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CONCEPT 1 – BASIC PROBLEMS.

1. The speed of the bus is 72 km/hr. The distance covered by the bus in 5 secs is
   a. 50 m
   b. 100 m
   c. 60 m
   d. 745 m

Ans: b. 100

Explanation:

$$*4 \begin{pmatrix} 18\ km/hr \longrightarrow 5\ m/s. \\ 72\ km/hr \longrightarrow 20\ m/s. \end{pmatrix} *4$$

A*18 km/hr = A*5 m/s

1 sec – 20 m.

5 sec – 100 m.

2. A train is travelling at a rate of 45 km/hr. How many seconds will it take to cover a distance of ⅘ km.
   a. 36 s
   b. 64 s
   c. 90 s
   d. 120 s

Ans: b. 64 s

Explanation: Distance = ⅘ km = 4000 / 5 m = 800 m.

Speed = 45 km/hr = $45 * \frac{5}{18}$ m/s = 12.5 m/s.

1 sec – 12.5 m.

x sec – 800 m.

x = 800 / 12.5 = 64 s.

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3. The speed of the bus is 10 m/s. The distance covered by the bus in 5 hours is
    a. 108 km
    b. 80 km
    c. 180 m
    d. 180 km

Ans: d.180 km.

Explanation:

A*18 km/hr = A*5 m/s

10 m/s = 5*2 m/s = 18*2 km/hr = 36 km/hr.

1 hr = 36 km.

5 hrs = 36*5 = **180 km.**

4. A train starts from place A at 6 a.m. and arrives at another place B at 4.30 p.m. on the same day. If the train's speed is 40 km/hr, find the distance travelled by the train?
    a. 320 km
    b. 230 km
    c. 420 km
    d. 400 km

Ans: c. 420 km

Explanation:

Time = 10.5 hrs. (From 6:00 am to 4:30 pm).
Speed = 40 km/hr.
Distance travelled = 40 * 10.5 = **420 km.**

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CONCEPT 2 – RELATIVE SPEED.

1.WHEN THE TWO OBJECTS TRAVEL IN SAME DIRECTION:

- ➔ The speed of the first body is x km/hr.
- ➔ The speed of the second body is y km/hr.
- ➔ So, their relative speed is equal to (x – y) km/hr ; x>y.

2.WHEN THE TWO OBJECTS TRAVEL IN OPPOSITE DIRECTION:

- ➔ The speed of the first body is x km/hr.
- ➔ The speed of the second body is y km/hr.
- ➔ So, their relative speed is equal to (x + y) km/hr.

5. A train of length 200 meters crosses a man running at 10 km/hr in the same direction in 10 seconds. What is the speed of the train?
   a. 72 km/hr
   b. 95 km/hr
   c. 85 km/hr
   d. 82 km/hr

Ans: d. 82 km/hr

Explanation:

Speed = 200/10=20 m/s. We will convert it into Km/hr

20 X 18/5 = 72 km/hr

Now, let the speed of the train is X km/hr. So, the relative speed,

72 km/hr = X km/hr - 10 km/hr

X-10=72

X= 72+10

X= 82 km/hr

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6. A train of length 200 meters is moving at a speed of 80 km/hr. At what time will it cross a man who is running at 10 km/hr in the opposite direction of the train?
    a. 11 seconds
    b. 9 seconds
    c. 7 seconds
    d. 8 seconds

Ans: d. 8 seconds

Explanation:

Relative speed= Speed of train + Speed of man = 80 +10 = 90 km/hr

90 km/hr = 18*5 km/hr = 5*5 m/s = 25 m/s.

25 m = 1 sec

200 m = 8 sec.

7. Two trains move in the same direction at 50 km/h and 32 km/h respectively. A man in the slower train observes the 15 seconds elapse before the faster train completely passes by him. What is the length of the fastest train?
    a. 100 m
    b. 75 m
    c. 120 m
    d. 50 m

Ans: b. 75 m

Explanation:

Relative speed= Speed of train1 - Speed of train 2 = 50 - 32 = 18 km/hr

90 km/hr = 18*1 km/hr = 5*1 m/s = 5 m/s.

5 m = 1 sec

75 m = 15 sec.

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8. A train 180 m long moving at the speed of 20m/sec overtakes a man moving at a speed of 10 m/ sec in the same direction. The train passes the man in
    a. 9 sec
    b. 6 sec
    c. 18 sec
    d. 27 sec

Ans: c. 18 sec

Explanation: Relative speed= Speed of train1 - Speed of train 2 = 20 - 10 = 10 m/s

10 m = 1 sec

180 m = 18 sec.

CONCEPT 3 – TRAIN CROSSING A POLE/MAN, PLATFORM, TRAIN.

1.WHEN TRAIN PASSES A POLE OR STATIONARY MAN:

Distance covered will be equal to the length of the train

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

T — Crossing time, L — Length of the train, S — Speed of the train.

9. A train 110 m in length runs through a station at the rate of 36 km per hour. How long will it take to pass a pole?
    a. 11 sec
    b. 12 sec
    c. 13 sec
    d. 15 sec

Ans: a. 11 sec
Explanation:

Speed= 36 km/hr = 18*2 km/hr = 5*2 m/s = 10 m/s.

10 m = 1 sec

110 m = 11 sec.

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10. A train is running at a speed of 90 km/hr. If it crosses a signal in 10 sec.The length of the train (in metres) is
    a. 150 m
    b. 324 m
    c. 900 m
    d. 250 m

Ans: d. 250 m

Explanation: Speed= 90 km/hr = 18*5 km/hr = 5*5 m/s = 25 m/s.

1 sec — 25 m

10 sec — 250 m. (Length of the train)

2.WHEN TRAIN PASSES A BRIDGE / PLATFORM / TUNNEL:

Distance covered will be equal to length of train + length of bridge/platform.

$$T = \frac{Lt+Lp}{S}$$

T — Crossing time, L_t — Length of the train ; L_p — Length of the platform/bridge/tunnel, S — Speed of the train.

11. A train 540 m long is running at a speed of 72 km/hr. In what time will a tunnel 160 m long pass ?
    a. 40 sec
    b. 30 sec
    c. 35 sec
    d. 42 sec

Ans: c. 35 sec

Explanation: Total distance = (540 + 160) m = 700 m.

Speed: 72 km/ hr = 18*4 km/hr = 5*4 m/s = 20 m/s.

20 m — 1sec

700 m — 35 sec.

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3.WHEN TRAIN PASSES ANOTHER TRAIN IN SAME DIRECTION:

Distance covered will be equal to the length of 2 trains.

$$T = \frac{L1+L2}{S1 \sim S2}$$

T — Crossing time.

L_1 — Length of the train1 ; L_2 — Length of the train2.

S_1 — Speed of the train1 ; S_2 — Speed of the train2.

12. A train 110 m in length runs through a station at the rate of 36 km per hour. How long will it take to pass another train 240 m in length that runs at a rate of 57 km/hr in the same direction?
    a. 60 sec
    b. 50 sec
    c. 65 sec
    d. 70 sec

Ans: a. 60 sec

Explanation:

Total distance = (110 + 240) m = 350 m.

Speed 1 = 36 km/hr ; Speed 2 = 57 km/hr.

Relative Speed = $S_1 \sim S_2$ = 21 km/hr = 21 X 5/18.

35/6 m — 1 sec

350 m — 60 sec.

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13. Two trains start from a certain place on two parallel tracks in the same direction. The speed of the trains are 45 km/hr and 40 km/hr respectively. The distance between the two trains after 45 minutes will be
    a. 3.75 km
    b. 2.75 km
    c. 1.75 km
    d. 4.75 km

Ans: a. 3.75 km

Explanation:

Time = 45 mins = ¾ hr.

Distance = Relative Speed * Time

= 5 * (3/4)

=3.75 km.

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4.WHEN TRAIN PASSES ANOTHER TRAIN IN OPPOSITE DIRECTION:

Distance covered will be equal to the length of 2 trains.

$$T = \frac{L1+L2}{S1+S2}$$

T — Crossing time, L_1 — Length of the train1 ; L_2 — Length of the train2,

S_1 — Speed of the train1 ; S_2 — Speed of the train2.

14. A train 230 m in length runs through a station at the rate of 90 km/hour. How long will it take to pass another train 370 m in length that runs at a rate of 180 km/hr in the opposite direction?
    a. 24 seconds
    b. 16 seconds
    c. 8 seconds
    d. 5 seconds

Ans: c. 8 seconds

Explanation:

Total distance = (230 + 370) m = 600 m.

Speed 1 = 90 km/hr = 25 m/s ; Speed 2 = 180 km/hr = 50 m/s.

Relative Speed = S_1 + S_2 = 75 m/s.

75 m — 1 sec

600 m — 8 sec.

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15. Two trains one 160 m and the other 140 m long are running in opposite directions on parallel tracks, the first at 57 km an hour and the other at 33 km an hour. How long will they take to cross each other?
    a. 12 seconds
    b. 4 seconds
    c. 6 seconds
    d. 10 seconds

Ans: a. 12 seconds

Explanation:

Total distance = (160 + 140) m = 300 m.

Speed 1 = 57 km/hr ; Speed 2 = 33 km/hr.

Relative Speed = $S_1 + S_2$ = 90 km/hr = 25 m/s.

25 m — 1 sec

300 m — 12 sec.

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5.WHEN A TRAIN PASSES A PERSON SITTING IN ANOTHER MOVING TRAIN:

Distance covered will be equal to the length of the train.

$$T = \frac{L}{RELATIVE\ SPEED}$$

T — Crossing time, L — Length of the train,

S_1 — Speed of the train1 ; S_2 — Speed of the train2.

16. A person sitting in a train travelling at a speed of 72 km/hr is crossed by another train of length 525 m travelling in the opposite direction in 15 seconds, then find the speed of the second train in km/hr?
    a. 36 km/hr
    b. 54 km/hr
    c. 60 km/hr
    d. 66 km/hr

Ans: b. 54 km/hr

Explanation:

Relative Speed = 525 / 15 = 35 m/s = 5*7 m/s = 18*7 k/hr = 126 km/hr.

$S_1 + S_2 = 126$ km/hr.

$S_2 = 126 - 72 =$ **54 km/hr.**

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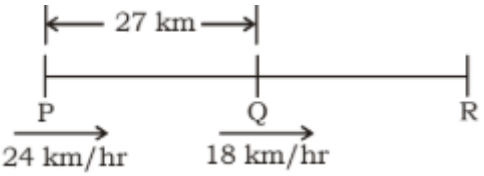
17. P and Q are 27 km away. Two trains with speeds of 24 km/ hr and 18 km/hr respectively start simultaneously from P and Q and travel in the same direction. They meet at a point R beyond Q. Distance QR is:
    a. 126 km
    b. 81 km
    c. 48 km
    d. 36 km

Ans: b. 54 km/hr

Explanation:



Relative Speed = S_1 - S_2 = 24-18 = 6 km/hr

Time required = 27/6 = 9/2 hr.

Distance between Q and R = 18 X 9/2 = **81 km.**

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NOTE: From question number 12 - 18 use the formula to save your valuable time

18. If a train crosses a standing man/a pole in '4' sec and crosses '150' meter long platform in '10' sec, then length of the train is
    a. 120 m
    b. 180 m
    c. 200 m
    d. 100 m

Ans: d. 100 m

Explanation:

Speed of the train = Length of the train / 4 = [Length of the (Train + Platform)] / 10

$$L_T * 10 = (L_T + L_P) * 4$$

$$L_T * 6 = 150 * 4$$

$$L_T = 100 \text{ m.}$$

ALTERNATIVE :

If a train crosses a standing man/a pole in 't1' sec time and crosses 'P' meter long platform in 't2' sec time, then

$$\text{Length of the train} = \frac{P*t1}{t1 \sim t2}$$

$$L_T = \frac{150*4}{4 \sim 10} = \frac{150*4}{6} = 100 \text{ m.}$$

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19. Two trains of equal length take 15 seconds and 25 seconds respectively to cross a telegraph post. If the length of each train is 150 meters. In what time (in seconds) will they cross each other in the same direction?
    a. 37.5 sec
    b. 75 sec
    c. 35 sec
    d. 65 sec

Ans: b. 75 sec.

Explanation:

Time taken by both the trains to cross each other,

$$T = \frac{2 * Product\ of\ Time}{Difference\ of\ time}$$

$$T = \frac{2 * 15 * 25}{10}$$

T = 75 sec.

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20. Two trains of equal length take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train is 120 meters. In what time (in seconds) will they cross each other in opposite directions?
    a. 20 sec
    b. 12 sec
    c. 15 sec
    d. 10 sec

Ans: b. 12 sec

Explanation:

Time taken by both the trains to cross each other,

$$T = \frac{2*Product\ of\ Time}{Sum\ of\ time}$$

$$T = \frac{2*10*15}{25}$$

T = 12 sec.

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21. Two trains starting from stations A and Band travel towards each other at 50 km/hr and 60km/hr respectively. At the time of their meeting the second train had travelled 120 km more than the first. The distance between A and B is
    a. 990 km
    b. 1200 km
    c. 1320 km
    d. 1440 km

Ans: c. 1320 km

Explanation:

Distance between A and B is,

$$D = \frac{Sum\ of\ Speeds}{Difference\ of\ Speeds} * Extra\ distance\ covered.$$

$$D = \frac{110}{10} * 120$$

D = 1320 km.

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22. Without any stoppage a person travels a certain distance at an average speed of 42 km/hr, and with stoppages he covers the same distance at an average speed of 28 km/hr. How many minutes per hour does he stop ?
    a. 14 mins
    b. 15 mins
    c. 28 mins
    d. 20 mins

Ans: d. 20 mins

Explanation:

$$Stoppage\ time/hr = \frac{Difference\ of\ Speeds}{Speed\ without\ stoppage}$$

$$Stoppage\ time/min = \frac{Difference\ of\ Speeds}{Speed\ without\ stoppage} * 60$$

$$T = \frac{14}{42} * 60$$

Stoppage time/min = 20 mins.

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23. Two trains, A and B, start from stations X and Y towards each other. They take 4 hours 48 minutes and 3 hours 20 minutes to reach Y and X respectively after they meet if train A is moving at 45 km/hr, then the speed of train B is.
    a. 3 : 1
    b. 3 : 2
    c. 1 : 1
    d. 2 : 1

Ans: c. 1:1

Explanation:

$$\frac{SA}{SB} = \sqrt{\frac{TB}{TA}}$$

T_A = 4 hrs 48 mins = 4 (⅘) = 24/5 hrs.

T_B = 3 hrs 20 mins = 3 (1/3) = 10/3 hrs.

$$\frac{45}{SB} = \sqrt{\frac{10}{3}} * \sqrt{\frac{5}{24}}$$

$$\frac{45}{SB} = \sqrt{\frac{25}{36}}$$

S_B = 54 km/hr.

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24. The distance between Station A and Station B is 778 km.What is the average speed of a train that travels from station A to station B at a uniform speed of 40 kmph and returns to the initial station at 60 kmph?
    a. 48 kmph
    b. 40 kmph
    c. 24 kmph
    d. 60 kmph

Ans: a. 48 kmph

Explanation:

$$\text{AVERAGE SPEED} = \frac{2*S1*S2}{S1+S2}$$

$$= \frac{2*40*60}{100}$$

Average Speed = 48 kmph.

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25. The ratio between the speeds of two trains is 5 : 7. If the first train covers 300 km in 3 hours, then the speed of the second train is
    a. 140 km/hr
    b. 150 km/hr
    c. 120 km/hr
    d. 130 km/hr

Ans: a. 140 km/hr

Explanation:

First train :

Speed : 3 hrs — 300 km

1 hr — 100 km which is 5 units.

Second train :

Speed : 7 units — 140 km/hr.

ALTERNATIVE:

Speed of the second train must be a multiple of 7 units.According to the options, **opt(a) - 140 km/hr** will be an Ans.

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26. Points 'A' and 'B' are 70 km apart on a highway and two cars start at the same time. If they travelin the same direction, they meet in 7 hours, but if they travel towards each other they meet in one hour. Find the speed of the two cars (in km/hr).
    a. 20, 30
    b. 40, 30
    c. 30, 50
    d. 20, 40

Ans: b. 40, 30

Explanation:

Let the speed of the cars be S1and S2

S1 – S2 =70 / 7 = 10
S1 + S2 =70 / 1 = 70

Solving 1 and 2, S1 = 40 km/hr ; S2 = 30 km/hr.