TIME, SPEED AND DISTANCE-2_CSAT_ANSWER_EXPLANATION

Answer 1: (A)
Let the distance travelled by farmer on foot be x.
∴ Distance covered by cycling = (61 – x) km
Time = Distance/Speed
According to the question,

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

$$\Rightarrow \frac{9x+61\times4-4x}{9\times4}=9$$

$\Rightarrow$ 5x + 244 = 9 × 9 × 4 = 324
$\Rightarrow$ 5x = 324 – 244 = 80
$\Rightarrow$ x = 80/5 = 16 km

Answer 2: (C)
We know that, their speeds S_a & S_b are given as:

$$\frac{S_a}{S_b}=\frac{\sqrt{T_b}}{\sqrt{T_a}}$$

$$\frac{25}{S_b}=\frac{\sqrt{25}}{\sqrt{16}}$$

$$S_b=\frac{25\times4}{5}=20 \text{ km/h}$$

Answer 3: (C)
Let P and Q meet after t hours.
Distance = speed × time
According to the question,
30t – 20t = 36
$\Rightarrow$ 10t = 36
$\Rightarrow$ t = 3.6 hours
∴ Distance between P and Q = 30t + 20t
= 50t = (50 × 3.6) km = 180 km

Alternate method:
Here, a = 30, b = 20, d = 36

$$\text{Required distance} = \left(\frac{a+b}{a-b}\right)\times d$$

$$=\left(\frac{30+20}{30-20}\right)\times36=\frac{50}{10}\times36=180 \text{ km}$$

Answer 4: (C)
Distance covered in 10 minutes at 20 km/h = distance covered in 8 minutes at (20 + x) km/h

$$\Rightarrow 20\times\frac{10}{60}=(20+x)\times\frac{8}{60}$$

$\Rightarrow$ 200 = 160 + 8x
$\Rightarrow$ 8x = 40
$\Rightarrow$ x = 40/8 = 5 km/h

Answer 5: (C)

$$\text{Relative speed} = \frac{\text{Total distance}}{\text{Total time}}=\frac{60+90}{30} = 5 \text{ m/s}$$

∴ 5 m/s = 18 km/hr
Now, relative speed = speed of auto rickshaw – speed of lorry
$\Rightarrow$ 18 = 38 – speed of lorry
∴ Speed of lorry = 38 – 18 = 20 km/h

Answer 6: (A)

$$\frac{S_1}{S_2}=\sqrt{\frac{t_2}{t_1}}$$

$$\Rightarrow \frac{240}{S_2}=\sqrt{\frac{9}{16}}$$

$\Rightarrow$ S_2 = 320 kmph

Answer 7: (B)
Total distance travelled in 10 hours = (40 + 45 + 50 + ... upto 10 terms)
This is an A.P with first term, a = 40, number of terms (n) = 10, d = 2
Required distance =

$$\frac{n}{2}[2a+(n-1)d]=\frac{10}{2}[2\times40+(10-1)5] = 625 \text{ km}$$

Answer 8: (B)

$$\text{Time taken by Kamal} = \frac{3600}{72\times\frac{5}{18}} = 180 \text{ seconds}$$

$$\text{Time taken by Ajit} = \frac{3600}{108\times\frac{5}{18}} = 120 \text{ seconds}$$

$$\text{Time taken by Rahul} = \frac{3600}{144\times\frac{5}{18}} = 90 \text{ seconds}$$

Required time = LCM of 180, 120 and 90 seconds
= 360 seconds = 6 min

Answer 9: (D)
Speed of car = x km/h
Relative speed = (x – 5) km/h

$$\text{Time} = 6 \text{ minutes} = \frac{1}{10} \text{ hr}$$

Distance = 800 m = $\frac{4}{5}$ km

$\therefore$ Relative speed = Distance ÷ Time

$\Rightarrow x - 5 = \frac{4}{5} \times 10$

$\Rightarrow x - 5 = 8$

$\Rightarrow x = 13$ km/h

Answer 10: (A)

Let length of each train be x m.

Relative speed = 46 – 36 = 10 km/h

$= 10 \times \frac{5}{18} = \frac{25}{9}$ m/s

$\therefore$ Time taken in crossing = Length of both trains ÷ Relative speed

$\Rightarrow 36 = \frac{2x}{\frac{25}{9}}$

$\Rightarrow 2x = 36 \times \frac{25}{9} = 100$

$\Rightarrow x = 50$ m

Answer 11: (A)

Given: Length of train = 100 m

Speed of train = 60 km/hr = 60 × 5/18 = 50/3 m/s

Length of platform = 150 m

Total distance = Length of train + Length of platform

= 100 + 150 = 250 m

Required time = Distance/Speed = $\frac{250 \times 3}{50}$ = 15 sec

Answer 12: (A)

Original time = $\frac{3}{4-3} \times 30$ = 90 minutes

Answer 13: (D)

Time	60	:	20
	3	:	1
Speed	1	:	3

Hence, new speed = $\frac{60}{1} \times 3 = 180$ km/h

Answer 14: (C)

Let the normal speed be s km/h.

Then, new speed = (s + 5) km/h

Now, $\frac{300}{s} - 2 = \frac{300}{s+5}$

On solving this equation, we get:

s = 25 km/h

Hence, speed (s) = 25 km/h

Alternate method:

Let the normal speed be s km/h

Then, new speed = (s + 5) km/h

Distance = $\frac{\text{Product of speed}}{\text{Difference of speed}} \times$ Change in time

$\Rightarrow 300 = \frac{s \times (s+5)}{5} \times 2$

$\Rightarrow s \times (s + 5) = 750$

$\Rightarrow s = 25$ km/h

Answer 15: (A)

Let the length of the train be x m.

$\therefore$ Speed of train = $\frac{x+400}{36} = \frac{x+250}{30}$

$\Rightarrow \frac{x+400}{6} = \frac{x+250}{5}$

$\Rightarrow 5x + 2000 = 6x + 1500$

$\Rightarrow x = 500$ m

$\therefore$ Speed of train = $\frac{x+400}{36} = \frac{900}{36} = 25$ m/s

= 90 km/h

Answer 16: (A)

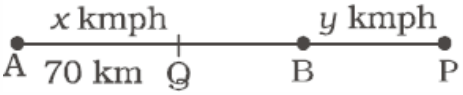
	Train 1	Train 2
Speed	11	23
Time	5	7
Distance	55	161

Total distance = 55 + 161 = 216 m

Relative speed = 23 – 11 = 12 m/s

Required time = $\frac{216}{12} = 18$ seconds

Answer 17: (B)



Let speed of car starting from A be x km/h and speed of car starting from B be y km/h.

Case I:

When cars meet at P,

7x = AP = AB + BP = 70 + 7y

$\Rightarrow$ 7x – 7y = 70

$\Rightarrow$ x – y = 10 .....(i)

Case II:

When cars meet at Q,

x + y = 70 .....(ii)

On adding these equations,

x = 40 km/h

Putting the value of x in equation (i),

y = 40 – 10 = 30 km/h

Answer 18: (A)

Suppose the speed of first train be x km/h.

Speed of second train = 30 km/h = 500 m/min

According to question,

$$\frac{\text{Total distance}}{\text{Relative speed}} = \frac{(66+88)}{x-500} = 0.168$$

$$\Rightarrow \frac{154}{x-500} = 0.168$$

$$\Rightarrow 0.168x - 84 = 154$$

$$\Rightarrow 0.168x = 238$$

$$\Rightarrow x = \frac{238}{0.168} = \frac{238\times1000}{168} \text{ m/min}$$

Hence, $x = \frac{238\times1000}{168}\times\frac{3}{50} = 85$ kmph

Answer 19: (A)

Here, a = 21, b = 14, d = 70

$$\text{Required distance} = \left(\frac{a+b}{a-b}\right)\times d$$

$$= \left(\frac{21+14}{21-14}\right)\times 70 = \frac{35}{7}\times 70 = 350 \text{ km}$$

Answer 20: (C)

Relative speed = 42 + 48 = 90 km/h = 25 m/s

Sum of the length of both trains

= 137 + 163 = 300 m

$\therefore$ Required time = 300/25 = 12 seconds

Answer 21: (C)

Let the speed of train be x km/h and its length be y km. When the train crosses a man, it covers its own length.

According to the question,

$$\frac{y}{(x-3)\times\frac{5}{18}} = 10$$

$$\Rightarrow 18y = 10\times5(x-3)$$

$$\Rightarrow 18y = 50x - 150 \quad \text{..... (i)}$$

Again, $\frac{y}{(x-5)\times\frac{5}{18}} = 11$

$$\Rightarrow 18y = 55(x-5)$$

$$\Rightarrow 18y = 55x - 275 \quad \text{.....(ii)}$$

From equations (i) and (ii),

$55x - 275 = 50x - 150$

$\Rightarrow 55x - 50x = 275 - 150$

$\Rightarrow 5x = 125$

$\Rightarrow x = 25$

$\therefore$ Speed of the train = 25 km/h

Answer 22: (C)

Let the Length of the train be x, then:

$$\text{Speed of the train} = \frac{x+162}{18} = \frac{x+120}{15}$$

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

$\Rightarrow 6x + 720 = 5x + 810$

$\Rightarrow x = 810 - 720 = 90$ m

$$\therefore \text{Speed of the train} = \frac{90+162}{18}$$

$$= \frac{252}{18}\times\frac{18}{5} = 50.4 \text{ km/h}$$

Answer 23: (B)

Let they meet t hours after 7 a.m.

$\therefore$ Distance covered by A in t hours = 20t km

Distance covered by B in (t – 1) hours = 25(t – 1) km

$\therefore 20t + 25(t-1) = 110$

$20t + 25t - 25 = 110$

$45t = 135$

$\therefore t = 3$

$\therefore$ They will meet at (7 am + 3 hours) = 10 am

Answer 24: (A)

In the same time, they cover 110 km and 90 km respectively.

For the same time, speed and distance is proportional.

So, ratio of their speed = 110 : 90 = 11 : 9

Answer 25: (B)

Let the length of each train be x m.

Then, Speed of first train = $\frac{x}{3}$ m/sec

Speed of second train = $\frac{x}{4}$ m/sec

They are moving in opposite direction, then:

$$\therefore \text{Relative speed} = \frac{x}{3} + \frac{x}{4} = \frac{7x}{12} \text{ m/s}$$

Total length = x + x = 2x m

$$\therefore \text{Time taken} = \frac{2x}{\frac{7x}{12}} = \frac{24}{7} = 3\frac{3}{7} \text{ sec}$$