gradeup

gradeup

Sahi Prep Hai Toh Life Set Hai

TIME, SPEED & DISTANCE

[Part – 3]

gradeup

Agenda

- Average speed → (48-50) min
  (7 Question)
- Relative speed → (45-48) min
  (7 Question)

Homework → 20 Questions

gradeup

Average Speed

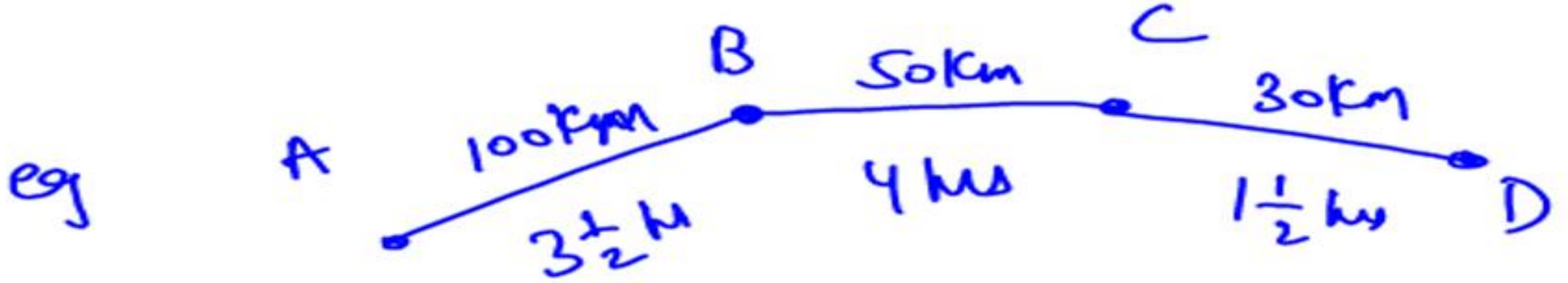
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Average speed} \longrightarrow \frac{\text{Total Distance}}{\text{Total Time}}$$

gradeup

AVERAGE SPEED

$$Average\ speed = \frac{Total\ distance}{Total\ time}$$



$$\Rightarrow \frac{100+50+30}{9} = 20\ km/hr$$

gradeup

100 Km/h 1 hr 100 Km

10 Km/h 5 hr 50 Km

I

$\frac{150}{6} = 25$ Km/h

$\frac{100+10}{2}$

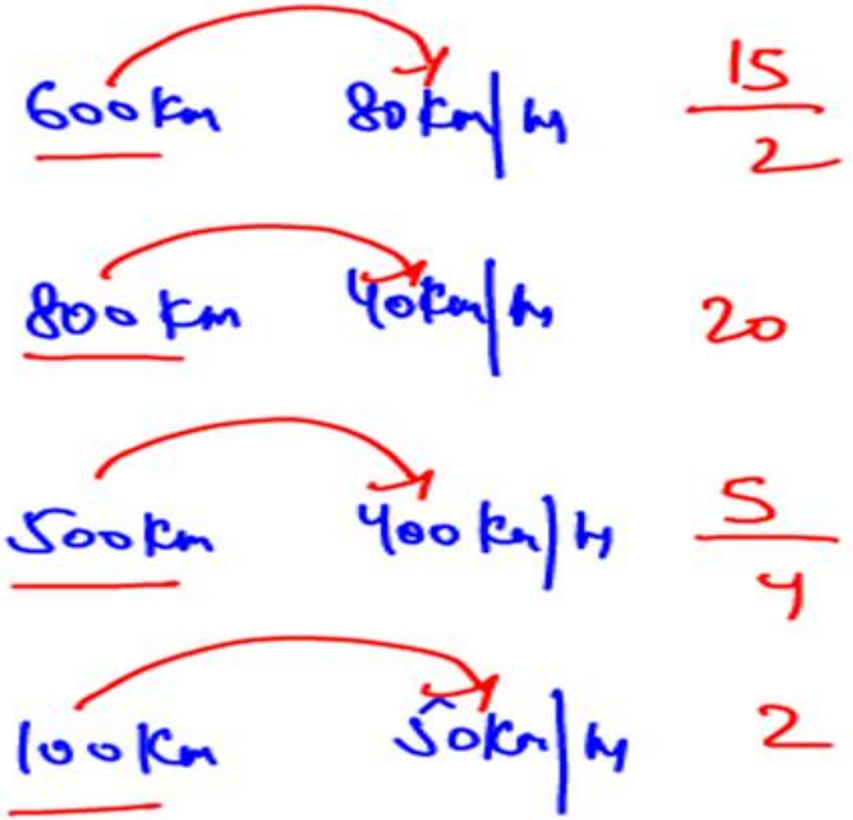
10 hrs/day → 1 day

$\frac{60}{101} \approx .6$

1/2 hr → 100

$\frac{10+\frac{2}{2}}{2}$

gradeup



Q1. A person travels 600 km by train at 80km/hr, 800 km by ship at 40km/hr, 500 km by aeroplane at 400 km/hr and 100 km by car at 50 km/hr. What is the average speed for the entire journey (in Km/hr)?

(a) $65\frac{5}{123}$ **(b)** 60

(c) 65 **(d)** $62\frac{5}{123}$

$$\frac{2000}{\frac{15}{2}+20+\frac{5}{4}+2} = \frac{2000 \cdot 4}{30+80+5+8} = \frac{8000}{123}$$

$$= 65\frac{5}{123}\ \text{km/H}$$

gradeup

Ans. (a)

gradeup

$6 \times 120 = 720\ km$

$360\ km$ $\frac{1}{2}D$ (40 km/hr) 9 hrs

$240\ km$ $\frac{1}{3}D$ (30 km/hr) 8 hrs

$120\ km$ Remaining (60 km/hr) 2 hrs

$\frac{720}{P_7}$

Q2. A person travels at a speed of 40 km/hr for 1/2 of the distance, at a speed of 30 km/hr for 1/3rd of the distance and at a speed of 60 km/hr for the remaining distance. Find his average speed.

(a) $35\frac{15}{17}$

(b) $37\frac{17}{19}$ ✓

(c) 27

(d) 39

gradeup

Ans. (b)

gradeup

12 X 150 = 1800 km

600 km $\frac{1}{3}$ D @ 25 km/h 24 h

450 km $\frac{1}{4}$ D @ 30 km/h 15 h

750 km Rest @ 50 km/h 15 h

Q3. One third of a certain journey is covered at the rate of 25 km/hr, one fourth at the rate of 30 km/hr and the rest at 50 km/hr. The average speed for the whole journey is

(a) 35 km/hr

(b) $37\frac{1}{12}$ **km/hr**

(c) 30 km/hr

(d) $33\frac{1}{3}$ **km/hr**

$\frac{1800}{54} \Rightarrow \frac{100}{3} \Rightarrow 33\frac{1}{3}$ km/h

gradeup

Ans. (d)

gradeup

Q4. Some part of the journey is covered at 40 km/hr and some part of the journey is covered at 60 km/hr. Find the average speed.

Some Part @ 40 Km/hr

Some Part @ 60 Km/hr

→ Can't be determined

gradeup

Total Distance = 420 km

(i)

Part I	Part II
@ 40 km/hr	@ 60 km/hr
Part I → 120 km	Part II → 300 km

Total Time = 8 hr 3 hr 5 hr

$$\frac{420}{8} = 52\frac{1}{2} \text{ km/hr}$$

Total Distance = 3D

(ii)

Part I	Part II
@ 40 km/hr	@ 60 km/hr
1/3rd of total Distance (D)	Remaining Distance (2D)

Total Time = $\frac{7D}{120}$

$$\frac{D}{40} + \frac{2D}{60} = \frac{7D}{120}$$

$$A\text{-}S = \frac{3D \cdot 120}{7D} = 51\frac{3}{7} \text{ km/hr}$$

gradeup

	Part I		Part II
	@ 40 km/hr		@ 60 km/hr
(iii)	The distance of Part I	=	The distance of Part II
	D		D

Total Distance = 2D

Total Time = $\frac{D}{40} + \frac{D}{60} = \frac{5D}{120}$

$A.S = \frac{2D}{\frac{D}{24}}$

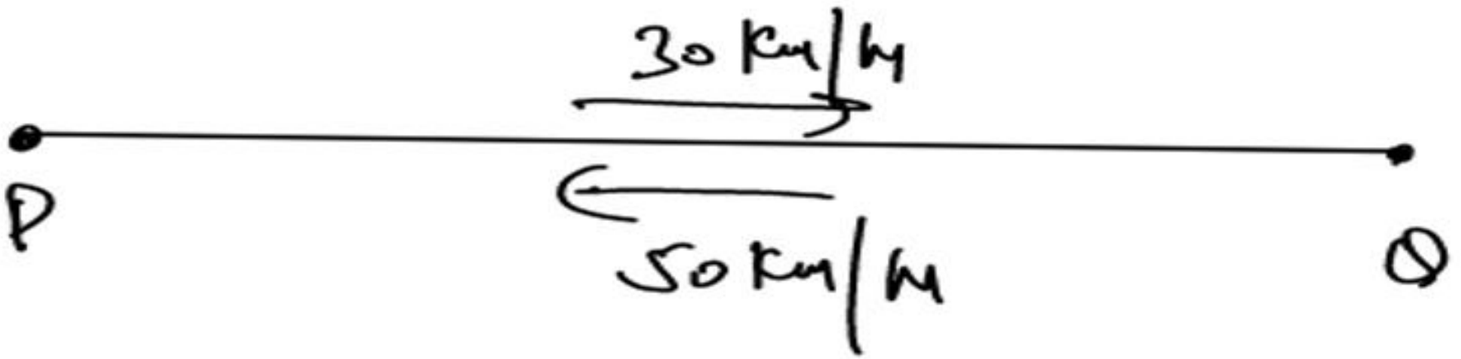
$= 48 \text{ km/h}$

gradeup

V. Imp

If the distance travelled at speed S_1 is same as the distance travelled at speed S_2, then:

$$\text{Average Speed} = \frac{2S_1S_2}{S_1 + S_2}$$



$$A \cdot S = \frac{2 \cdot 30 \cdot 50}{30 + 50} = \frac{\cancel{2} \cdot 3\cancel{0} \cdot 50}{4\cancel{8}} = 37\frac{1}{2} \text{ Km/H}$$

gradeup

(iv)

Part I	Part II
@ 40 km/hr	@ 60 km/hr
2 Hours	3 Hours
80 Km	180 Km

Total Distance = 260 Km

Total Time = 5 hrs

A.S = $\frac{260}{5}$ = 52 Km/hr

(v)

Part I	Part II
@ 40 km/hr	@ 60 km/hr
1/3 time	2/3 time
T	2T

Total Distance = 40·T + 60·2T

= 160T

Total Time = 3T

$\frac{160T}{3T}$ = $53\frac{1}{3}$ Km/hr

He travelled for 1/3rd time for part I & remaining time for part II.

gradeup

	Part I	Part II
	@ 40 km/hr	@ 60 km/hr
(vi)	T	T

The time taken for part I is same as the time taken for part II. Find average speed.

Total Distance = $40T + 60T$

$= 100T$

Total Time $= 2T$

$A\text{-}S = \frac{100T}{2T} = 50 \text{ km/hr}$

gradeup

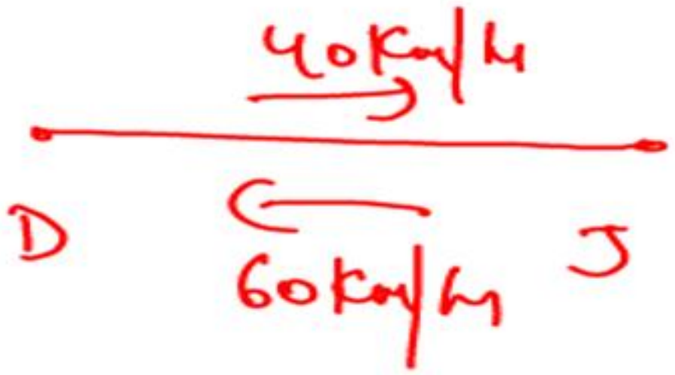
If a person travels for the same time at 2 different speeds S_1 & S_2 then:

$T \rightarrow S_1$

$T \rightarrow S_2$

$$Average\ Speeed = \frac{S_1 + S_2}{2}$$

gradeup

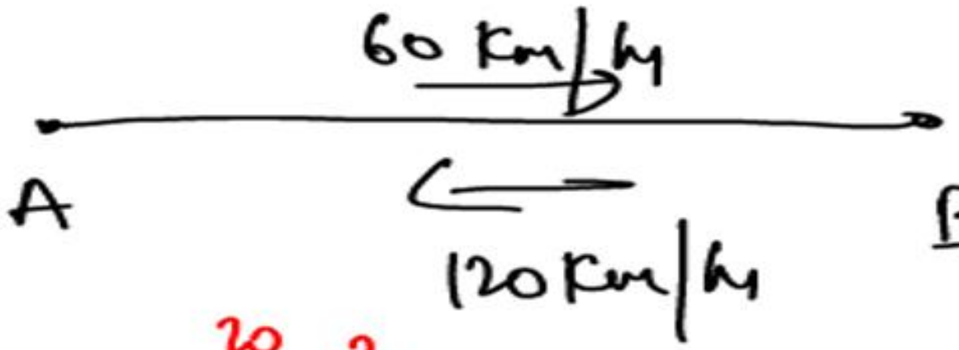


Q5. A person travels from Delhi to Jaipur at a speed 40 km/hr and he travels from Jaipur to Delhi at a speed of 60 km/hr. Find the average speed of the entire journey.

$$A\text{-}S = \frac{2 \cdot 40x \cdot 60x}{100x} = 48 \text{ Km/h}$$

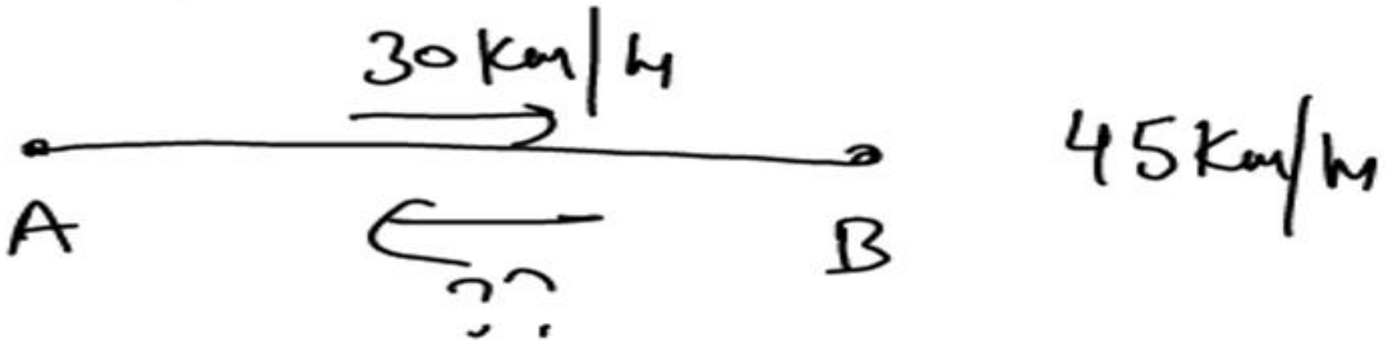
gradeup

Ans. 48 km/hr



$$A\text{-}S = \frac{2 \cdot 60 \cdot 120}{180} = 80 \text{ Km/h}$$

eg



$$\frac{2 \cdot 30 \cdot S_2}{30 + S_2} = 45$$

$$4S_2 = 90 + 3S_2$$

$$S_2 = 90 \text{ Km/h}$$

gradeup

* Average speed = $\frac{\text{Total Distance}}{\text{Total Time}}$

$D \rightarrow S_1$

$D \rightarrow S_2$

$T \rightarrow S_1$

$T \rightarrow S_2$

Imp

$$A\text{-}S = \frac{2S_1S_2}{S_1+S_2}$$

$$A\text{-}S = \frac{S_1+S_2}{2}$$

gradeup

Q6. A train covers a distance of 3584 km in 2 days 8 hours. If it covers 1440 km on the first day and 1608 km on the second day, by how much does the average speed of the train for the remaining part of the journey differ from that for the entire journey?

(a) 3 km/hr (b) 4 km/hr
(c) 10 km/hr (d) 2 km/hr

3584 km → 56 hrs

1440 km → I st

1608 km → II nd

3584 − 1440 − 1608 ← 8 hrs

536 km

PYQ → SSC

+ Average speed of entire journey = 3584/56 ⇒ 64 km/h

+ Average speed of Rem part 536/8 ⇒ 67 km/h

gradeup

Ans. (a)

gradeup

Q7. Sachin travel ~~form~~ first 100 km at a speed of 50 km/hr, the next 1 hour at a speed of 40 km/hr and the rest at a speed of 60 km/hr. If the average speed of the entire journey is 52 km/hr. Find the distance of entire journey?

D	S	T
100km	50km/h	2hrs
40km	40km/h	1hr
60x	60km/h	xH

Average speed = 52km/h

D = ??

Time → 90sec

$\frac{140+60x}{3+x} = 52$

$140+60x = 156+52x$

$8x = 16$

$x = 2$

$140+60\cdot2 = 260km$

gradeup

Ans. 260 km

gradeup

RELATIVE SPEED

Relative → "with respect to"

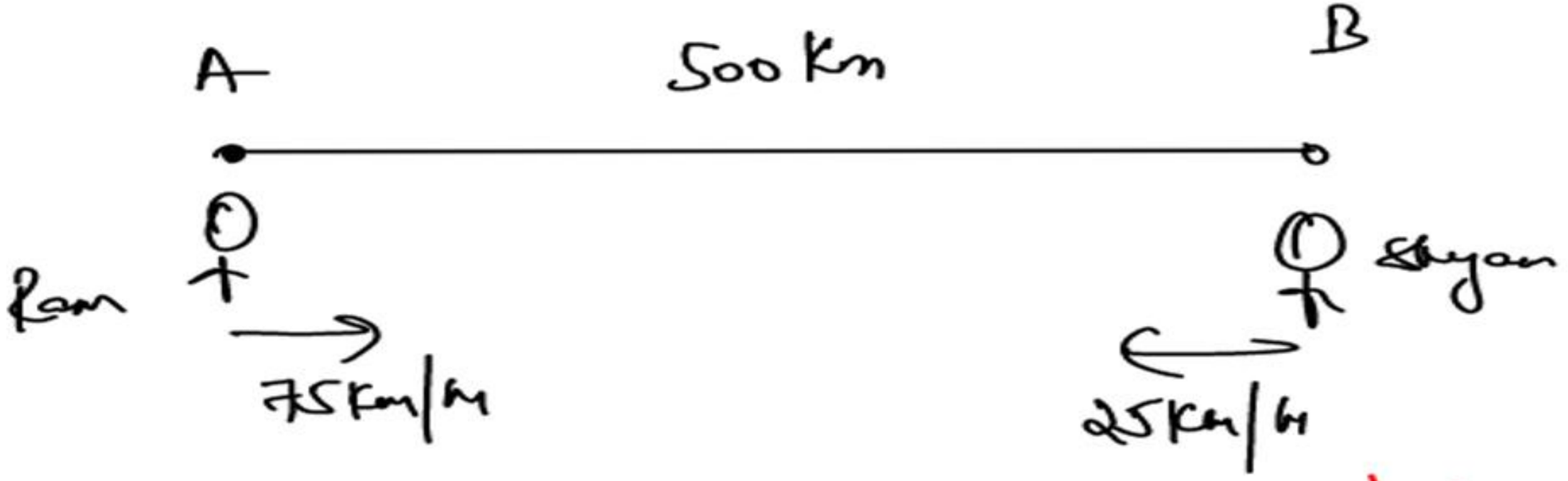
Q After how many hours Ram will overtake Shyam ??

(Initial separation) Distance (D) = 500 km

Relative speed Speed (S) = $S_R - S_S$ (same direction)

= 50 Km/H

Time = $\frac{500}{50}$ = 10 Hr



* After how many hours they will meet

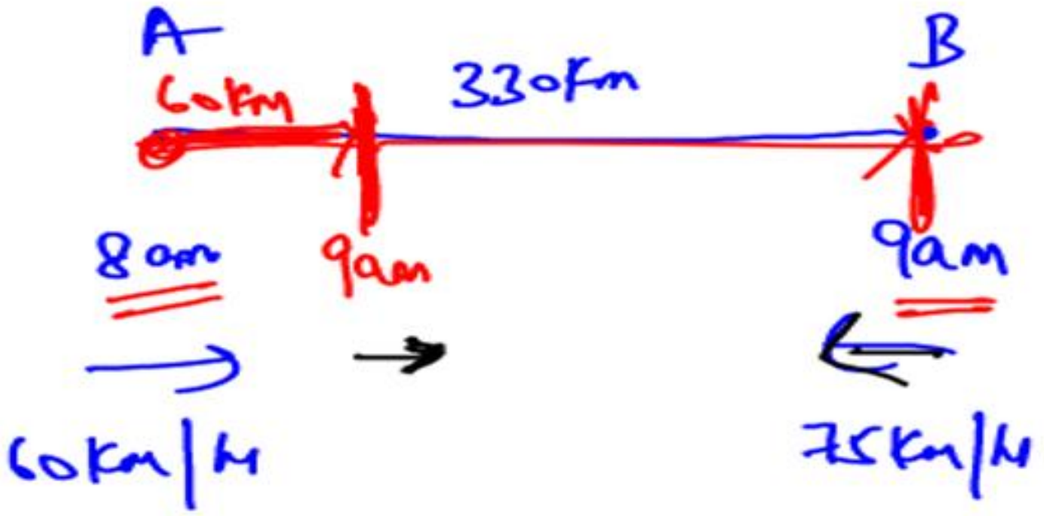
Initial separation $D = 500$ Km

$S = S_R + S_S$ (Opp Direct)

$= 100$ Km/H

$T = \frac{500}{100} \rightarrow 5$ H

gradeup



Q1. The distance between two cities A and B is 330 km. A train starts from A at 8 am and travels towards B at 60 km/hr. Another train starts from B at 9 am and travels towards A at 75 km/hr. At what time do they meet?

(a) 10:00 AM (b) 10:30 AM

(c) 11:00 AM (d) 11:30 AM

$D = 270\ km$

$S = 135\ km/h$

$T = 2\ hr$

gradeup

Ans. (c)

Q2. A thief is noticed by a policeman from a distance of 200 m 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 respectively. What is the distance between them after 6 minute?

~~(a)~~ 100 m (b) 190 m
(c) 200 m (d) 150 m

Police extra Time

1 Km 1 h

1000 m 60 min

100 m 6 min

gradeup

Ans. (a)

gradeup

$D = 490$ km

$S = 140$ km/h

$T = \frac{490}{140} = 3\frac{1}{2}$ hr

Q3. The distance b/w two station A and B is 450 Km. A train starts at 4 pm with 60 Km/Hr from A to B Another train starts from station B at 3.20 pm towards A with a speed of 80 Km/hr. At what time will the both train meets.

(a) 6:30 pm **(b) 6:40 pm**

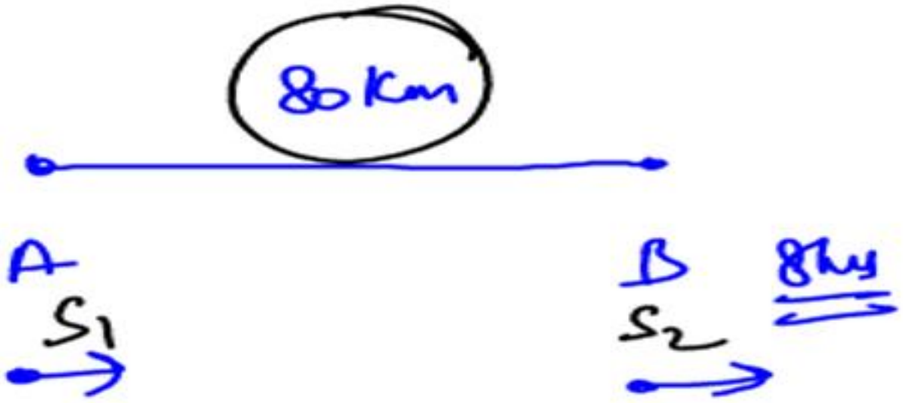
(c) 6:50 pm **(d) 6:20 pm**

6:50 pm

gradeup

Ans. (c)

gradeup



Q4. A and B are two points 80 km a part. A car starts from A and another from B at the same time and move in the same direction, they meet each other in 8 hrs. If they move in opposite direction towards each other, they meet in 1 hr 20 min. Find the speed of the faster car.

(a) 20 kmph
(b) 25 kmph
(c) 35 kmph
(d) 30 kmph

$$S_1 - S_2 = 10 \quad \text{—(1)}$$

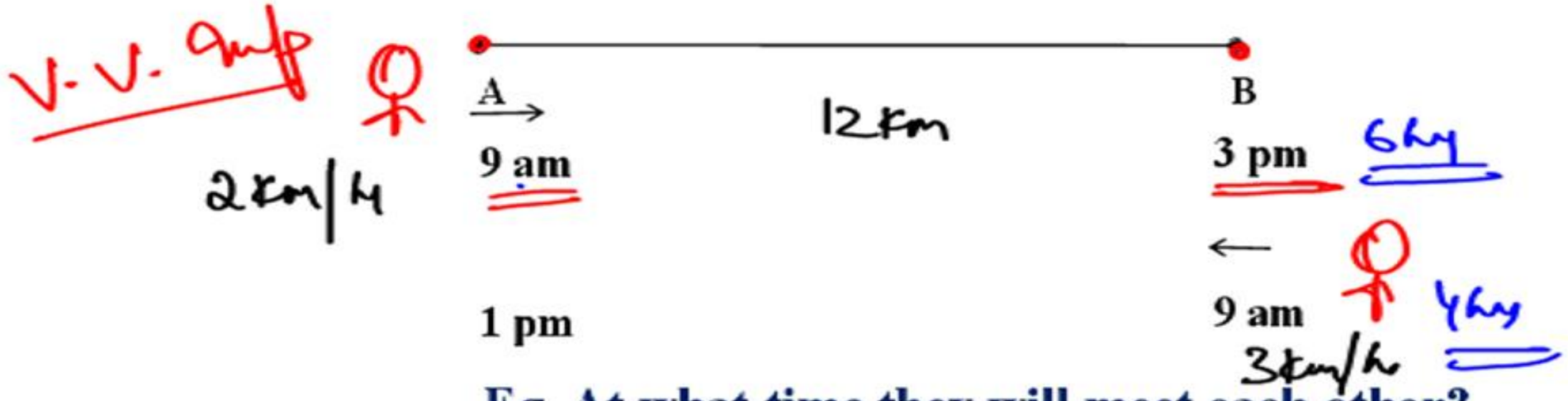
$$S_1 + S_2 = 60 \quad \text{—(2)}$$

$$2S_1 = 70$$

$$S_1 = 35 \text{ Kms/hr}$$

gradeup

Ans. (c)



Eg. At what time they will meet each other?

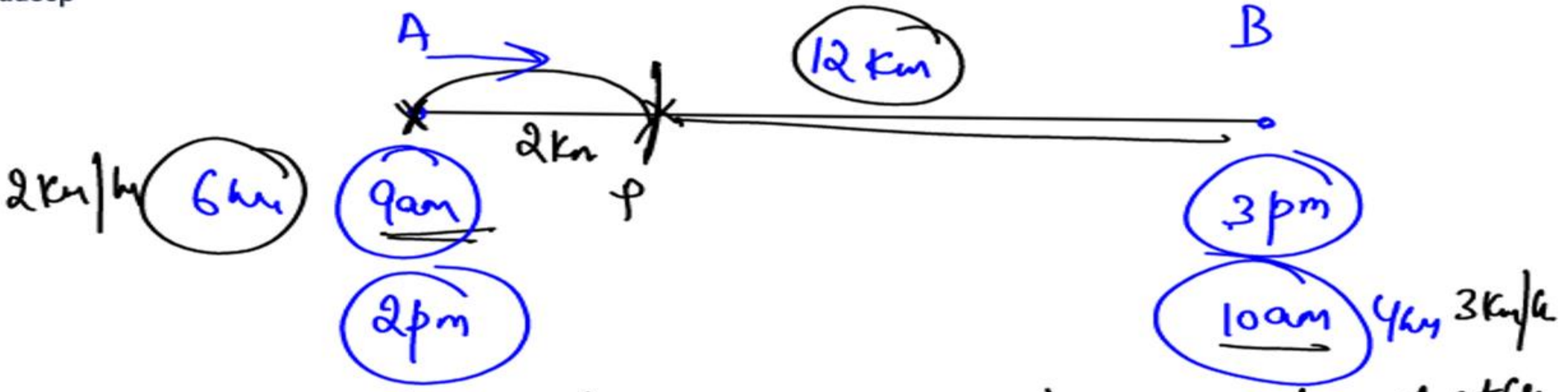
let $D = 12$ Km

$S = 5$ Km/h

$T = \frac{12}{5} = 2\frac{2}{5}$ hr

2 hr 24 min

11:24 am



At what time they will meet each other

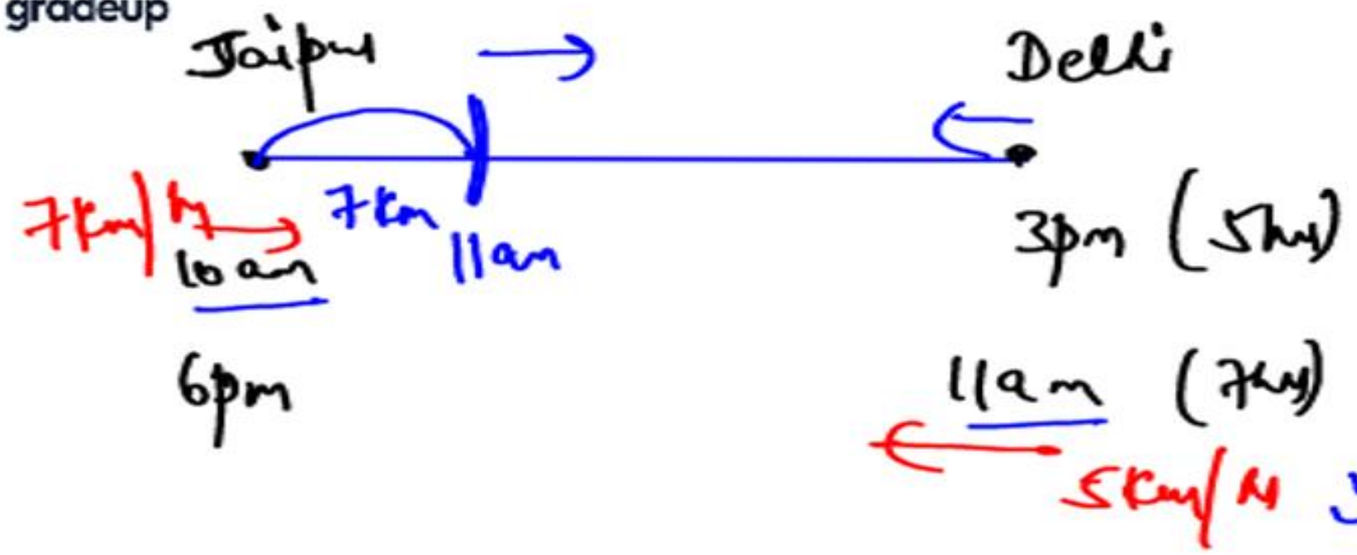
$$D = 10$$

$$S = 5$$

$$T = \frac{10}{5} = 2 \text{ hr}$$

10 + 2

12 noon



D = 35 km

Q5. A train starts from Jaipur at 10:00 am and reach Delhi at 3.00 pm. Another train starts from Delhi at 11 am and reach Jaipur at 6.00 pm. find the meeting time.

(a) 1:20 pm
(b) 12:20 pm
(c) 2:20 pm
(d) 1:55 pm

D = 28 km

S = 12 km/h

T = $\frac{28}{12} \times 3$ → 2hr 20 min

gradeup

Ans. (a)

gradeup

V. Imp

Q6. A, B and C, walk 1 km in 5 minutes, 8 minutes and 10 minutes respectively, C starts walking from a point, at a certain time, B starts from the same point 1 minute later and A starts from the same point 2 minutes later than C, then A meets B and C after.

A → 200 m/min
B → 125 m/min
C → 100 m/min

(i) AB

5 125 m

3 75 m/sec

(ii) AC

200m

100m/min

2 min

Time → 2 min

(a) $\frac{5}{3}$ min., 2 min.

(b) 1 min., 2 min.

(c) 2 min., 3 min.

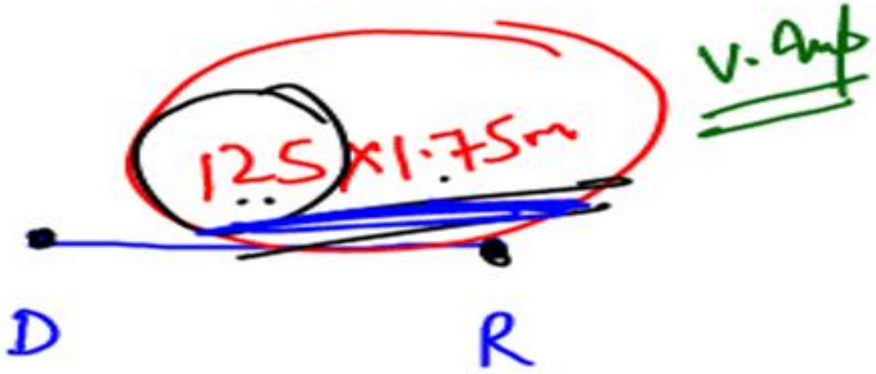
(d) $\frac{4}{3}$ min., 3 min.

C
1 min B
2 min A

gradeup

Ans. (a)

gradeup



V. imp

Q7. A dog chases rabbit. The rabbit is 125 leaps ahead of itself jumps from dog. The rabbit can jump 4 times in a time in which the dog can jump 3 times. The distances covered by the rabbit and the dog in one jump are 1.75 and 2.75 m respectively. In how many jumps the dog will catch the rabbit ?

(a) 175 **(b) 350**

(c) 525 **(d) 700**

1 min

Rabbit — 4 jump — 1.75m — 7m

Dog — 3 jump — 2.75m — 8.25m

2 min

Dog — 3 jumps — 1.25m

extra

300 jump ← 125m

525 jump — 125 X 1.75

gradeup

Ans. (c)

gradeup

Practice Questions

gradeup

Q1. **A man divided his journey into three parts of distances of 18 km, 20 km and 27 km. He travelled the distance at the speeds of 6 km/hr, 5 km/h and 9 km/h, respectively. What was his average speed during the entire journey?**

(a) 6.5 km/h **(b) 4.5 km/h**

(c) 7.5 km/h **(d) 5.5 km/h**

gradeup

Ans. (a)

gradeup

Q2. **A car travels for 6 hours at different speeds. For the first two hours at 60 m/s, for the next 2 hours at 50 m/s and for the remaining time at x m/s. If the average speed for the entire journey is 52 m/s, what is the value of x?**

(a) 46 (b) 44½

(c) 48 (d) 45½

gradeup

Ans. (a)

gradeup

Q3. **A man goes from C to D at 40 km/h and he returns from D to C at x km/h. If the average speed of the man for the whole journey is 60 km/h, then what is the value of x?**

(a) 100 **(b) 120**

(c) 110 **(d) 80**

gradeup

Ans. (b)

gradeup

Q4. **Pranav went to the bank at the speed of 60 km/h while returning for his home he covered the half of the distance at the speed of 10 km/h. but suddenly he realized that he was getting late so he increased the speed and reached the home by covering rest half of the distance at the speed of 30 km/h. The average speed of the Pranav in the whole length of journey is:**

(a) 24 km/hr **(b) 16 km/hr**

(c) 14 km/hr **(d) 10 km/hr**

gradeup

Ans. (a)

gradeup

Q5. **Pranav walked at 5 km/h for certain part of the journey and then he took an auto for the remaining part of the journey travelling at 25 km/h. If he took 10 hours for the entire journey, what part of journey did he travelled by auto if the average speed of the entire journey be 17 km/h?**

(a) 750 km **(b) 100 km**

(c) 150 km **(d) 200 km**

gradeup

Ans. (c)

gradeup

Q6. **Amit travelled from A to B at an average speed of 80 km/h. He travelled the first 75% of the distance in two-third of the time and the rest at a constant speed of x km/h. The value of x is:**

(a) 56 **(b) 60**

(c) 64 **(d) 54**

gradeup

Ans. (b)

gradeup

Q7. **A train goes from P to Q with a speed u km/h, then from Q to R (QR = 2PQ) with a speed 3u km/h, and returns from R to P with a speed u/2 km/h. What is the average speed (in km/h) of the train for the entire journey starting from P and back to P?**

(a) $\frac{18u}{23}$

(b) $\frac{4u}{3}$

(c) $\frac{16u}{23}$

(d) $\frac{3u}{2}$

gradeup

Ans. (a)

gradeup

Q8. **A person covers 40% of the distance from A to B at 8 km/h, 40% of the remaining distance at 9km/h and the rest at 12 km/h. His average speed (in km/h) for the journey is:**

(a) $9\frac{3}{8}$

(b) $9\frac{5}{8}$

(c) $9\frac{1}{3}$

(d) $9\frac{2}{3}$

gradeup

Ans. (a)

gradeup

Q9. **A man on a tour travels first 360 km by train at 72 km/h, the next 160 km on a motor cycle at 12.80 km/h, and the last 200 km by on a bicycle at 16 km/h. ignoring the buffer times between the different modes of travels, what is the average speed (in m/s) for his tour?**

(a) 6.67
(b) 7.33
(c) 4.33
(d) 5.67

gradeup

Ans. (a)

gradeup

Q10. **The average speed of a train is 20% less on the return journey than on the onward journey. The train halts for half an hour at the destination station before starting on the return journey. If the total time taken for the to and fro journey is 23 hours, covering a distance of 1000 km, the speed of the train on the return journey is**

(a) 60 km/hr **(b) 50 km/hr**

(c) 40 km/hr **(d) 55 km/hr**

gradeup

Ans. (c)

gradeup

Q11. **Two cyclists A and B start cycling at 21 km/hr and 24 km/hr towards each other. The meet after 1 hour and 12 minutes. How far (in km) were they from each other when they started?**

(a) 48 **(b) 42**

(c) 54 **(d) 36**

gradeup

Ans. (c)

gradeup

Q12. **Three cars A, B and C started from a point at 5 pm, 6 pm and 7 pm respectively and travelled at uniform speeds of 60 km/hr, 80 km/hr and x km/hr respectively in the same direction. If all the three met at another point at the same instant during their journey, then what is the value of x?**

(a) 120 (b) 110

(c) 105 (d) 100

gradeup

Ans. (a)

gradeup

Q13. **A thief steals a car parked in a house and goes away with a speed of 40 kmph. The theft was discovered after half an hour and immediately the owner sets off in another car with a speed of 60 kmph. When will the owner meet the thief?**

(a) 55 km from the owner's house and one hour after the theft.

(b) 60 km from the owner's house and 1.5 hours after the theft

(c) 60 km from the owner's house and 1.5 hours after the discovery of the theft

(d) 55 km from the owner's house and 1.5 hours after the theft

gradeup

Ans. (b)

gradeup

Q14. Two thieves are standing 40 metres away from a police officer on a straight road. Both of them are on the same side of the police officer. They start running away from him as soon as they see him. The second thief runs at a speed which is twice the speed of the first. If the policeman runs at a constant speed of 6 m/s and catches the first thief in 10 seconds, then how long (in seconds) would he catch the second thief?

(a) 10 (b) 20

(c) 30 (d) 40

gradeup

Ans. (b)

gradeup

Q15. **Places A and B are 396 km apart. Train X leaves from A for B and train Y leaves from B for A at the same time on the same day on parallel tracks. Both trains meet after 5½ hours. The speed of Y is 10 km/h more than that of X. What is the speed (in km/h) of Y?**

(a) 31 **(b) 36**

(c) 41 **(d) 46**

gradeup

Ans. (c)

gradeup

Q16. **B starts 4.5 minutes after A from the same point, for a place at a distance of 3.5 miles from the starting point. A on reaching the destination turns back and walk a mile where he meets B. If A's speed is a mile in 6 minutes then B's speed is a mile in _____ minutes?**

(a) 8 **(b) 9**

(c) 10 **(d) 12**

gradeup

Ans. (b)

gradeup

Q17. **A, B and C can walk at the speed of 3, 4 and 5 km. They departs from Pune at 1, 2 and 3 o'clock respectively. When B reaches to A, then B sends a message to C by A. when will C get the message?**

(a) 4:15
(b) 5:15
(c) 6:25
(d) Can not be determined

gradeup

Ans. (b)

gradeup

Q18. **A motorbike leaves point A at 1 pm and moves towards point B at a uniform speed. A car leaves point B at 2 pm and moves towards point A at a uniform speed which is double that of the motorbike. They meet at 3:40 pm at a point which is 168 km away from A. What is the distance, in km, between A and B?**

(a) 364
(b) 378
(c) 380
(d) 388

gradeup

Ans. (b)

gradeup

Q19. **Two cars travel the same distance starting at 10:00 am and 11:00 am, respectively, on the same day. They reach their common destination at the same point of time. If the first car travelled for at least 6 hours, then the highest possible value of the percentage by which the speed of the second car could exceed that of the first car is**

(a) 20 **(b) 30**

(c) 10 **(d) 25**

gradeup

Ans. (a)

Q20. Village A is separated from village B by a distance of 42 km. Geeta goes by bicycle whereas Meena goes by car, which is 6 times as fast as Geeta's bicycle. If at 9 a.m., Geeta starts from B at 5 km/hr by bicycle and Meena starts from A on her car simultaneously. Unfortunately, Meena's car breaks down half way between A and B. Fortunately, a farmer who was passing by gives him a lift immediately to B on his tractor, which is only half as fast as Geeta's bicycle, then when will they meet?

(a) 11:42 am
(b) 11.56 am
(c) 12:02 pm
(d) 12:42 pm

gradeup

Ans. (c)