BIZOTIC
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APTITUDE MASTERY SERIES

MODULE 7 – TIME, SPEED AND DISTANCE

1. By walking at 3/4th of his usual speed, a man reaches office 20 minutes later than usual. What is his usual time?

(a) 30 min **(b) 60 min** (c) 70 min (d) 50 min

Solution:

$\frac{3}{4}$ of a man's usual speed means, he takes $\frac{4}{3}$ of his usual time to cover the same distance. i.e., he takes:

$= \frac{4}{3} - 1$

$= \frac{1}{3}$ time extra.

$\frac{1}{3}$ time is 20 minutes (given)

Usual time = 20 x 3 = 60 minutes.

2. Walking at the speed of 5 km/hr from his home, Ajay misses his train by 7 minutes. Had he walked 1 km/hr faster, he would have reached the station 5 minutes before the actual departure time of the train. Find the distance between his home and the station?

(a) 6 km (b) 8 Km (c) 10 Km (d) 12 Km

Solution:

Let the distance between his home and the station be 'd' km.

→Time required to reach the station at 5 km / hr = d/5 hours

→Time required to reach the station at 6 km / hr = d/6 hours

Now, the difference between these times is 12 minutes = 0.2 hours. (7 minutes late – 5 minutes early = (7) – (-5) = 12 minutes)

Therefore, (d / 5) – (d / 6) = 0.2

→d / 30 = 0.2

→d = 6

Thus, the distance between his home and the station is 6 km.

3. A man travels 800 km by train at 80 km/hr, 400 km by car at 60 km/hr and 200 km by cycle at 20 km/hr. What is the average speed of the journey?

(a) 139/40 Km/hr **(b) 140/9 Km/hr** (c) 126/9 Km/hr (d) 116/11 Km/hr

Solution:

Avg. Speed = Total distance/time taken

(800 + 400 + 200) / [(800/80) + (420/60) + (200/20)]

→1400 / (10 + 70 + 10)

→1400/90

→140/9 km/hr

4. Two trains start at the same time from Pune and Delhi and proceed towards each other at 80 kmph and 95 kmph respectively. When they meet, it is found that one train has travelled 180 km more than the other. Find the distance between Delhi and Pune?

(a) 2000 Km (b) 2150 Km **(c) 2100 Km** (d) 2300 Km

Solution:

Let t be the time after they meet

Distance1 = Speed * Time = 80 * t = 80t

Distance2 = Speed * Time = 95 * t = 95t

As the distance gap between both trains is 180 kms

Therefore, we can say that:

95t - 80t = 180

15t = 180

t = 12 seconds

Total Distance, (95+80) t = 175 * 12 (t = 12)

Distance = 2100 kms

5. Indrayani Express leaves Pune for Bombay at 17:30 hrs and reaches Bombay at 21:30 hrs. While, Shatabdi, which leaves Bombay at 17:00 hrs reaches Pune at 20:30 hrs. At what time do they pass each other?

(a) 19:06 hrs (b) 16:04 hrs (c) 18:23 hrs (d) 17:36 hrs

Solution:

Let the distance between Bombay and Pune = d km

Indrayani's Speed = (d/4) kmph and that of Shatabdi = (d/3.5) kmph

Let t be the time in hrs after Shatabdi has left for Pune, when the two trains meet

Therefore, distance travelled by Shatabdi = (d/3.5)* t

And that of Indrayani = (d/4) * (t-30/60)

The sum of the distances travelled by the two trains = distance between Bombay and Pune = d km

Therefore, (d/3.5)* t + (d/4) * (t-30/60)=d

Solving for t, we get t = 2.1 hrs or 2 hrs and 6 mins

Hence, the two trains meet at 19:06 hrs

6. A boy can swim in still water at 4.5 km/h, but takes twice as long to swim upstream than downstream. The speed of the stream is?

(a) 1.8 Kmph (b) 2 Kmph (c) 2.2 Kmph **(d) 1.5 Kmph**

Solution:

Speed of Boy is B = 4.5 kmph

Let the speed of the stream is S = x kmph

Then speed in Down Stream = 4.5 + x

Speed in Up Stream = 4.5 - x

As the distance is same,

→4.5 + x = (4.5 - x)2

→4.5 + x = 9 -2x

3x = 4.5

x = 1.5 kmph

7. Rajesh rows in still water with a speed of 4.5 kmph to go to a certain place and comes back. Find his average speed for the whole journey, if the river is flowing with a speed of 1.5 kmph?

(a) 2 Kmph **(b) 4 Kmph** (c) 6 Kmph (d) 8 Kmph

Solution:

Let the distance in one direction = k kms

Speed in still water = 4.5 kmph

Speed of river = 1.5

Hence, speed in upstream = 4.5 - 1.5 = 3 kmph

Speed in downstream = 4.5 + 1.5 = 6 kmph

Time taken by Rajesh to row upwards = k/3 hrs

Time taken by Rajesh to row downwards = k/6 hrs

Now, required average speed = $\frac{Total\ distance}{Total\ speed} = \frac{2k}{\frac{k}{3}+\frac{k}{6}}$

$= \frac{2k \text{ x } 18}{6k+3k} = 4$ kmph

Therefore, the average speed of the whole journey = 4kmph.

8. Two persons start running simultaneously around a circular track of length 300 m from the same point at speeds of 15 km/hr and 25 km/hr. When will they meet for the first time anywhere on the track if they are moving in opposite directions?

(a) 27 sec (b) 31 sec (c) 23 sec (d) 29 sec

Solution:

Time taken to meet for the first time anywhere on the track

= length of the track / relative speed

= 300 / (15 + 25)5/18 = 300x 18 / 40 x 5 = 27 seconds.

9. A man is riding a bike with front and back wheel circumference of 40 inches and 70 inches respectively. If the man rides the bike on a straight road without slippage, how many inches will the man have travelled when the front wheel has made 15 revolutions more than the back wheel?

(a) 1100 (b) 1300 **(c) 1400** (d) 1200

Solution:

Given the ratio of the circumference of front wheel is 40 inches and back wheel is 70 inches

Distance covered = Circumference of the wheel × No. of Revolutions made by the wheel

If n is the number of revolutions made by back wheel, the number of revolutions made by front wheel is n+15

Distance covered by both the wheels is the same

40*(n+3) = 70n

n=20

	Front wheel	:	Back Wheel
Circumference	40	:	70
Revolutions	35	:	20

Distance covered: 40×35 = 70×20 = 1400 inches.

10. In a race of 200 m, A can beat B by 31 m and C by 18 m. In a race of 350 m, C will beat B by?

(a) 21 m (b) 19 m **(c) 25 m** (d) 22 m

Solution:

A:B = 200 : 169

A:C = 200 : 182

$\frac{C}{B} = \frac{C}{A} \text{ x } \frac{A}{B}$

$\frac{182}{200} \text{ x } \frac{200}{169}$

➔ 182 : 169

When C covers 182 m, B Covers 169 m

When C covers 350 m, B Covers $\frac{169}{182}$ x 350

➔ 325 m

So C beats B by (350 – 325) = 25 m

11. K is 50% faster than L. L starts at 9 A.M. and K starts at 10 A.M. L travels at a speed of 50 km/hr. If L and K are 300 kms apart, the time when they meet when they travel in opposite direction is?

(a) 12 pm (b) 1 pm (c) 11 am (d) 11:30 am

Solution:

let 't' be the time after which they met since L starts.

Given K is 50% faster than L

50 t + 1.5*50(t-1) = 300

50 t +75 t = 300 + 75

t = 375 / 125 = 3 hrs past the time that L starts

So they meet at (9 + 3) hrs = 12:00 noon.

12. 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 metres and its speed by y m/sec.

Then, x/y = 8 => x = 8y

Now, (x+264)/20 = y

8y + 264 = 20y

y = 22.

Speed = 22 m/sec = (22*18/5) km/hr = 79.2 km/hr.

13. A boat sails 15 km of a river towards upstream in 5 hours. How long will it take to cover the same distance downstream, if the speed of current is one-fourth the speed of the boat in still water:

(a) 1.8 h **(b) 3 h** (c) 4 h (d) 5 h

Solution:

Upstream speed = B-S

Downstream speed = B+s

B-S = 15/5 = 3 km/h

Again B= 4S

Therefore B-S = 3= 3S

S = 1 and B= 4 km/h

Therefore, B+S = 5km/h

Therefore, Time during downstream = 15/5 = 3h

14. Arun, Barun and Kiranmala start from the same place and travel in the same direction at speeds of 30, 40 and 60 km per hour respectively. Barun starts two hours after Arun. If Barun and Kiranmala overtake Arun at the same instant, how many hours after Arun did Kiranmala start?

(a) 3.0 (b) 3.5 **(c) 4.0** (d) 4.5

Solution:

Let us assume that Arun started running at 10 AM and Barun started at 12 noon.

So, in these two hours distance travelled by Arun is 60 km and the relative speed of Barun w.r.t Arun is 10 km/hr.

So Barun will overtake Arun after =60/10=6 hrs

So, Barun reaches there at 6 PM.

So, Kiranmala also overtakes Arun at 6 PM.

Let us assume Kiranmala takes t time to overtake Arun and the relative speed of Kiranmala w.r.t Arun is 30 km/hr and Arun ran for 8 hrs.

So, distance travelled by Arun is:

=time×speed

=8×30 -------- (1)

While Kiranmala's distance travelled is:

=t×60 -------- (2)

Since distance traveled by them is equal,

⇒(1)=(2)

⇒8×30=t×60

t=4 hours

So, after 4 hrs, Kiranmala will start running

15. Three friends A, B and C run around a circular track of length 120 metres at speeds of 5 m/sec, 7 m/sec and 15 m/sec, starting simultaneously from the same point and in the same direction. How often will the three of them meet?

(a) Every 30 seconds

(b) Every 60 seconds

(c) Every 120 seconds

(d) None of these

Solution:

The problem can be solved as follows:

A and B will meet for the first time in

➔ $\left(\frac{Circumference\ of\ the\ track}{Relative\ speed}\right) seconds$

$\left(\frac{120}{2}\right) = 60\ seconds$

This also means that A and B will continue meeting each other every 60 seconds.

Next find out when B and C will meet for the first time.

B and C will meet for the first time in $\frac{120}{8}$=15 seconds

This also means that they will meet every 15 seconds after they meet for the first time i.e. A and B meet every 60 seconds and multiples of 60 seconds and B and C meet every 15 seconds and multiples of 15 seconds.

The common multiples to both these time, will be when A and B and B and C will meet i.e. when A, B and C will meet.

The common multiple of 60 and 15 will be 60,120,180 etc. i.e. they will meet every 60 seconds

HOME WORK

16. A goods train and a passenger train are running on parallel tracks in the same direction. The driver of the goods train observes that the passenger train coming from behind overtakes and crosses his train completely in 60 sec. Whereas a passenger on the passenger train marks that he crosses the goods train in 40 sec. If the speeds of the trains be in the ratio 1:2, find the ratio of their lengths?

(a) 3:1 **(b) 2:1** (c) 3:2 (d) 4:3

Solution:

Let the speeds of the two trains be s and 2s m/s respectively.

Also, suppose that the lengths of the two trains are P and Q metres respectively.

Then,

$\frac{P+Q}{2s-s} = 60$ → (i)

And

$\frac{P}{2s-s} = 40$ → (ii)

On dividing these two equations we get

$$\frac{P+Q}{P} = \frac{60}{40}$$

P : Q = 2: 1

17. A race course is 400 m long. A and B run a race and A wins by 5m. B and C run over the same course and B wins by 4m. C and D run over it and D wins by 16m. If A and D run over it, then who would win and by how much?

(a) A by 7.2 m (b) A by 8.4 m **(c) D by 7.2 m** (d) D by 8.4 m

Solution:

If A covers 400m, B covers 395 m

If B covers 400m, C covers 396 m

If D covers 400m, C covers 384 m

Now if B covers 395 m, then C will cover 396/400×395=391.05m

If C covers 391.05 m, then D will cover 400/384×391.05=407.24

If A and D run over 400 m, then D wins by 7.2 m (approx.)

18. Two identical trains A and B, running in opposite direction at same speed take 2 minutes to cross each other completely. The number of bogies of A are increased from 12 to 16. How much more time would they now require to cross each other?

(a) 50 sec (b) 40 sec (c) 60 sec **(d) 20 sec**

Solution:

Total initial bogies is 12+12=24

Additional bogies =16−12=4

24 bogies take 2 minutes.

4 bogies will take:

$=\frac{2 \times 60}{24} \times 4$

= 20 sec.

19. A motorboat whose speed is 15 km/hr in still water goes 30km downstream and comes back in four and a half hours. The speed of the stream is:

(a) 4.5 km/hr (b) 6 km/hr (c) 7 km/hr **(d) 5 km/hr**

Solution:

Let the speed of the stream be 's' km/hr.

Then, upward speed = (15−s) km/hr

and downward speed = (15+s) km/hr

Therefore,

$$\frac{30}{(15+s)} + \frac{30}{(15-s)} = 4.5$$

On solving this equation we get, s = 5 km/hr

20. A monkey tries to ascend a greased pole 14 m high. He ascends 2 m in first two minutes and slips 1 m in alternate minute. If he continues to ascend in this fashion, how long does he take to reach the top?

(a) 22 min (b) 24 min **(c) 25 min** (d) 26 min

Solution:

In every two minutes he is able to ascend 1 m. In this fashion he ascends up to 12 m because when he reaches at the top he does not slip down. Thus, up to 12 m he takes 12×2=24 min. and for the last 2 m he takes 1 m.

Therefore, total time taken by him is 24+1 = 25 min to reach the top