 = 11 \text{ min}$

$\frac{D}{S} \sim \frac{D}{S} = 11 \text{ min}$

$\frac{D}{30 \text{ km/hr}} - \frac{D}{24 \text{ km/hr}} = 11 \text{ min}$

Convert min in hr
$\therefore \frac{11}{60}$ hr

$\frac{D}{30\frac{\text{km}}{\text{hr}}} - \frac{D}{24\frac{\text{km}}{\text{hr}}} = \frac{11}{60} \text{ hr}$

$\frac{4D - 5D}{120} = \frac{11}{60}$

$D = 11 \times 2 \text{ km} = 22 \text{ km}$

formula

$$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$$

$D = \frac{11 \times 30' \times 24 \times 2}{60 \times 6 \times 1} \Rightarrow D = 22 \text{ km}$

② Walking at 5 km/hr a student reaches his school from his house 15 min early and walking at 3 km/hr he is late by 9 min. What is the distance betn his school and his house?

→ Late / Early ⇒ 15 + 9 = 24 min

$T_1 \sim T_2 = 24 \text{ min}$

$\frac{D}{5 \text{ km/hr}} \sim \frac{D}{3 \text{ km/hr}} = \frac{24}{60} \text{ hr}$ (convert min into hr $\therefore \frac{24}{60}$ hr)

$\frac{3D \sim 5D}{15} = \frac{24}{60}$

$2D = 6 \quad \therefore D = 3 \text{ km}$

formula

$$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$$

$= \frac{24 \times 5 \times 15}{60 \times 2}$

$\therefore D = 3 \text{ km}$

③ A student rides on a bicycle at 8 km/hr and reaches his school 2.5 min late. The next day he increases his speed to 10 km/hr and reaches school 5 min early How far is the school from his house?

→ Late/early → 2.5 min + 5 min ⇒ 7.5 min

$T_1 \sim T_2 = 7.5$ min

$\frac{D}{8} \sim \frac{D}{10} = \frac{7.5}{60}$

$\frac{10D \sim 8D}{80} = \frac{75}{600}$

$\frac{2D}{80} = \frac{75}{600}$

$D = 5$ km

formula

$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$

$= \frac{2.5 \times 8 \times 10}{2}$

$D = 5$ km

④ When a person cycled at 10 km/hr he arrived at his office 6 min late. He arrived 6 min early, when he inc. his speed by 2 km/hr The distance of his office from starting place.

→ Late/Early ⇒ 6 min + 6 min ⇒ 12 min

$T_1 \sim T_2 = 12$ min

$\frac{D}{10} \sim \frac{D}{12} = \frac{12}{60}$

$\frac{120 \sim 10D}{120} = \frac{1}{5}$

$\frac{2D}{120} = \frac{1}{5}$

$D = \frac{60}{5} = 12$ km

formula

$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$

$= \frac{12 \times 10 \times 12}{60 \times 2}$

$D = 12$ km

(5) A Boy walking at a speed of 20 km/hr reaches his school 30 min late. Next time he increases the speed by 24 km/hr but still he is late by 10 min. Find the distance of the school from the house.

→ Late/Late ⇒ 30 min − 10 min = 20 min

$24 - 20 = 4$

$T_1 \sim T_2 = 20$ min

$\frac{D}{20} \sim \frac{D}{24} = \frac{20}{60}$

$\frac{60 \sim 5D}{120\ 40} = \frac{20}{60\ 3}$

$\frac{D}{40} = 1$ ∴ $D = 40$

Formula

$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$

$D = \frac{20 \times 20 \times 24}{3\ 60 \times 4}$ ∵ ($t = 20$ min $t = \frac{20}{60}$ hr)

$D = 40$

(6) If a car runs at 40 km/hr, it reaches its destination late by 11 min. But if it runs at 50 km/hr, it is late by 5 min only. The correct time (in min) for the car to complete the journey.

→ Late/Late → 11 min − 5 min = 6 min

Formula

$D = \frac{\Delta t \times S_1 \times S_2}{S_1 \sim S_2}$

$= \frac{6 \times 40 \times 50}{60 \times 10}$

$D = 20$ km

40 km/hr

1 hr → 40 km

30 min → 20 km

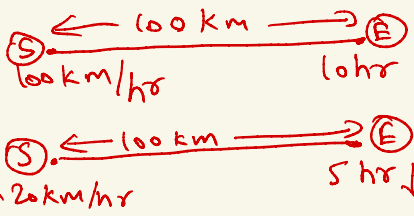
∴ 30 min

− 11 min (late)

19 min

⑦ Walking 6/7th of his usual speed, a man is 12min late. The usual time taken by him to cover that distance.

→ Note



Speed $\propto \frac{1}{\text{Time}}$

↳ $\frac{6}{7} = \frac{7}{6}$

Late Time ~ Usual Time = 12 min

$\frac{7}{6} \times x \sim x = 12\text{min}$

$\frac{7x - 6x}{6} = 12\text{min}$

$x = 72\text{min}$

$x = 60\text{min} + 12\text{min}$

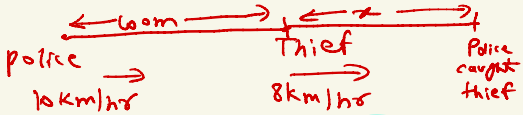
$= 1\text{hr } 12\text{min}$

CHASING

↳ Basic concepts

↳ Equating (Speed/time/Distance)

↳ formula $D = \Delta D \times \left[\frac{a}{a \sim b}\right]$



Same direction = 10 − 8 = 2 km/hr

① A thief spots a policeman 100 m away and takes to his heels. If the police man gives a chase immediately, then how far would the thief have run before he is over taken? The speeds of the thief and policeman are 8 kmph and 10 kmph respectively.

→ Basic

$T = \frac{D}{\text{Speed}} = \frac{100\text{m}}{2\text{km/hr}}$

$D = S \times T$

$= \frac{100\text{m}}{2\text{km/hr}} \times 8\text{km/hr}$

$D = 400\text{m}$

Equating

$T_p = T_T$

$\frac{D_p}{S_p} = \frac{D_T}{S_T}$

$\frac{100 + x}{10} = \frac{x}{8}$

$800 + 8x = 10x$

$2x = 800$

$x = 400\text{m}$

formula

$D = \Delta D \times \frac{a}{a \sim b}$

$= \frac{50\text{m}}{100\text{m}} \times \frac{8\text{km/hr}}{2\text{km/hr}}$

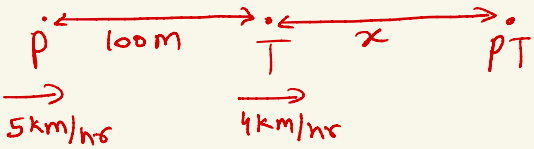
$D = 400\text{m}$

② A thief, who was chased by a policeman was 100m ahead of the policeman initially. If the ratio betn speeds of the policeman and the thief is 5:4, then how long thief would have covered before he was caught by the policeman.

→ Speed = 5:4 ⇒ 5 km/hr : 4 km/hr

① Basic

$T = \frac{D}{S} = \frac{100\,m}{1\,km/hr}$



$D = S \times T$

$= \frac{100\,m}{1\,km/hr} \times 4\,km/hr$

D = 400m

② Equating

$T_P = T_T$

$\frac{D}{5} = \frac{D}{5}$

$\frac{100+x}{5} = \frac{x}{4}$

$400 + 4x = 5x$

x = 400m

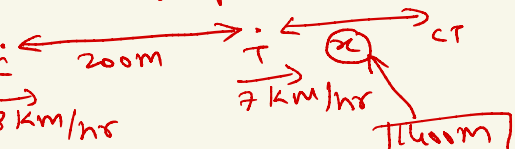
③ Formula

$D = \Delta D \times \frac{a}{a \sim b}$

$= 100 \times \frac{4}{1}$

D = 400m

③ A constable follows a theif who is 200m ahead of the constable. If the constable and the theif run at speeds of 8km/h and 7km/h resp. the constable would catch the theif in,



→ ① Equating

$T_C = T_T$

$\frac{D}{5} = \frac{D}{5}$

$\frac{200+x}{8} = \frac{x}{7}$

$1400 + 7x = 8x$

x = 1400m

Total Distance

= 1400 + 200

= 1600 m

$T = \frac{D}{S}$

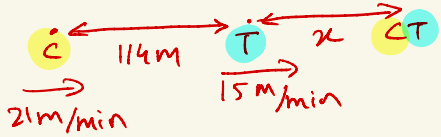
$= \frac{1600\,m}{8\,km/hr}$

$= \frac{1600\,m}{8 \times \frac{5}{18}\,m/sec}$

$= (40 \times 18)\,sec \Rightarrow \frac{40 \times 18}{60}\,min \Rightarrow$ 12min

④ A constable is 114 m behind a thief. The constable runs 21m and the thief 15m in a minute. In what time will the constable catch the thief?

→



$D = \Delta D \times \frac{a}{a \sim b}$

$= 114 \times \frac{21}{6}$

$D = 399\ m$

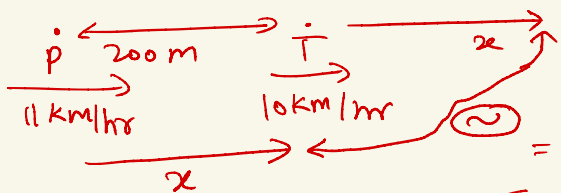
$T = \frac{D}{S}$

$= \frac{399\ m}{21\ m/min}$

$T = 19\ min$

⑤ A thief is noticed by a policeman from a distance of 200m. The thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km/hr and 11 km/hr resp. What is the distance betn them after 6 minutes?

→



$D_P \sim D_T$

$S_P \times T_P - S_T \times T_T$

$= 11\ km/hr \times 6min - 10\ km/hr \times 6min$

$= 11 \times \frac{5}{18}\ m/sec \times 6min - 10 \times \frac{5}{18}\ m/sec \times 6min$

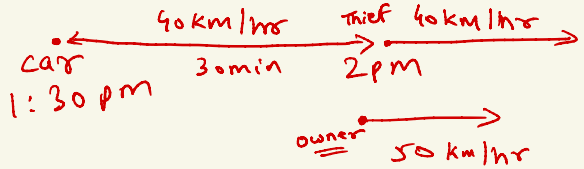
$= 11 \times \frac{5}{18}\ m/sec \times 6 \times 60 - 10 \times \frac{5}{18}\ m/sec \times 6 \times 60$

$= \frac{5}{18} \times 6 \times 60\ [11 - 10]$

$= 100m$

⑥ A thief steals a car at 1:30 pm and drives it off at 40km/hr. The theft is discovered at 2 pm and the owner sets off in another car at 50 km/hr. He will overtake the thief at,

→



$D = \Delta D \times \frac{a}{a \sim b}$

$= 20 \times \frac{50}{10}$

$= 100\ km$

$T = \frac{D}{S}$

$= \frac{100\ km}{50\ km/hr}$

$T = 2\ hr$

2 pm

↓ 2hr

$T = 4\ pm$

Train

① A 100 m long train crossed a {Rock/Pole/standing man ...} then the distance travelled by the train = Length of the Train.

② A 100m long train crossed a {platform / Tunnel} of length 200m then the distance travelled by the train.
= length of train + platform length

③ * Train-1 overtakes Train-2
* Train-1 and Train-2 running in a parallel direction
(subtract the speed) ← same direction.

④ * Train-1 crosses Train-2
* Train-1 and Train-2 proceeds towards each other.
(add there speed) ← opposite direction

Basic Que

① A train 100 m long is running at the speed of 30 km/hr The time (in second) in which it will pass a man standing near the railway line is,

→ D = 100m S = 30km/hr

$$T = \frac{D}{S}$$

$$= \frac{100\ m}{30 km/hr}$$

$$= \frac{100\ m}{30 \times \frac{5}{18}\ m/sec}$$

$$= 12 sec$$

② A train is 125m long. If the train takes 30 seconds to cross a tree by the railway line, then the speed of the train is, (km/hr)

→ D = 125m T = 30sec

$$S = \frac{D}{T}$$

$$= \frac{125\ m}{30 sec}$$

$$= \frac{125}{30}\ m/sec$$

$$= \frac{125}{30} \times \frac{18}{5}\ km/hr$$

$$= 15\ km/hr$$

③ A 120 m long train takes 10 sec to cross a man standing on a platform. What is the speed of the train? (m/sec)

→ $D = 120m$, $t = 10sec$

$Speed = \frac{D}{T}$

$= \frac{120m}{10sec} =$ **12 m/sec**

④ A 75 meter long train is moving at 20 kmph. It will cross a man standing on the platform in (sec)

→ $D = 75m$ $S = 20 km/hr$

$T = \frac{75m}{20 km/hr}$

$= \frac{75m}{20 \times \frac{5}{18} m/sec} =$ **13.5 sec**

⑤ In what time (sec) will a train 100 meters long cross an electric pole, if its speed be 144 km/hour?

→ $D = 100m$ $S = 144 km/hr$

$T = \frac{100m}{144 km/hr} = \frac{100m}{144 \times \frac{5}{18} m/sec} =$ **2.5 sec**

⑥ A train 240 meters in length crosses a telegraph post in 16 seconds. The speed of the train is (km/hr)

→ $D = 240m$ $T = 16 sec$

$S = \frac{240}{16} m/sec$

$= \frac{240}{16} \times \frac{18}{5} km/hr \Rightarrow$ **54 km/hr**

(7) A train 300 m long is running at a speed of 25 m per sec. It will cross a bridge of 200 m in,

→ $D = 300 + 200 = 500\,m$ $\quad S = 25\,m/sec$ $\quad T = \frac{500\,m}{25\,m/sec} \Rightarrow$ 20 sec

(8) A 120 m long train is running at a speed of 90 km per hr It will cross a railway platform 230m long in (sec)

→ $D = 120\,m + 230\,m = 350\,m$ $\quad S = 90\,km/hr$ $\quad T = \frac{350\,m}{90\,km/hr} \Rightarrow \frac{350\,m}{90 \times \frac{5}{18}\,m/sec} \Rightarrow$ 14sec

(9) A train traveling at a speed of 30 m/sec crosses a platform, 600 m long. In 30 sec The length (in meter) of train is,

→ $S = 30\,m/sec$ $\quad P_L = 600\,m$ $\quad T = 30\,sec$

$D = S \times T$

$600 + x = 30\,m/\cancel{sec} \times 30\,\cancel{s}ec$

$600 + x = 900\,m$

$x = 300\,m$

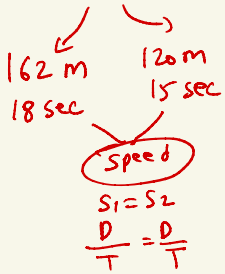
(10) A train 150m long, takes 30 sec to cross a bridge 500 m long. How much time will the train take to cross a platform 370 m long?

→ $S = \frac{D}{T} = \frac{150 + 500\,m}{30\,sec} = \frac{650\,m}{30\,sec} = \frac{65}{3}\,m/sec$

$T = \frac{D}{S} = \frac{150 + 370}{S} = \frac{520\,m}{\frac{65}{3}\,m/sec} \Rightarrow \frac{3 \times 520}{65} \Rightarrow$ 24 sec

(11) A train takes 18 sec to pass through a platform 162m long and 15 sec to pass through another platform 120m long. The length of the train (in m) is,

→



$S_1 = S_2$

$\frac{D}{T} = \frac{D}{T}$

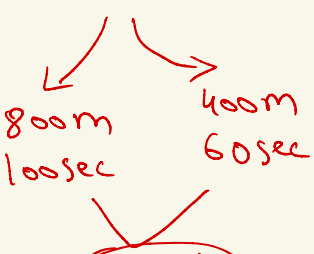
$\frac{x+162}{18} = \frac{x+120}{15}$

$5x + 810 = 6x + 720$

$x = 90m$

(12) A train passes two bridges of lengths 800m and 400m in 100 sec and 60 sec resp. The length of the train is,

→



$S_1 = S_2$

$\frac{D}{T} = \frac{D}{T}$

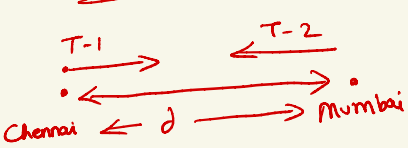
$\frac{x+800}{10} = \frac{x+400}{6}$

$6x + 6 \times 800 = 10x + 4000$

$4x = 800$ ⇒ $x = 200\ m$

Two trains meeting

Type ①



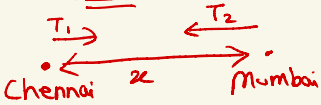
formula (Distance)

$$S_1\left[\frac{d+S_2T}{S_1+S_2}\right]\text{km}$$

formula (Time)

$$\left[\frac{d+S_2T}{S_1+S_2}\right]\text{hours}$$

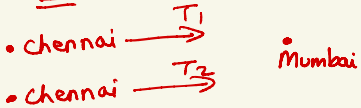
Type ②



formula

$$d\left[\frac{S_1+S_2}{S_1\sim S_2}\right]\text{km}$$

Type ③



formula (distance)

$$\left[\frac{S_1\times S_2\times T}{S_1\sim S_2}\right]\text{km}$$

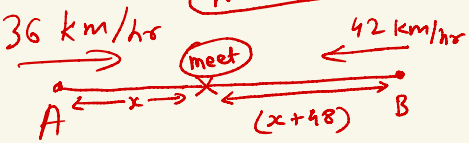
formula (Time)

$$\left[\frac{S_1T}{S_1\sim S_2}\right]\text{hours}$$

① Two trains start at the same time from A & B and proceed towards B & A at 36 kmph & 42 kmph resp. When they meet, it is found that one train has moved 48 km more than the other. What is the distance between A and B?

→ Type II

Normal method



$T_1 = T_2$

$\frac{D}{S} = \frac{D}{S}$

$\frac{x}{36} = \frac{x+48}{42}$

$\frac{x}{6} = \frac{x+48}{7}$

$7x = 6x + 48 + 6$

$x = 288$

$\therefore 2x + 48 \quad (\because x + x + 48)$

$2(288+48)$

$= 624$ km

↳ Distance betn A to B

formula

$$d\left[\frac{S_1+S_2}{S_1\sim S_2}\right]\text{km}$$

$$48\left[\frac{36+42}{36\sim 42}\right]$$

$$48\left[\frac{78}{6}\right]^{13}$$

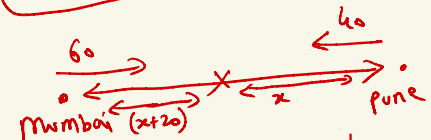
48×13

$= 624$ km

② Two Trains start at a same time from Mumbai and Pune and proceeds towards each other at the rate of 60 km and 40 km per hour resp. When they meet it is found that one train has travelled 20 km more than the other. Find the distance betn Mumbai & Pune.

→ Type II

Normal method



$T_1 = T_2$

$\frac{x+20}{60} = \frac{x}{40}$

$\frac{3}{} \quad \frac{2}{}$

$2x + 40 = 3x$

$x = 40$

$2x + 20 \quad (\because x + x + 20)$

$= 2(40) + 20$

$= 80 + 20$

$= 100$ km

formula $d\left[\frac{S_1+S_2}{S_1 \sim S_2}\right]$ km

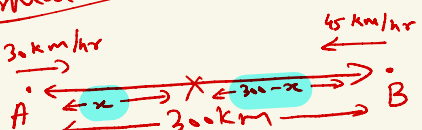
$20\left[\frac{60+40}{20}\right]$

100 km

③ The distance betn two stations A and B is 300 km. A train leaves station A at the speed of 30 kmph. at the same time another train departs from station B at the speed of 45 kmph. What will be the distance of the points where both the trains meet from point A?

→ Type I

Normal method



$T_1 = T_2$

$\frac{D}{S} = \frac{D}{S}$

$\frac{x}{30} = \frac{300-x}{45}$

$\frac{2}{} \quad \frac{3}{}$

$3x = 600 - 2x$

$5x = 600$

$x = 120$ km

t ⇒ time diff. $T_1 \sim T_2$

formula ①

$D = S_1\left[\frac{d + S_2 t}{S_1 + S_2}\right]$ km

$30\left[\frac{300 + 30(0)}{30 + 45}\right]$

$30\left[\frac{300}{75}\right]$

$\frac{9000}{75} = 120$ km

formula ②

$\left[\frac{d + S_2 t}{S_1 + S_2}\right]$ hours

$\left[\frac{300 + 45(0)}{30 + 45}\right]$

$\frac{300}{75}$

$T = 4$ hrs

④ Chennai is at a distance of 560 km from Mumbai. A train starts from Mumbai to Chennai at 6am with a speed of 40 km/hr. Another train starts from Chennai to Mumbai at 7am with a speed of 60 km/hr. At what distance from Mumbai and at what time will the two trains be at the point of crossing?

→ Type I

time diff
t = 6am ~ 7am
= 1 hr

formula ①

$$S_1\left[\frac{d+S_2t}{S_1+S_2}\right]\text{km}$$

$$40\left[\frac{560+60\times 1\text{hr}}{100}\right]$$

$$4\cancel{0}\left[\frac{62\cancel{0}}{1\cancel{0}\cancel{0}}\right] \Rightarrow 248\text{ km}$$

formula ②

$$\left[\frac{d+S_2t}{S_1+S_2}\right]\text{hours}$$

$$= \frac{560+60\times 1}{100}$$

$$= \frac{\cancel{62\cancel{0}}}{\cancel{10\cancel{0}}} \Rightarrow \frac{31}{5} \Rightarrow 6.20$$

$$\Rightarrow 6\text{ hr }20\text{ min}$$

6am + 6 hr 20 min ⇒ 12:20 noon

(Start)

⑤ A train leaves the station at 5 am at 60 km/hr. Another train leave the same station at 6:30 am at 75 km/hr and travels in the direction of the first train. At what time and at what distance from the station will they meet.

→ Type III

time diff
t = 5am ... 6:30
= 1:30
$= 1\frac{1}{2}$
$= \frac{3}{2}$

formula ①

$$\left[\frac{S_1\times S_2\times T}{S_1\sim S_2}\right]$$

$$\frac{\cancel{30}^{2}\cancel{60}\times 75\times\frac{3}{\cancel{2}}}{\cancel{15}}$$

$$= 150\times 3 = 450\text{ km}$$

formula ②

$$\left[\frac{S_1T}{S_1\sim S_2}\right]\text{hours}$$

$$\left[\frac{\cancel{30}^{2}\times\frac{3}{\cancel{2}}}{\cancel{15}}\right]\text{hours}$$

$$= 2\times 3$$

= 6 hours

6:30 pm
↓ 6 hrs
12:30 pm