gradeup

gradeup

Sahi Prep Hai Toh Life Set Hai

TIME, SPEED & DISTANCE

[Part – 1]

gradeup

Time speed & Distance

- * $D = S \cdot T$ — 2 classes
- * Average speed & Relative — 1 class
- * Trains — 1 class
- * Boat & Stream — 1 class
- * Races & Circular — 1 class
- * Doubt Session — 1 class

100+ Class

125+ Homework

gradeup

STRUCTURE OF TIME, SPEED & DISTANCE

Today's Session

→ Basics of Time, Speed & Distance

Units, Relationship

Question Based

$D = S \cdot T$

gradeup

Time Speed & Distance

2 Approaches

I Solving Question by using only D = ST & Equation

II Logic → Use Ratio & Proportion

gradeup

* $1\ km/h = \frac{1000\ m}{3600\ sec} = \frac{5}{18}$

$$1\ km/h = \frac{5}{18}\ m/sec$$

$$1\ m/sec = \frac{18}{5}\ km/h$$

gradeup

$D = S \cdot T$

D → Distance, S → speed, T → Time

If D → km Time Hrs speed Km/H

M sec speed M/sec

$$1\ Km/H = \frac{5}{18}\ M/sec$$

$$1\ M/sec = \frac{18}{5}\ Km/H$$

gradeup

$D = S \cdot T$

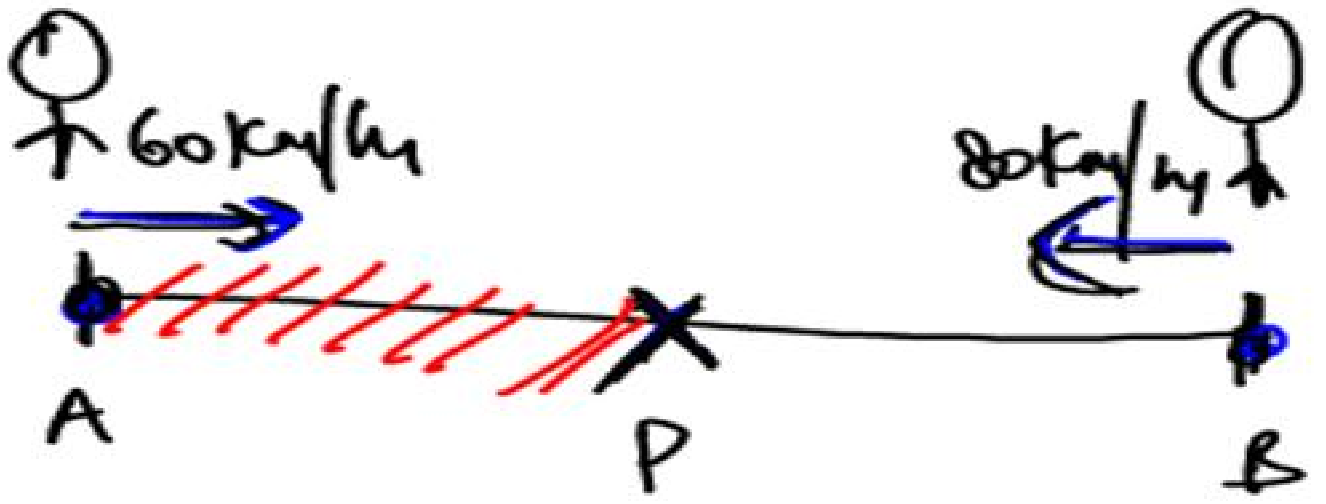
$D_1 : D_2 = T_1 : T_2$ (If Speed is constant)

$D_1 : D_2 = S_1 : S_2$ (If Time is constant)

$S_1 : S_2 = \frac{1}{T_1} : \frac{1}{T_2}$ (If Distance is constant)

$S_1 : S_2 = T_2 : T_1$

eg 1



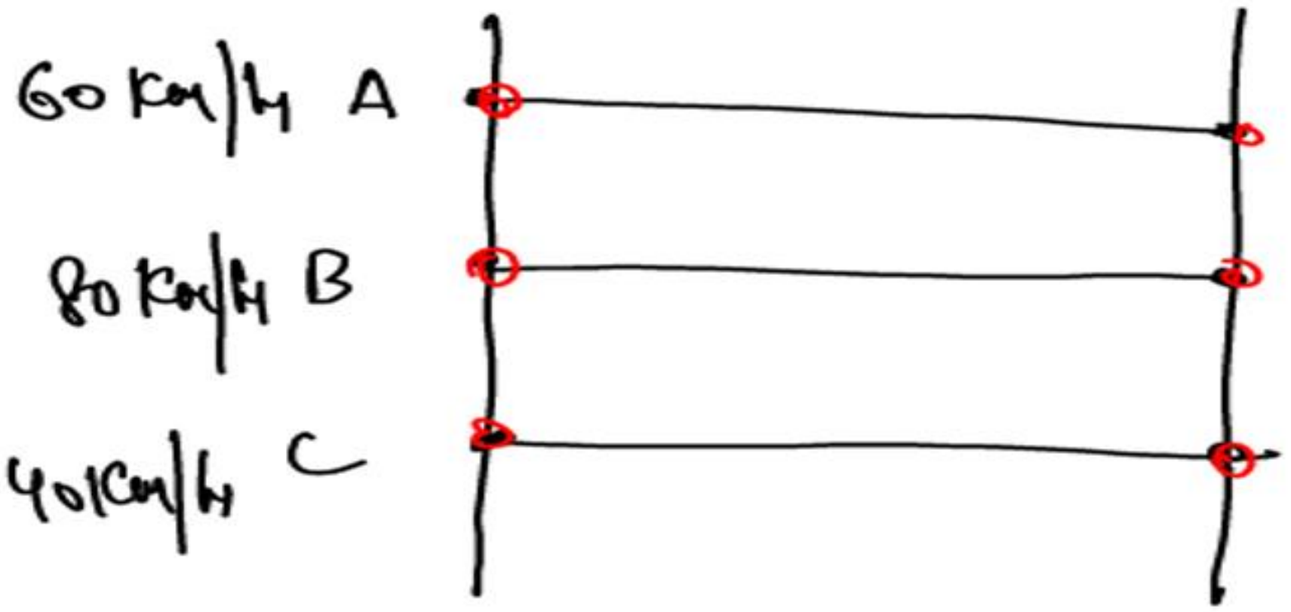
→ What is constant ??

Time is constant

$D = S \cdot T$ 60 : 80 = 3 : 4

$$\frac{AP}{BP} = \frac{3}{4}$$

gradeup



~~D~~ = S-T

$T = \frac{1}{S_A} : \frac{1}{S_B} : \frac{1}{S_C}$

What is constant → Distance

What is the ratio of the taken by A, B, C

$\frac{1}{60} : \frac{1}{80} : \frac{1}{40}$

4 : 3 : 6

gradeup

Eg1. Walking at 6/7 of his usual speed a man is 12 minute late. The usual time taken by him to cover that distance is

(a) 1 hour

(b) 1 hour 12 min.

(c) 1 hour 15 min.

(d) 1 hour 20 min.

I^st Equation

$D = S \cdot T$

$D = \frac{6}{7} S (T+12)$

$S \cdot T = \frac{6}{7} S (T+12)$

$7T = 6T + 72$

$T = 72 \text{ min}$

Time = 1 hr 12 min

II^nd Ratio

	Speed	Time
	7	6
	6	7

1 unit → 12 min

6 → 72 min

gradeup

Ans. (b)

gradeup

Eg2. In covering a certain distance of 30km, Abhay takes 2 hrs. more than Sameer. If Abhay doubles his speed then he would take 1 hour less than Sameer. Find Abhay's speed? (in km/hr)

(a) 5 (b) 6

(c) 6.25 (d) 7.5

I^st Equation

$30 = S \cdot T$ (Sameer)

$30 = S_A (T+2)$ — (1)

$30 = 2S_A (T-1)$ — (2)

$S_A(T+2) = 2S_A(T-1)$

$T = 4$

$S_A = 5$ km/h

II^nd

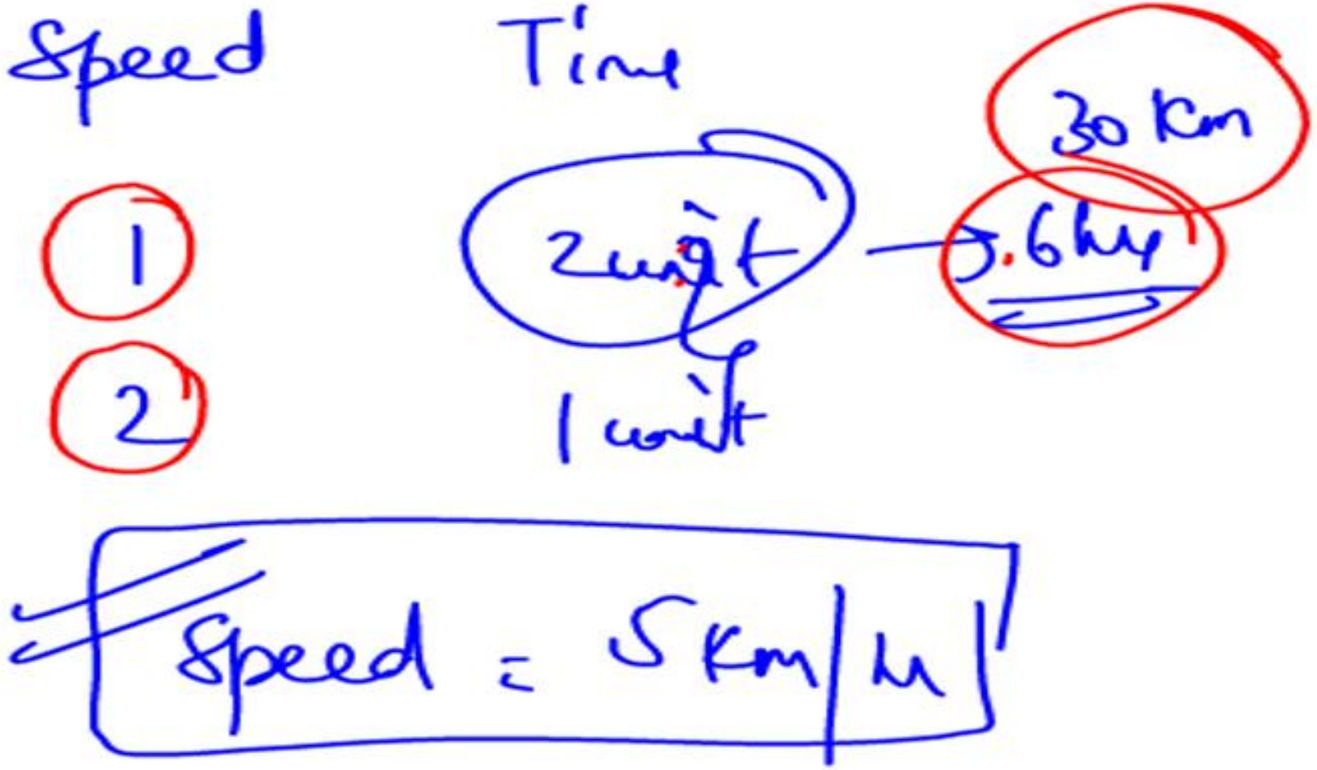
$T = \frac{D}{S}$

$\frac{30}{S_A} - \frac{30}{2S_A} = 3$

$\frac{15}{S_A} = 3$

$S_A = 5$ km/h

gradeup



gradeup

Ans. (a)

gradeup

Eg3. Walking at 5 km/hr a student reaches his school from his house 15 minute early and walking at 3 km/hr he is late by 9 minute. What is the distance between his school and his house?

(a) 5 km
(b) 8 km
(c) ~~3~~ km
(d) 2 km

8:45 ~~9~~

5 Km/h → 15 min earlier

3 Km/h → 9 min late

9:09

I^st

Time = Distance / Speed

$$\frac{D}{3} - \frac{D}{5} = \frac{24}{60}\ 2$$

$$\frac{2D}{15\ 3} = \frac{2}{5}$$

D = 3 Km

gradeup

II nd

5 Km/H ⟶ 15 min earlier

3 Km/H ⟶ 9 min late

D = ??

let D. = 15 Km

3 Hrs

5 Hrs

Gap

2 Hrs (120 min)

24 min

Ans D = 3 Km

gradeup

Ans. (c)

gradeup

$D = S \cdot T$

	S	Time
D = ??	↑ 6 km/hr	↓ 6 hr
	↓ 6 km/hr	↑ 10 hrs

I & II

(I) $D = S \cdot T$

(II) $D = (S+6)(T-6)$

$D = (S-6)(T+10)$

Eg4. A train covers a certain distance at a certain speed, if the speed of the train is 6km/hr more, then to cover the same distance it takes 6 hours less. But, if the speed of the train is 6 km/hr less then it would take 10 hrs more to cover the same distance. Find the distance covered by the train.

$ST = ST - 6S + 6T - 36$

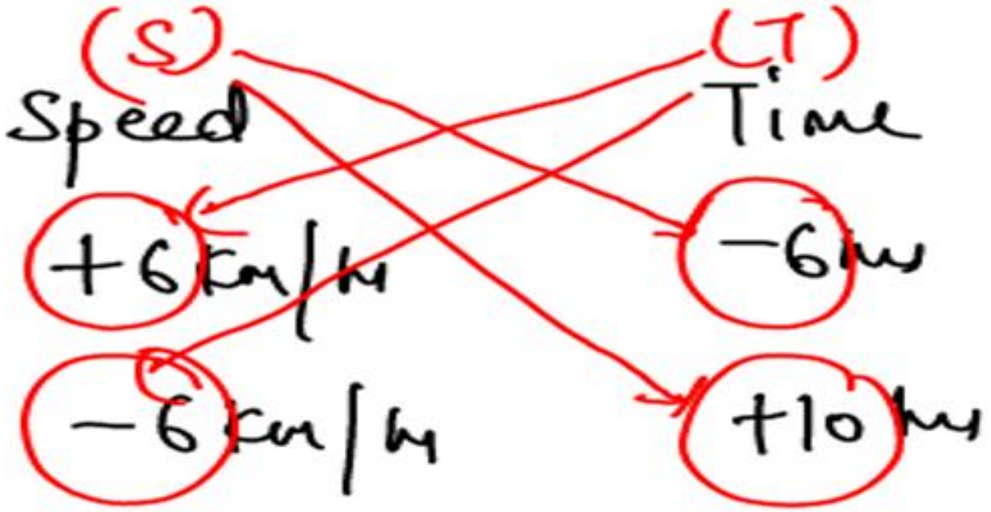
$-6S + 6T = 36$

$ST = ST + 10S - 6T - 60$

$10S - 6T = 60$

gradeup

+



D = ??

$-6S + 6T = 36$

$10S - 6T = 60$

$4S = 96$

$S = 24$

$T = 30$

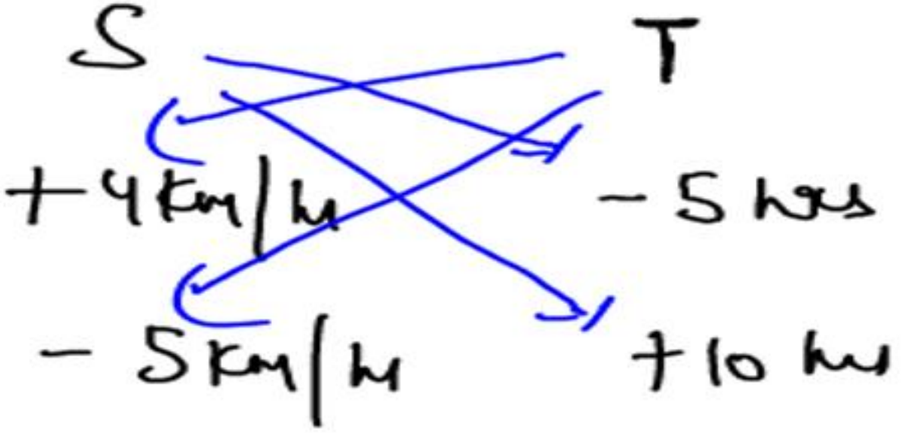
$D = 24 \times 30$

720 Km

gradeup

eg

D = ??



$-5S + 4T = 20$

$10S - 5T = 50$

$-10S + 8T = 40$

$10S - 5T = 50$

$3T = 90$

$T = 30$

$S = 20$

D = 600 km

gradeup

Without stoppage → 54 km/hr

With stopp → 45 km/hr

45 | 5
9 | 1
54 | 6

Eg5. Without any stoppage, speed of the bus is 54 km/hr and with stoppage its speed is 45 km/hr. The bus stops for how many minutes per hour?

(a) 9 **(b) 10**

(c) 12 **(d) 20**

$\frac{1}{6} \times 60 = 10$ min

gradeup

Ans. (b)

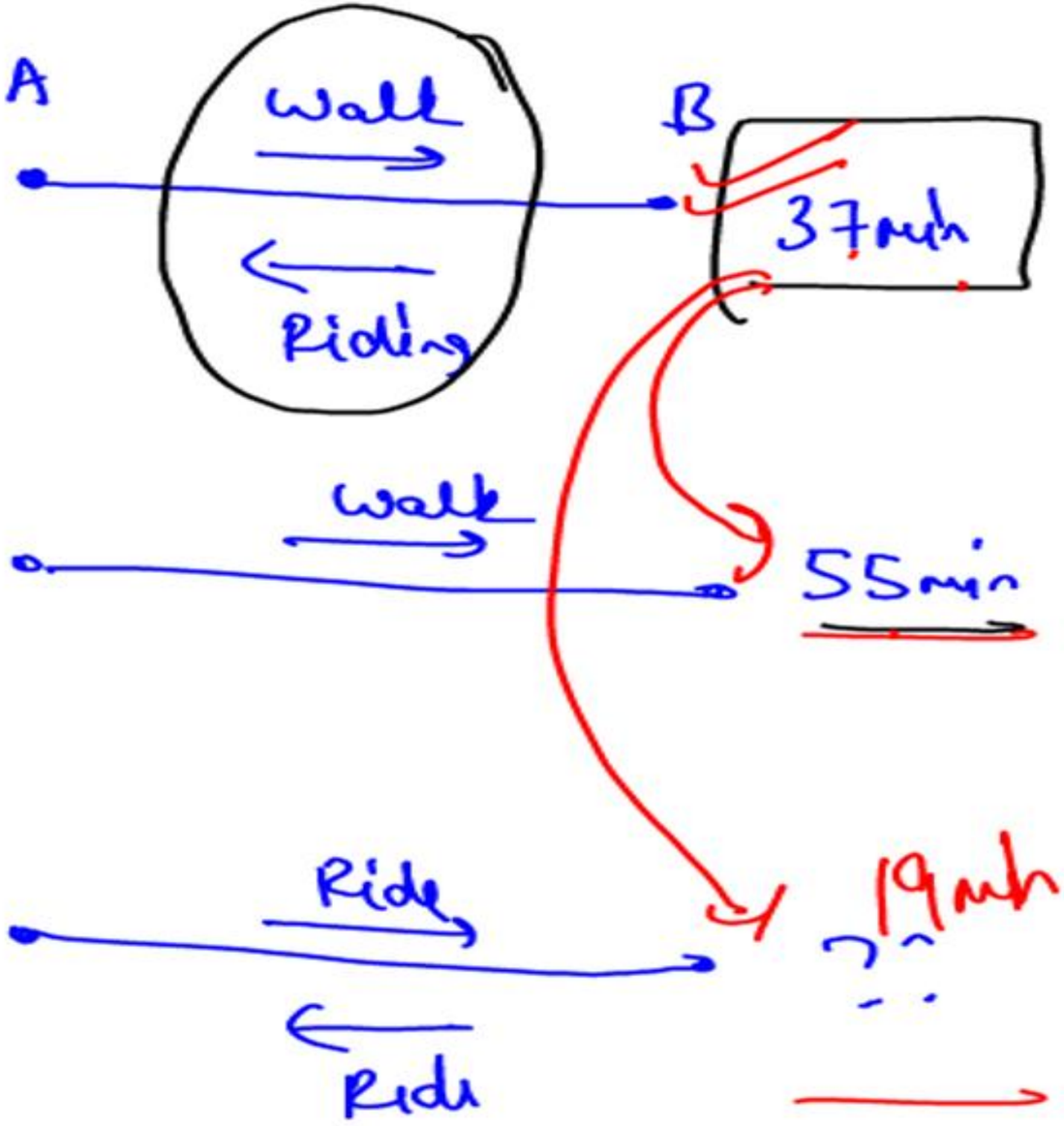
Neeraj — Real Life

Without using Phone — 90Q — 1 hr

While using Phone — 60Q — 1 hr

$\frac{60Q}{90Q} = \frac{2}{3}$

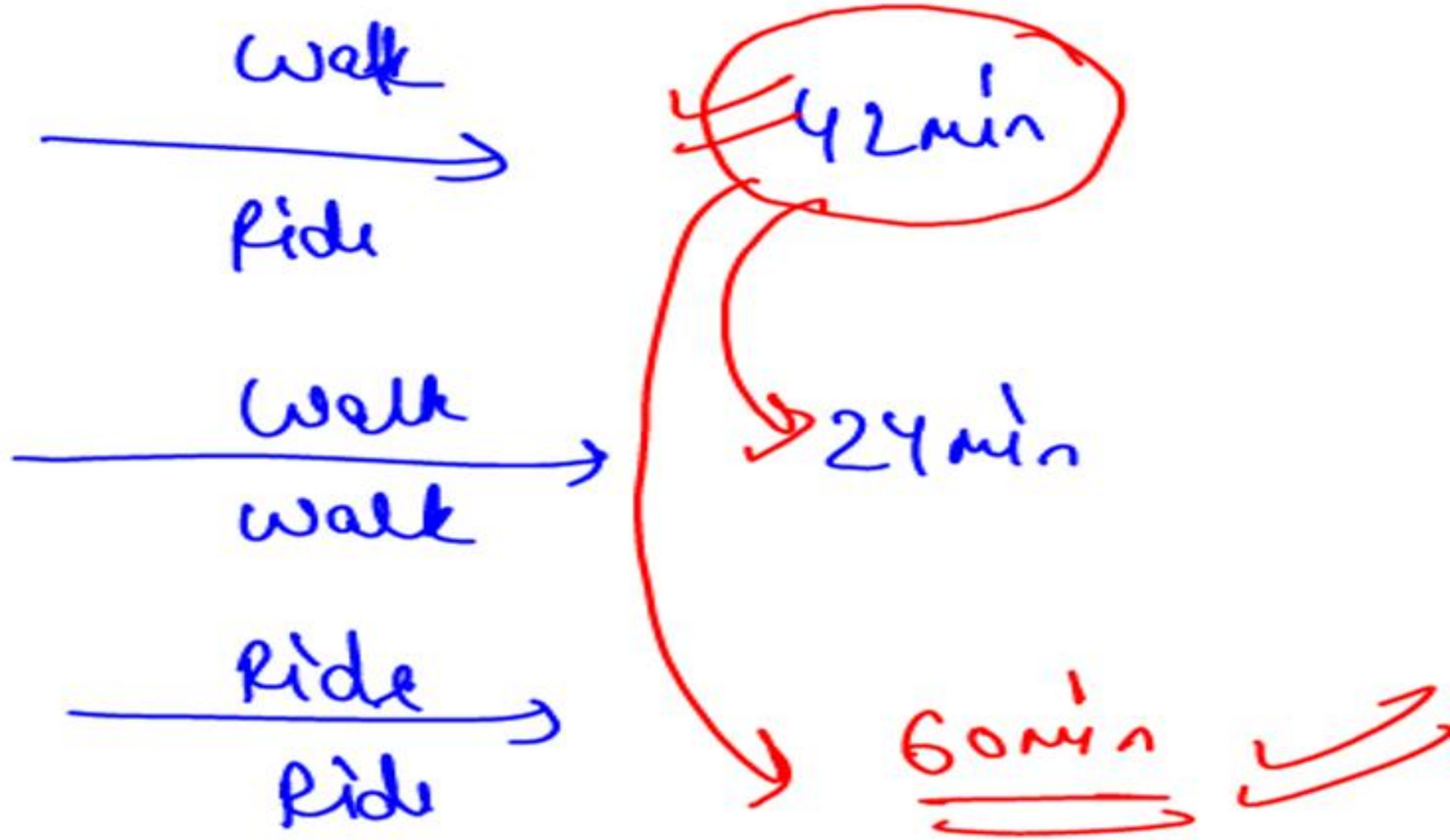
$\frac{1}{3} \times 60 = 20\text{ min}$

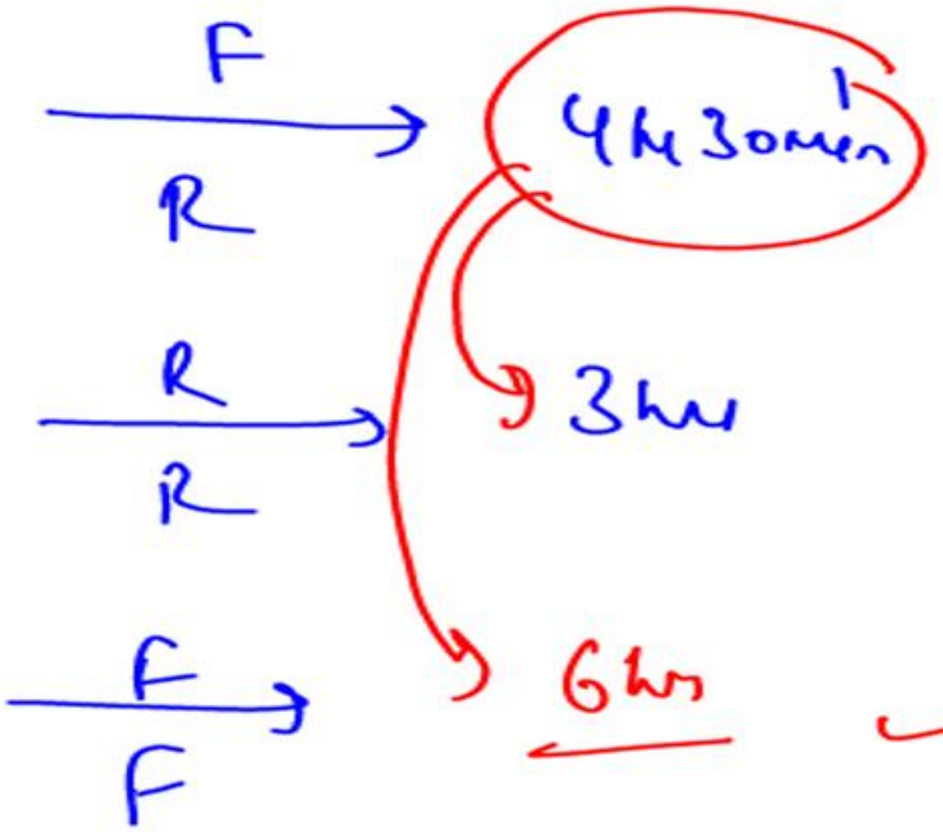


Eg6. I walk a certain distance and ride back taking a total time of 37 minutes. I could walk both ways in 55 minutes. How long would it take me to ride both ways?

(a) 9.5 min.
(b) 19 min.
(c) 18 min.
(d) 20 min.

eg





Eg7. A man walks a certain distance by foot and rides back on horse in 4 hr. 30 min. He could ride on horse both ways in 3hrs. The time required by the man to walk by foot both ways is :

(a) 4 hours 30 min.

(b) 4 hours 45 min.

(c) 5 hours

(d) 6 hours

gradeup

Ans. (b)

gradeup

Eg8. Ravi and Ajay start simultaneously from a place A towards B, 60 km apart. Ravi's speed is 4 km/hr less than that of Ajay. Ajay, after reaching B turns back and meets Ravi at a place 12km away from B. Ravi's speed is :

(a) 12 km/hour
(b) 10 km/hour
(c) 8 km/hour
(d) 6 km/hour

Time ∝ sec

Ravi - 4 Km/h

Ajay

48 Km → 2

72 Km → 3

D = S · T

gradeup

Ans. (c)

gradeup

D

Walk → 4 km/hr

Cycle → 9 km/hr

Time → 9 hr

Eg9. A man completes a journey of 61 km partially by walking at 4 km/hr and partially on bicycle at 9 km/hr. He takes 9 hr in total. How much distance did he cover by walking (in kms)?

(a) 16 (b) 31

(c) 45 (d) 12

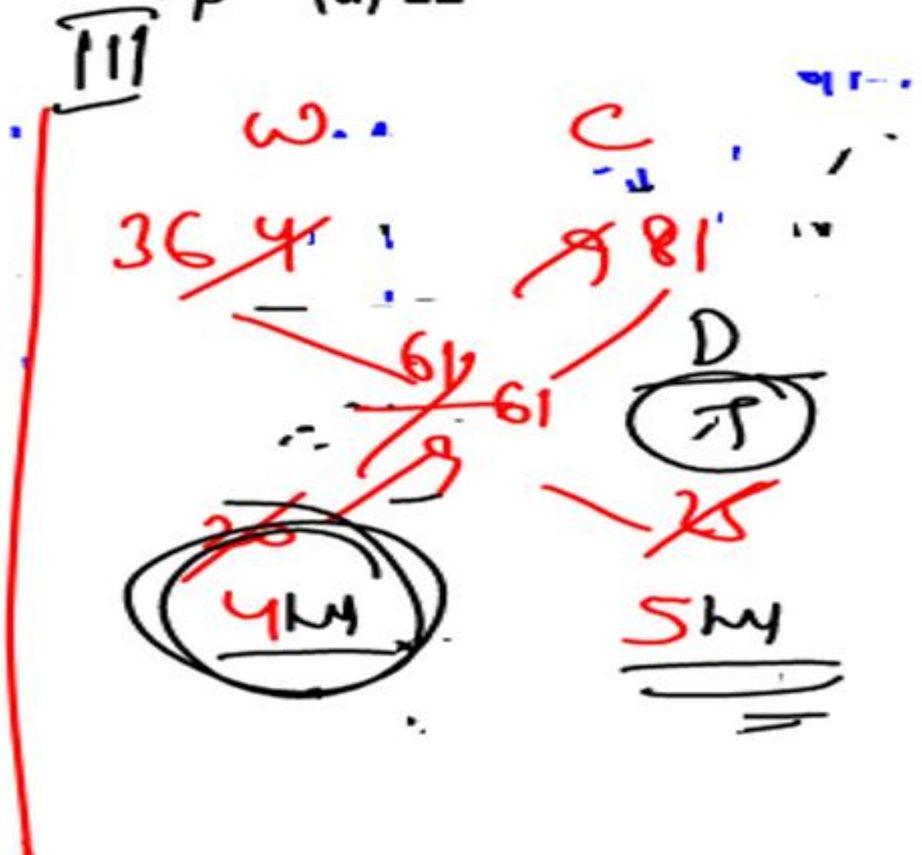
I^st Equation

$$\frac{D}{4} + \frac{61-D}{9} = 9$$

$$\frac{9D + 244 - 4D}{36} = 9$$

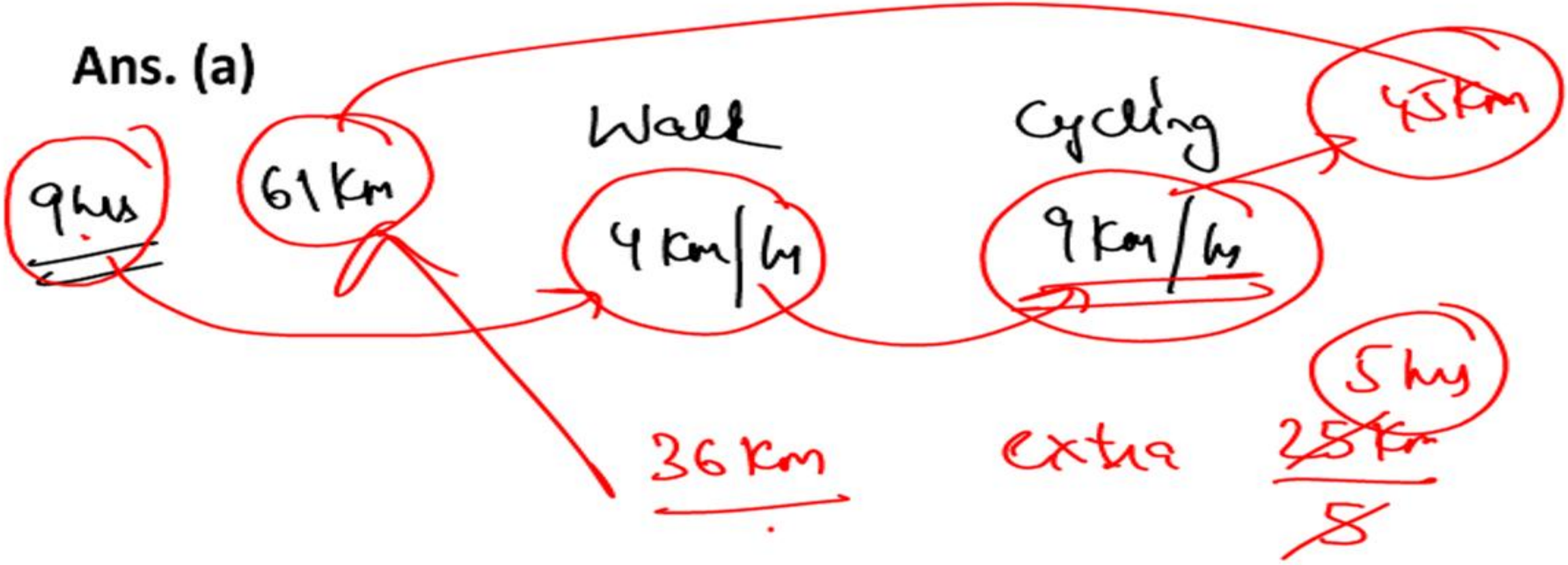
$$244 + 5D = 324$$

$$D = 16 \text{ km}$$



gradeup

Ans. (a)



Walk → 16Km

gradeup

Eg10. Ravi travels 300 km partly by train and partly by car. He takes 4 hours to reach. If he travels 60 km by train and rest by car. He will take 10 minute more if he were to travel 100 km by train and rest by car. The speed of the train is

(a) 50 km/hour
(b) 60 km/hour
(c) 100 km/hour
(d) 120 km/hour

	Train	Car	Time
Speed of Train → T	60 km	240 km	4 hr
Speed of Car → C	100 km	200 km	4 hr 10 min

I^st

$$\frac{60}{T} + \frac{240}{C} = 4 \quad -(1) \times 5$$

$$\frac{100}{T} + \frac{200}{C} = \frac{25}{6} \quad -(2) \times 6$$

$$\frac{300}{T} + \frac{1200}{C} = 20 \quad -(1)$$

$$\frac{600}{T} + \frac{1200}{C} = 25 \quad -(2)$$

$$\frac{300}{T} = 5$$

$$T = 60 \text{ km/hr}$$

gradeup

Train	Car	Time
60 km	240 km	4h

100 km — 200 km — 40 — 4h 10min — 10

300 km — 0 km — 240 km — 5hr — 960

60 km/h

gradeup

HOMEWORK

Eg11. A distance of 600 Km is to be covered in 2 parts. In 1st phase 120 Km is travelled by train and rest by car and it took total of 8 Hr, but if 200 Km is covered by train and rest by car it takes 20 min more. find the avg speed of car and train ?

(a) 80 & 60 km/hour

(b) 90 & 60 km/hour

(c) 120 & 90 km/hour

(d) 120 & 100 km/hour