DI Mixed Chart Questions for IBPS PO Mains, SBI PO Mains, and RBI Grade B Exams.

DI Mixed Chart No.86

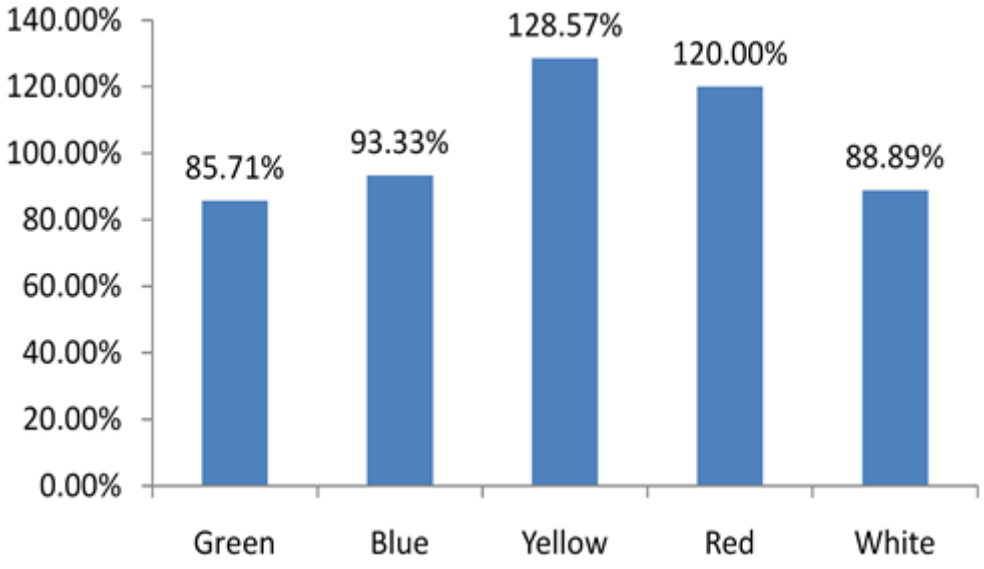
Directions : Study the following table and bar chart carefully and answer the questions given beside.

Five teams - Green, Blue, Red, Yellow and White participate in a relay race of 400m. In the relay race first 200m are run by Starter and next 200 m are run by Finisher, the finisher starts running when the baton is passed on to him by the starter, after completing the first 200 m.

The table below shows the players of each team

Team	Starter	Finisher
Green	J	K
Blue	M	N
Yellow	P	Q
Red	S	T
White	U	V

The chart given below shows the time the finisher of each team would take to complete the 400m race alone as a percent of the time taken by his team when both starter and finisher are running their respective distance.



Team Blue takes 28.57% less time than team Green. The time taken by team Yellow is 200% of time taken by team Red. Time taken by team blue is 25% less that by team Red. Team White takes 12.5% more time than team yellow.

1. The speed of starter of team Green is what percent of the speed of the finisher of team Red?

A. 75% B. 100% C. 125% D. 114.28% E. 80%

2. The distance between P and Q when U reaches halfway his course is what percent of the distance between U and V when Q finishes the race?

A. 25% B. 12.5% C. 16.67% D. 20% E. 37.5%

3. Team Red runs in the reverse direction, starts from the finish line and ends at the starting line. What will be the distance between T and N when J passes the baton to K?

A. $172\frac{11}{19}$ m B. $180\frac{20}{21}$ m C. $180\frac{17}{21}$ m D. 175 m E. $172\frac{15}{19}$ m

4. After reaching finish line N turns back and runs towards starting line. After passing the baton to N, M runs towards the starting line until J passes the baton to K, after which M again turns and runs towards the finish line and meets N for the second time. The distance between J and K, when M and N meet for the second time is what percent of the distance between M and N when J passes baton to K?

A. 52.33% B. 66.67% C. 16.8% D. 83.33% E. 74.67%

5. S and K, M and V, and U and T are three pairs of players who replaced each other from their respective positions in their teams. The names of the team remain the same. The distance between K and U when Team green finishes the race, is what percent of the distance between T and M when baton is passed from starter to finisher in team Red?

A. 123.33% B. 58.67% C. 62.5% D. 176% E. 93.33%

Correct Answers:

1	2	3	4	5
B	C	B	E	D

Explanations:

1. From the chart,

In team green, starter is J and finisher is K

Time taken by K to finish 400m race = 85.71% (Time taken by team Green)

$$\frac{\text{Time (K – 400m)}}{\text{Time (Green)}} = \frac{6}{7}$$

So, $\frac{\text{Time (K – 200m)}}{\text{Time (Green)}} = \frac{3}{7}$

Time (Green) = Time (J – 200) + Time (K – 200)

$$\frac{\text{Time (K – 200)}}{\text{Time (J – 200)}} = \frac{3}{4}$$

So in team Green, $\frac{\text{Time (K)}}{\text{Time (J)}} = \frac{3}{4}$

Let the time taken by J = 4g and that by K = 3g

Similarly we can find the time ratio of the players of each team,

Team	Green	Blue	Yellow	Red	White
Time ratio Starter/Finisher	4/3	8/7	5/9	2/3	5/4
Time Starter	J (4g)	M (8b)	P (5y)	S (2r)	U (5w)
Time Finisher	K (3g)	N (7b)	Q (9y)	T (3r)	V (4w)
Time Team	7g	15b	14y	5r	9w

Team Blue takes 28.57% less time than team Green

$$\text{Time (Blue)} = \frac{5}{7} \times \text{Time (Green)}$$

$$15b = \frac{5}{7} \times 7g$$

$$\frac{b}{g} = \frac{1}{3}$$

Time taken by team blue is 25% less that by team Red.

$$\text{Time (Blue)} = \frac{3}{4} \times \text{Time (Red)}$$

$15b = \frac{3}{4} \times 5r$

$\frac{b}{r} = \frac{1}{4}$

The time taken by team Yellow is 200% of time taken by team Red.

Time (Yellow) = 2 × Time (Red)

$14y = 2 \times 5r$

$\frac{y}{r} = \frac{5}{7}$

Team White takes 12.5% more time than team yellow.

Time (White) = $\frac{9}{8}$ × Time (Yellow)

$9w = \frac{9}{8} \times 14y$

$\frac{w}{y} = \frac{7}{4}$

So, g : b : y : r : w = 21 : 7 : 20 : 28 : 35

Speed of starter of team Green as a percent of the finisher of team Red

Speed of J = $\frac{\text{Distance}}{\text{Time}} = \frac{200}{4g}$

Speed of T = $\frac{200}{3r}$

$\frac{\text{Speed (J)}}{\text{Speed (T)}} = \frac{3r}{4g}$

$= \frac{3}{4} \times \frac{r}{g} = \frac{3}{4} \times \frac{28}{21} = 1 : 1$

So, speed of J is 100% of speed of T

Hence, option B is correct.

2.

Team	Green	Blue	Yellow	Red	White
Time ratio Starter/Finisher	4/3	8/7	5/9	2/3	5/4
Time Starter	J (4g)	M (8b)	P (5y)	S (2r)	U (5w)
Time Finisher	K (3g)	N (7b)	Q (9y)	T (3r)	V (4w)
Time Team	7g	15b	14y	5r	9w

g : b : y : r : w = 21 : 7 : 20 : 28 : 35

Ratio of $\frac{y}{w} = \frac{20}{35} = \frac{4}{7}$

Let y = 4t and w = 7t

Time of Team Yellow → P = 20t and Q = 36t

Time of Team White → U = 35t and V = 28t

U is halfway his course at 35t/2

The distance covered by P in $\frac{35t}{2} = \frac{35t}{2 \times 20t} \times 200 = 175m$

So distance between P and Q = (200 – 175) = 25m

Q finishes the race at, 20t + 36t = 56t, from the start

U passes the baton to V at 35t and when Q finishes, V has run for (56t – 35t) = 21t

Distance between U and V = $\frac{21t}{28t} \times 200 = 150m$

Reqd. % = $\frac{25}{150} \times 100 = 16.67\%$

Hence, option C is correct.

3.

Team	Green	Blue	Yellow	Red	White
Time ratio Starter/Finisher	4/3	8/7	5/9	2/3	5/4
Time Starter	J (4g)	M (8b)	P (5y)	S (2r)	U (5w)
Time Finisher	K (3g)	N (7b)	Q (9y)	T (3r)	V (4w)
Time Team	7g	15b	14y	5r	9w

g : b : y : r : w = 21 : 7 : 20 : 28 : 35

g : r: b = 21 : 28 : 7 = 3 : 4 : 1

Let g = 3t, r = 4t and b = t

Team red runs in the reverse direction, S starts from finish line and passes baton to T at the centre and T finishes at the starting line.

Time taken by players to complete 200m

Green	J	12t	K	9t
Red	S	8t	T	12t
Blue	M	8t	N	7t

S and M reach and pass the baton to T and N respectively after 8t.

J passes the baton to K at 12t

So, when J and K meet, T and N have run for time 4t

Distance between T and N in time 4t

$$= \frac{4t}{12t} \times 200 + \frac{4t}{7t} \times 200 = \frac{19}{21} \times 200 = 180\frac{20}{21}\text{ m}$$

Hence, option B is correct.

4.

Team	Green	Blue	Yellow	Red	White
Time ratio Starter/Finisher	4/3	8/7	5/9	2/3	5/4
Time Starter	J (4g)	M (8b)	P (5y)	S (2r)	U (5w)
Time Finisher	K (3g)	N (7b)	Q (9y)	T (3r)	V (4w)
Time Team	7g	15b	14y	5r	9w

g : b : y : r : w = 21 : 7 : 20 : 28 : 35

g : b = 21 : 7

Let g = 3t and b = t

Green	J	12t	K	9t
Blue	M	8t	N	7t

M and N meet at 8t after which M runs towards starting line until J meets K,

So M runs towards start line for 12t – 8t = 4t

Distance between M and N at 12t = $\frac{4t}{8t} \times 200 + \frac{4t}{7t} \times 200 = \frac{1500}{7}$ m

When J passes baton to K, M turns and starts running towards finish line and meets N for the second time, N on reaching finish line turns and runs towards start line.

The distance M and N travel between first and second meeting = $2 \times \left(\frac{4t}{8t} \times 200 + 200\right) = 600$m

Time after which they meet = $\frac{600}{[200/8t + 200/7t]} = \frac{56t}{5}$

K starts running when M and N have already run for 4t

Time for which K travels until M and N meet for the second time = $\frac{56t}{5} - 4t = \frac{36t}{5}$

Distance between J and K when M and N meet for the second time = $\frac{200}{9t} \times \frac{36t}{5} = 160$m

Reqd. % = $\frac{160 \times 7}{1500} \times 100 = 74.67\%$

Hence, option E is correct.

5.

Team	Green	Blue	Yellow	Red	White
Time ratio Starter/Finisher	4/3	8/7	5/9	2/3	5/4
Time Starter	J (4g)	M (8b)	P (5y)	S (2r)	U (5w)
Time Finisher	K (3g)	N (7b)	Q (9y)	T (3r)	V (4w)
Time Team	7g	15b	14y	5r	9w

g : b : y : r : w = 21 : 7 : 20 : 28 : 35

As there is no replacement in yellow, let us consider the other four only

g : b : r : w = 21 : 7 : 28 : 35 = 3 : 1 : 4 : 5

Let g = 3z, b = 1z, r = 4z and w = 5z

Team	Green	Blue	Red	White
Time Starter	J (12z)	M (8z)	S (8z)	U (25z)
Time Finisher	K (9z)	N (7z)	T (12z)	V (20z)

After Replacement

Team	Green	Blue	Red	White
Time Starter	J (12z)	V (20z)	K (9z)	T (12z)
Time Finisher	S (8z)	N (7z)	U (25z)	M (8z)
Time Team	20z	27z	34z	20z

The distance between K and U when Team green finishes the race,

Team green finishes race in 20z, in that time K runs for 9z and then U runs for 11z,

The distance between U and K in $11z = \frac{11z}{25z} \times 200 = 88m$

Distance between T and M when baton is passed from starter to finisher in team Red

Baton is passed in team Red at 9z

Distance between T and M at $9z = \frac{1 - 9z}{12z} \times 200 = 50m$

Reqd. $\% = \frac{88}{50} \times 100 = 176\%$

Hence, option D is correct.