



**PERSONALITY DEVELOPMENT ASSOCIATION
MADRAS INSTITUTE OF TECHNOLOGY
ANNA UNIVERSITY – CHENNAI
“DISCOVER THYSELF”**

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SOLUTIONS

1. Two, trains, one from Howrah to Patna and the other from Patna to Howrah, start simultaneously. After they meet, the trains reach their destinations after 9 hours and 16 hours respectively. The ratio of their speeds is:

- a)2:3 b)4:3 c)6:7 d)9:16

Solution:

Let us name the trains as A and B. Then,
(A's speed) : (B's speed) = $b : a = 16 : 9 = 4 : 3$.

Ans: **B**

2. Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. Fast train completely passes a man sitting in the slower train in 5 seconds. What is the length of the fast train?

- a)23 m b)209/9 m c)250/9 m d)29 m

Solution:

Relative speed=(40-20) km/hr=(20*5/18) m/s=(50/9) m/s

Length of faster train =(50/9)*5 m= (250/9) m

Answer: **C**

3. A train overtakes two persons who are walking in the same direction in which the train is going, at the rate of 2 kmph and 4 kmph and passes them completely in 9 and 10 seconds respectively. The length of the train is:

- a)45 m b)50 m c)54 m d)72 m

Solution:

2 kmph=(2*5/18) m/s =5/9 m/s

4 kmph=(4*5/18) m/s =10/9 m/s

Let the length of the train be x m and its speed as y m/s

Then, $\left(\frac{x}{y-9} \right) = 9$ and $\left(\frac{x}{y-10} \right) = 10$.

$\therefore 9y - 5 = x$ and $10(9y - 10) = 9x$

$\Rightarrow 9y - x = 5$ and $90y - 9x = 100$.

On solving, we get: $x = 50$.

Answer: **B**

4. A train overtakes two persons walking along a railway track. The first one walks at 4.5 km/hr. The other one walks at 5.4 km/hr. The train needs 8.4 and 8.5 seconds respectively to overtake them. What is the speed of the train if both the persons are walking in the same direction as the train?

- a)66 km/hr b)72 km/hr c)78 km/hr d)81 km/hr

Solution:

$$4.5 \text{ km/hr} = (4.5 \times 5/18) \text{ m/sec} = 1.25 \text{ m/sec, and}$$

$$5.4 \text{ km/hr} = (5.4 \times 5/18) \text{ m/sec} = 1.5 \text{ m/sec.}$$

$$\Rightarrow 8.4x - 10.5 = 8.5x - 12.75$$

$$\Rightarrow 0.1x = 2.25$$

$$\Rightarrow x = 22.5$$

$$\therefore \text{Speed of the train} = \left(22.5 \times \frac{18}{5} \right) \text{ km/hr} = 81 \text{ km/hr.}$$

Answer: **D**

5. A train travelling at 48 kmph completely crosses another train having half its length and travelling in opposite direction at 42 kmph, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the platform is

- a)400 m b)450 m c)560 m d)600 m

Solution:

Let the length of the first train be x metres.

The length of the second train is $(x/2)$ m

Relative speed = $(48 + 42)$ kmph = 25 m/s

$$(x + (x/2))/25 = 12 \text{ or } 3x/2 = 300 \text{ or } x = 200$$

Therefore the length of the first train is 200 m

Let the length of the platform be y m

Speed of the first train = $(48 \times 5/18)$ m/s = $40/3$ m/s

Therefore $(200 + y) \times 3/40 = 45$ which gives $y = 400$ m

Answer: **A**

6. Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph. Another train starts from B at 8 a.m. and travels towards A at a speed of 25 kmph. At what time will they meet?

- a)9 am b)10 am c)10.30 am d)11 am

Solution:

Suppose they meet x hours after 7 a.m.

Distance covered by A in x hours = $20x$ km.

Distance covered by B in $(x - 1)$ hours = $25(x - 1)$ km.

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

$$\Rightarrow 45x = 135$$

$$\Rightarrow x = 3.$$

So, they meet at 10 a.m.

Answer: **B**

7. A train 108 m long moving at a speed of 50 km/hr crosses a train 112 m long coming from opposite direction in 6 seconds. The speed of the second train is:

- a)48 km/hr b)54 km/hr c)66 km/hr d)82 km/hr

Solution:

Let the speed of the second train be x km/hr

Relative speed $= (x+50)$ km/hr

$$= ((x+50) * 5/18) \text{ m/s}$$

$$= ((250+5x)/18) \text{ m/s}$$

Distance covered $= (108+112)=220$ m

$$(220/((250+5x)/18))=6$$

$$250+5x=660$$

$$X=82 \text{ km/hr}$$

Answer: **D**

8. Two trains of equal lengths take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train be 120 metres, in what time (in seconds) will they cross each other travelling in opposite direction?

- a)10 b)12 c)15 d)20

Solution:

Speed of the first train $= (120/10) \text{ m/s} = 12 \text{ m/s}$

Speed of the second train $= (120/15) \text{ m/s} = 8 \text{ m/s}$

Relative speed $= (12+8) \text{ m/s} = 20 \text{ m/s}$

Required time $= ((120+120)/20) \text{ s} = 12 \text{ s}$

Answer: **B**

9. Two trains are running in opposite directions with the same speed. If the length of each train is 120 meters and they cross each other in 12 seconds, then the speed of each train (in km/hr) is:

- a)10 b)18 c)36 d)72

Solution:

Let the speed of each train be x m/s

Then, the relative speed of the two trains $= 2x \text{ m/s}$

$$\text{So, } 2x = (120+120)/12$$

$$2x = 20 \text{ or } x = 10$$

Therefore speed of each train $= 10 \text{ m/s} = 36 \text{ km/hr}$

Answer: **C**

10. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?

- a)120 m b)180 m c)324 m d)150 m

Solution:

Speed $= 60 \text{ km/hr} = 50/3 \text{ m/s}$

Length of the train $= (\text{speed} * \text{time})$

$$\text{Length of the train} = 50 * 9/3 = 150 \text{ m}$$

Answer: **D**

11. A train 125 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:

- a)45 km/hr b)50 km/hr c)54 km/hr d)55 km/hr

Solution:

Speed of the train relative to man $= (125/10) \text{ m/s} = 25/2 \text{ m/s} = 45 \text{ km/hr}$

Let the speed of the train be $x \text{ km/hr}$. then relative speed $= (x-5) \text{ km/hr}$

Therefore $x-5=45$ or $x=50 \text{ km/hr}$

Answer: **B**

12. The length of the bridge, which a train 130 m long travelling at 45 km/hr can cross in 30 seconds, is:

- a)200 m b)225 m c)245 m d)250 m

Solution:

Speed $= 45 \text{ km/hr} = 25/2 \text{ m/s}$

Time $= 30 \text{ s}$

Let the length of bridge be x ,

Then, $(130+x)/30 = 25/2$ or $x=245 \text{ m}$

Answer: **C**

13. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/hr, what is the length of the train?

- a)120 m b)240 m c)300 m d)360 m

Solution:

Speed $= 54 \text{ km/hr} = 15 \text{ m/s}$

Length of the train $= (15 \times 20) \text{ m} = 300 \text{ m}$

Let the length of the platform be $x \text{ m}$

Then, $(x+300)/36 = 15$

$x+300 = 540$ or $x = 240 \text{ m}$

Answer: **B**

14. A 270 m long train running at the speed of 120 km/hr crosses another train running in the opposite direction at the speed of 80 km/hr in 9 seconds. What is the length of other train?

- a)230 m b)240 m c)260 m d)320 m e)none of these

Solution:

Relative speed $= (120+80) \text{ km/hr} = 500/9 \text{ m/s}$

Let the length of the other train be $x \text{ m}$

Then $(x+270)/9 = 500/9$

$x+270 = 500$ or $x=230$

Answer: **A**

15. Two trains each 100 m long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast the other, then the speed of the faster train is:

- a)30 km/hr b)45 km/hr c)60 km/hr d)75 km/hr

Solution:

Let the speed of the slower train be x m/s

Then, the speed of the faster train $=2x$ m/s

Relative speed $= (x+2x)$ m/s $=3x$ m/s

Therefore $(100+100)/8 =3x$

$24x=200$ or $x=25/3$

So, speed of the faster train $=50/3$ m/s $=60$ km/hr

Answer: **C**

16. A train 110 m long is running with a speed of 60 km/hr. In what time will it pass a man who is running at 6 km/hr in the direction opposite to that in which train is going?

- a)5 sec b)6 sec c)7 sec d)10 sec

Solution:

Speed of the train relative to man $= (60+6)$ km/hr $=66$ km/hr $=55/3$ m/s

Therefore time taken to pass the man $= 110 \times 3/55$ s $=6$ s

Answer: **B**

17. A train 800 m long is running at a speed of 78 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in meters) is:

- a)130 b)360 c)500 d)540

Solution:

Speed $=78$ km/hr $=65/3$ m/s

Time $=1$ min $=60$ s

Let the length of the tunnel be x m

Then, $(800+x)/60 =65/3$

$3(800+x) =3900$

$X=500$

Answer: **C**

18. A train travelling at a speed of 75 mph enters a tunnel 3.5 miles long. The train is 0.25 miles long. How long does it take for the train to pass through the tunnel from the moment the front enters to moment the rear emerges?

- a)2.5 min b)3 min c)3.2 min d)3.5 min

Solution:

Total distance covered $= (3.5+0.25)$ miles $=3.75$ miles

Therefore time taken $= (3.75/(75))$ hrs $=1/20$ hrs $=3$ min

Answer: **B**

19. A 300 m long train crosses a platform in 39 seconds while it crosses a signal point in 18 seconds. What is the length of the platform?

- a)320 m b)350 m c)650 m d)data inadequate

Solution:

Speed $= (300/18)$ m/s $=50/3$ m/s

Let the length of the platform be x m

Then, $(x+300)/39 =50/3$

$$3(x+300)=1950$$

$$X=350 \text{ m}$$

Answer: **B**

20. A train moves past a telegraph post and a bridge 264 m long in 8 seconds and 20 seconds respectively. What is the speed of the train?

a)69.5 km/hr b)70 km/hr c)79 km/hr d)79.2 km/hr

Solution:

Let the length of the train be x m and its speed by y m/s

Then $x/y = 8$ therefore $x=8y$

$$\text{Now, } (x+264)/20 = y$$

$$8y+264= 20y$$

$$Y=22$$

Therefore speed= 22 m/s =79.2 km/hr

Answer: **D**