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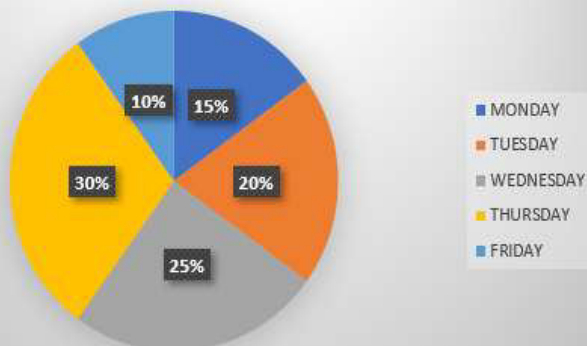
Boats and Streams

Directions (1 – 5): Study the following chart and answer accordingly.

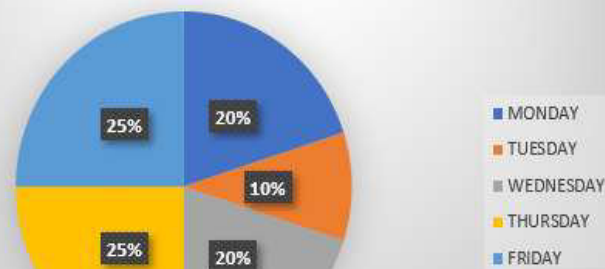
Speed of stream is same for both upstream and downstream distance on respective days.

Chart shows percentage distribution of distance on each day.

UPSTREAM DISTANCE=200KM



DOWNSTREAM DISTANCE=240KM



DAY	SPEED OF STREAM (in km/hr)
MONDAY	3
TUESDAY	-
WEDNESDAY	2
THURSDAY	2.5
FRIDAY	3

1. Time taken to cover the upstream distance on Wednesday is the same as the time taken to cover the downstream distance on Monday. The total sum of speeds of the boat in still water on Monday and Wednesday is 13 km/hr. Find the ratio of the speed of the boat in still water on Monday and Wednesday.

- a) 64 : 27
- b) 128 : 63
- c) 96 : 49
- d) 32 : 27
- e) None of these

2. Total downstream distance travelled by boat on Monday, Thursday and Friday together is what percentage of total upstream distance travelled by boat on the same days together?

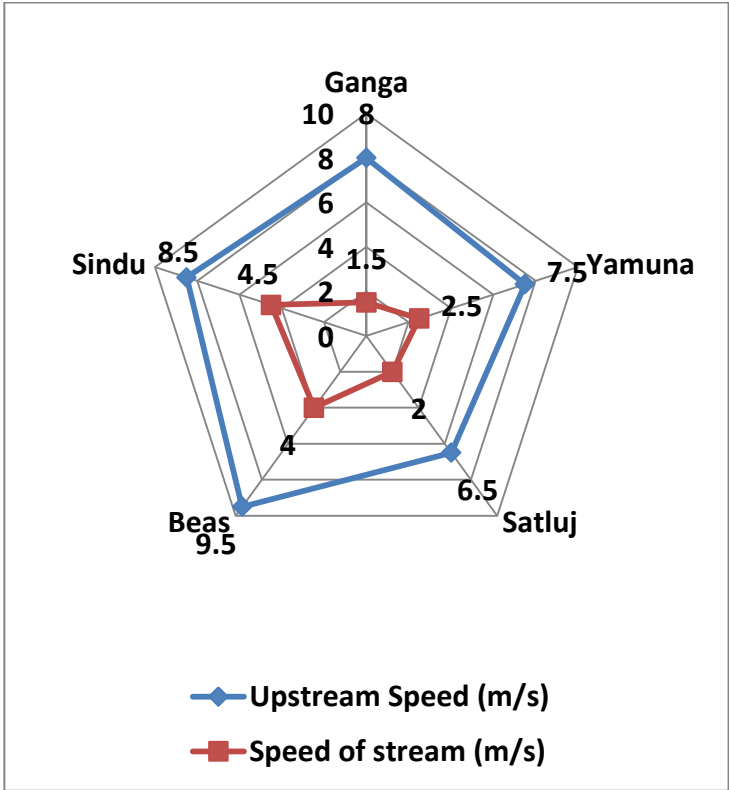
- a) 113%
- b) 52.7%
- c) 73%
- d) 152.72%
- e) 133.33%

3. Find the difference between the up-stream distance travelled by boat on Wednesday and Thursday together and the down-stream distance travelled by boat on the same days together?

- a) 13
 - b) 8
 - c) 5
 - d) 2
 - e) 27
4. Find the sum of total distance travelled by boat on Tuesday, Monday and Friday?
- a) 285km
 - b) 222km
 - c) 345km
 - d) 128km
 - e) 56km
5. What is the ratio of the total distance travelled by boat on Monday and Tuesday to the total distance travelled by boat on Wednesday, Friday and Thursday?
- a) 32:67
 - b) 73:137
 - c) 71:149
 - d) 25:89
 - e) 3:5

Directions (6 – 10): Study the following information carefully and answer the question.

The Radar graph given below shows the upstream speed of the boat and the speed of stream in five different rivers:



6. What is the time taken by the boat to cover 171 km in still water and 257.4 km downstream in river Ganga?

- a) 10 hours 50 minutes
- b) 11 hours
- c) 11 hours 30 minutes
- d) 11 hours 50 minutes
- e) 12 hours

7. A boat goes 25.5 km in still water in river Sutlej and then 81 km in still water in river Beas. What is the average speed of the boat in the whole journey?

- a) 42.8 km/h
- b) 42.6 km/h
- c) 42.4 km/h
- d) 42.2 km/h

e) None of these

8. A boat goes a certain distance from A to B downstream in river Yamuna and comes back up to a certain point C upstream in 7 hours 30 minutes. If the distance between point B and C is 90% of the distance between point A and B then find the total distance covered by the boat?

- a) 250.5 km
- b) 252.5 km
- c) 254.5 km
- d) 256.5 km
- e) 258.5 km

9. Speed of boat in still water in river Beas is approximately what percent more than the downstream speed of boat in river Sutlej?

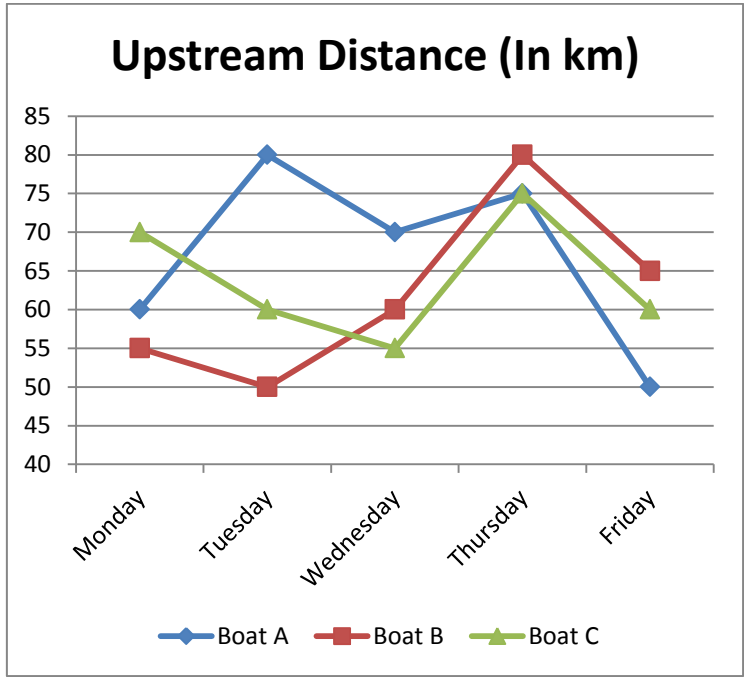
- a) 29%
- b) 69%
- c) 59%
- d) 39%
- e) 49%

10. After rain, speed of the stream in river Sindhu is increased by 20% and due to low visibility, the speed of the boat in still water is decreased by 20%. Find the time taken by the boat to cover 1422 km downstream and 1044 km upstream in river Sindhu after rain.

- a) 86 hours
- b) 85 hours
- c) 84 hours
- d) 83 hours

e) 82 hours

Directions (11 – 15): Following graph show upstream distances covered by 3 boats on 5 days of a week.



Following table shows speeds of stream on 5 days. (Some of the data is missing in the table indicated by ‘-’)

Day	Speed of stream
Monday	-
Tuesday	3
Wednesday	-
Thursday	4
Friday	-

11. If speed of boat A in still water on Thursday is 70% more than the speed of boat B in still water on Thursday and upstream journey time of boat B on Thursday is 5 hours, then what will be the upstream journey time of boat A on Thursday?

a) 2.5 hours

b) 3 hours

c) 4 hours

d) 3.2 hours

e) Other than above

12. If upstream distance covered by boat C on Saturday is average of upstream distance covered by it on other 5 days and ratio of speed of boat in still water to speed of the stream is 9:1 and total upstream journey time is 2 hours, then how much time will boat take to cover same distance downstream ?

a) 1.8 hours

b) 1.5 hours

c) 1.6 hours

d) 2.4 hours

e) Other than above

13. If on Tuesday speeds of all 3 boats in still water are same and average speed of upstream journeys of all 3 boats is 20 km/h, then what will be speed of boat in still water?

a) 24 km/h

b) 23 km/h

c) 25 km/h

d) 22 km/h

e) Other than above

14. If on Friday ratio of speeds of boats A, B and C in still water is 6:7:9 and upstream journey times of boats A and C are 2 hours and 1.5 hours respectively, then what is the upstream journey time of boat B on Friday?

a) 2 hours 30 minutes

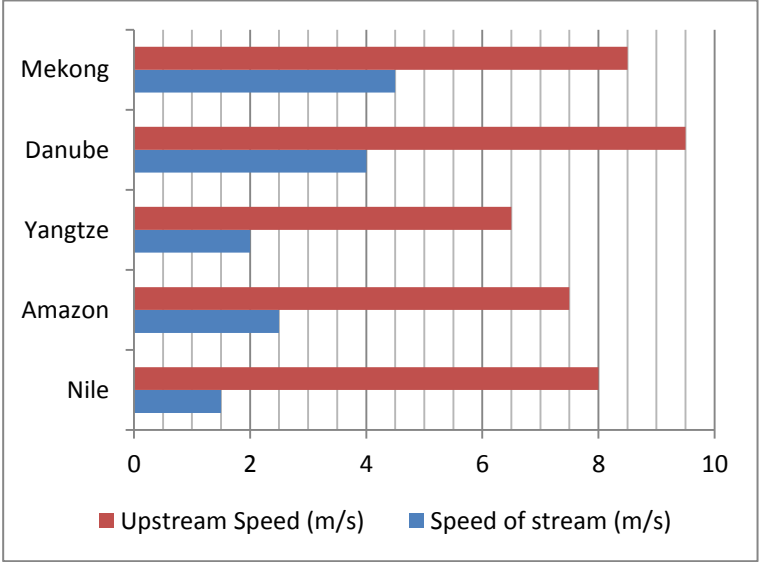
- b) 2 hours 10 minutes
- c) 3 hours 16 minutes
- d) 4 hours 15 minutes
- e) Other than above

15. If speed of stream on Thursday is 20% less than the speed of stream on Monday and speed of boat A in still water on Monday is 40% more than speed of boat B in still water on Monday, then what is the speed of boat A in still water on Monday if ratio of upstream journey times of boats A and B on Monday is 8/11?

- a) 35 km/h
- b) 40 km/h
- c) 42 km/h
- d) 45 km/h
- e) Other than above.

Directions (16 – 20): Study the following information carefully and answer the question.

The following bar graph given below shows the upstream speed of the boat and the speed of stream in five different rivers



16. What is the time taken by the boat to cover 171 km in still water and 257.4 km downstream in river Nile?

- a) 10 hours 50 minutes
- b) 11 hours
- c) 11 hours 30 minutes
- d) 11 hours 50 minutes
- e) 12 hours

17. A boat goes 25.5 km in still water in river Yangtze and then 81 km in still water in river Danube. What is the average speed of the boat in the whole journey?

- a) 42.8 km/h
- b) 42.6 km/h
- c) 42.4 km/h
- d) 42.2 km/h
- e) None of these

18. Speed of Boat in the river of Nile and Amazon is what % more or less than the downstream speed in the river of Danube?

- a) 12.45%
- b) 13.22%
- c) 254.5 km
- d) 11.43%
- e) 22.35%
19. A fisher man goes upstream in the river of Mekong at 10:30 AM, while come back to the starting point at 3:42 PM. Total distance covered by the fisher man?
- a) 29.75
- b) 30.75
- c) 50.50
- d) 39.25
- e) 49.49
20. What is the difference between times taken by Boat to cover 121 km downstream in the river of Nile to the time taken by boat to cover same distance upstream in the river of Danube?
- a) 1.9 hours
- b) 1.5 hours
- c) 1.8 hours
- d) 1.5 hours
- e) 2.5 hours

Direction (21 – 25): The table shows the percentage of the distance travelled by three boats P, Q and R and each Boat travels some distance in region D1, D2 and D3 respectively. Every boat travels some percent in each region and complete 100%.

Boat	Distance travelled	Distance travelled	Distance travelled
------	--------------------	--------------------	--------------------

	D1 = 2000 km	D2 = 1000 km	D3 = 1500 km
P	25%	50%	25%
Q	-	30%	25%
R	75%	-	15%

Second table shows the speed of all the three boats(x) and speed of the river(y) speed in km/hr

Boat P		Boat Q		Boat R	
x km/hr	y km/hr	x km/hr	y km/hr	x km/hr	y km/hr
40	30	25	18	30	20

21. If the speed of the boat Q increases by 15% than what is the approximate difference between the time taken by boat Q to travel upstream with the increased speed and the given speed in D1 region.
- a) 40 hours
- b) 42 hours
- c) 45 hours
- d) 44 hours
- e) None of these
22. What is the total distance covered by boat P to cover D1, boat Q to cover D2 and boat R to cover D3?
- a) 1025 km
- b) 1000 km
- c) 1100 km
- d) 1200 km
- e) None of these

23. Find the ratio of time taken by boat Q in travelling upstream in D2 region to the time taken by boat R in travelling upstream in D3 region?

- a) 21 : 40
- b) 24 : 10
- c) 10 : 24
- d) 40 : 21
- e) None of these

24. If one more boat D joins this fleet of boats whose speed is 30% more than the speed of boat R in still water, then what is the speed of the river if, the time taken to travel upstream and downstream is same.

Take upstream = downstream distance = 1800 km

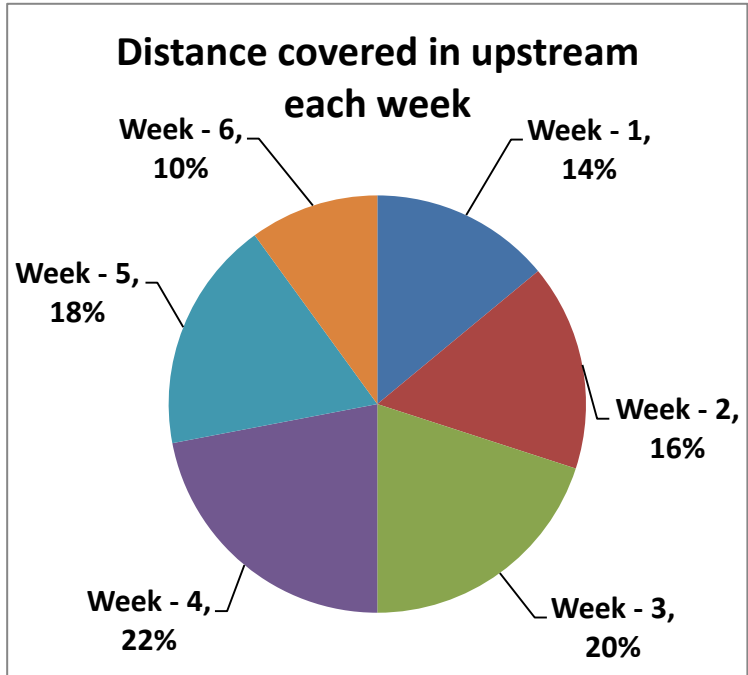
- a) 44 Km/hr
- b) 23 Km/hr
- c) 45 Km/hr
- d) Insufficient Data
- e) None of these

25. Total distance covered by boat P in D1 is how much percent more than the total distance travelled by boat R in D2 region?

- a) 400%
- b) 203.4%
- c) 234%
- d) 223%
- e) None of these

Directions (26 – 30): Study the following pie graph and answer the questions

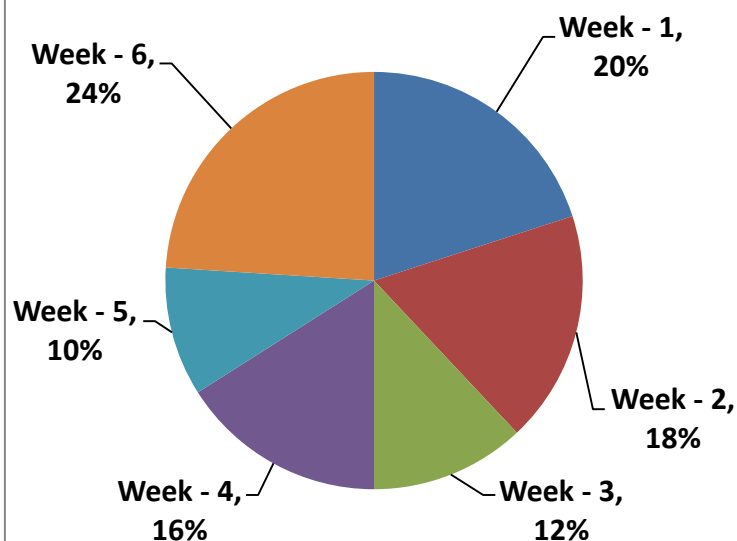
Containers are transported by boat in six weeks from point A to point B which is 1800 km apart. The boat has the speed of 7 km/hr in still water. The total distance covered in upstream and downstream are in the ratio of 4 : 5



Following table gives the information regarding speed of stream on each week.

Serial number	Week	Speed in km/hr
1	Week - 1	4
2	Week - 2	-
3	Week - 3	3
4	Week - 4	-
5	Week - 5	5
6	Week - 6	-

**Distance covered in
Downstream each week**



26. The ratio of time taken to travel downstream to upstream in the 4th week is 3 : 5. The speed of the stream is? [Correct up to 3 decimal places]?

- a) 1.434 km/hr
- b) 1.578 km/hr
- c) 2.341 km/hr
- d) 1.872 km/hr
- e) 1.125 km/hr

27. Due to storm, the boat covers only 45% of the actual distance in 3rd week. How much distance need to cover to reach the destination after that incident?[Consider the speed of stream in 2 km/hr for 4th, 5th and 6th week]?

- a) 1954 km
- b) 154 km
- c) 1054 km
- d) 900 km
- e) None of these

28. The difference between the average of distance covered in downstream on 1st, 2nd and 6th week to the average distance covered in upstream on the remaining week is?[Correct up to 2 decimal places]?

- a) 52.23 km
- b) 46.67 km
- c) 30.41 km
- d) 40.52 km
- e) 52.69 km

29. Time taken in downstream on 2nd week is one third of the time taken for upstream in 5th week. What is the difference between in the speed of upstream of 2nd week and downstream in 5th week?

- a) 4 km/hr
- b) 7 km/hr
- c) 5.9 km/hr
- d) 5.5 km/hr
- e) 6.2 km/hr

30. The difference of time taken for downstream of 5th and 6th week and the time taken for upstream of 1st and 3rd week is 20 hours. If the speed of the boat increases by 3 km/hr in last week, the ratio of downstream to the upstream speed of 6th week is?

- a) 5 : 1
- b) 7 : 1
- c) 11 : 1
- d) 15 : 1
- e) None of these

Directions (31 – 32): Answer the questions based on the information given below.

There are three boats A, B and C. The speed of boat C in still water is equal to the downstream speed of boat A. The speed of boat B in still water is equal to the upstream speed of boat C. Boat C takes 12 hours to cover 192 km downstream. If the speed of boat B in still water would have been twice its initial speed in still water, the time taken by it to cover 150 km upstream would have been 12.5 hours.

31. If boat A travels with 50% more speed than its initial speed in another river ‘R’ then it takes 14.5 hours to cover 290 km downstream. Boat C decreased its speed by x% and takes 36 hours to cover 612 km downstream in river ‘R’. If the speed of boat B in still water is increased by x%, then find the time taken by boat B to cover 225 km downstream in river ‘R’.

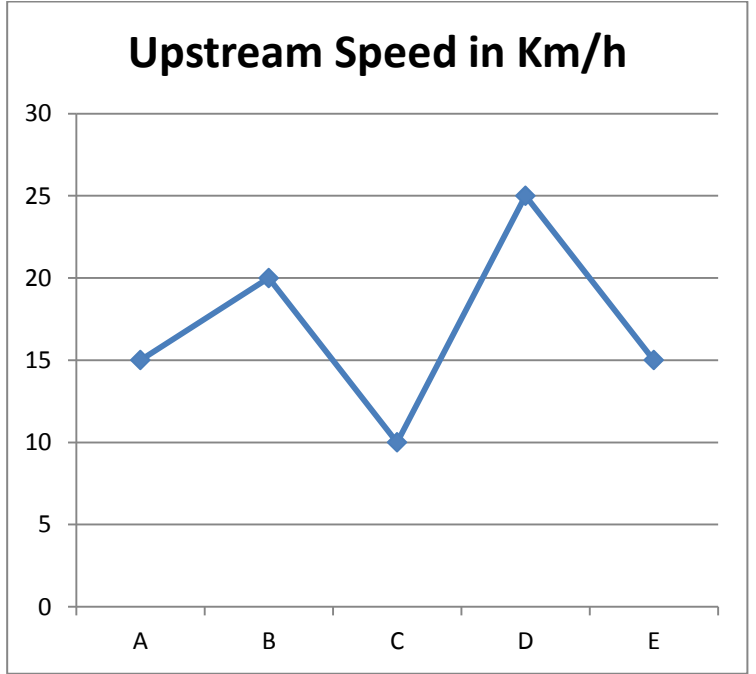
- a) 15 hours
- b) 12.5 hours
- c) 14 hours
- d) 10.5 hours
- e) 16 hours

32. The speed of boat ‘D’ in still water is equal to the average of speeds of boat A and C in still water. If the speed of the stream in which boat D is travelling is 25% more than that of the stream in which boat A, B and C were travelling, then the time taken by boat ‘D’ to cover 480 km downstream in the stream in which it is travelling is how much percent more/less than the time taken by boat ‘C’ to cover the same downstream distance in the stream in which it was travelling?

- a) (15/6)%
- b) (20/3)%

- c) (40/9)%
- d) (18/5)%
- e) None of these

Directions (33 – 37): Line graph given below shows the upstream speed of five boats A, B, C, D and E and table shows the time taken (in minutes) by those boats to cover a certain distance in downstream.



Boats	Time taken (in minutes) in Downstream journey to cover a certain distance
A	96
B	60
C	54
D	36
E	48

33. If boat A covers 40 km distance in downstream in the given time, then what is the total time taken by boat A to cover the same distance if it is flowing with the speed of stream only?

- a) 4 hours

- b) 5 hours
- c) 6 hours
- d) 8 hours
- e) None of these

34. What is the time taken by boat C to travel in upstream if it travels the same distance in upstream as it travels in downstream for the time mentioned in the table?(speed of the stream = 2.5 km/h)

- a) 64 minutes
- b) 81 minutes
- c) 49 minutes
- d) 100 minutes
- e) None of these

35. Boat E can travel 20 km in downstream for time mentioned in table. If boat D and E start at the same point with the stream, then what is the total distance covered by boat D when boat E covers 20 km?

- a) 24 km
- b) 28 km
- c) 32 km
- d) 36 km
- e) None of these

36. What is the speed of stream, if time taken by boat B to cover the same distance in upstream (that it covers in downstream in the time mentioned in table) in 84 minutes?

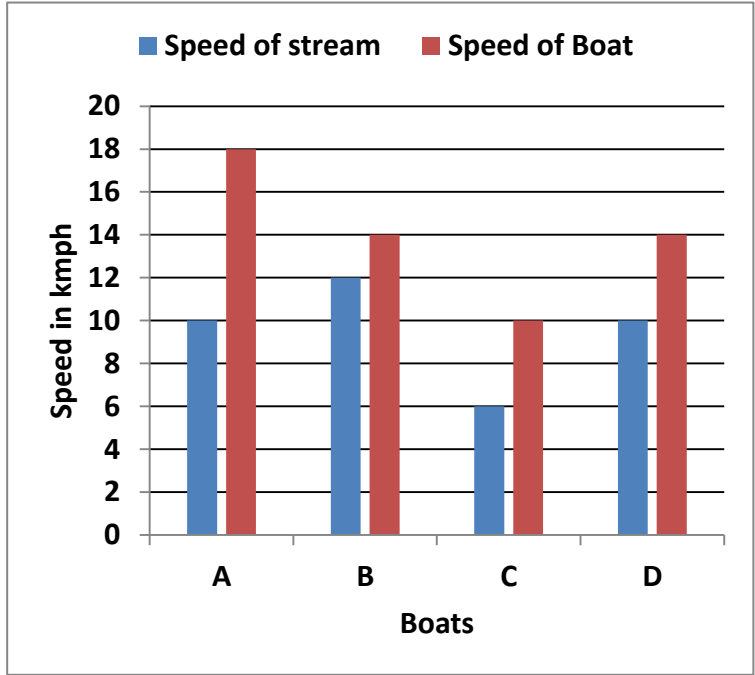
- a) 4 km/h
- b) 3 km/h

- c) 5 km/h
- d) 6 km/h
- e) None of these

37. If boats C and E start towards each other from points P and Q respectively which are 40 km apart, then find the time after which both the boats met with each other.

- a) Can't be determined
- b) 2 hours
- c) 0.8 hours
- d) 1.6 hours
- e) 1 hour

Directions (38 – 40): Study the following bar-graph carefully to answer the following questions.



Note: Boat A, B, C and D are operated in different rivers.

38. If the speed of boat C is increased by 40% and the speed of stream decreases by 20% then what is the

difference between the time taken by the boat now and that taken previously to travel 200 km upstream?

- a) 28 $\frac{6}{23}$ hours
- b) 22 $\frac{4}{5}$ hours
- c) 20 $\frac{4}{5}$ hours
- d) 18 $\frac{5}{6}$ hours
- e) 35 $\frac{5}{6}$ hours

39. If the speed of boat D increases by 10% then what is the approximate time taken by a person to travel 500 km by boat D in upstream direction?

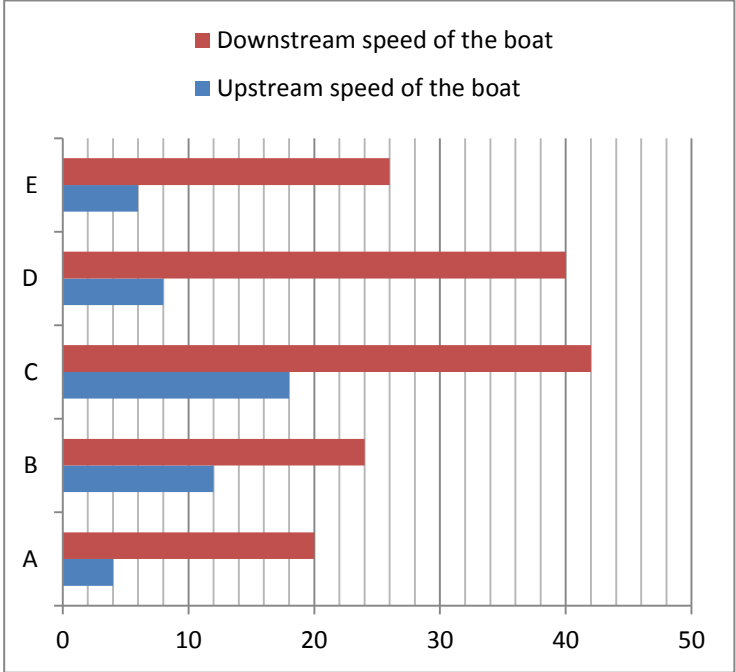
- a) 88 hours
- b) 92.6 hours
- c) 68 hours
- d) 78 hours
- e) 44 hours

40. What is the ratio of the time taken by boat C to that taken by boat D to travel equal distance downstream?

- a) 9: 7
- b) 7: 5
- c) 5: 3
- d) 7: 3
- e) 3: 2

Directions (41 – 45):Answer the questions based on the information given below.

The given line graph shows the upstream speed and downstream speed of five different boats (A, B, C, D and E) in respective five different streams.



41. If the speed of the boat ‘A’ in still water had been 25% more, then find the time taken by the boat to cover 276 km downstream.

- a) 9 hours
- b) 14 hours
- c) 12 hours
- d) 15 hours
- e) 10.5 hours

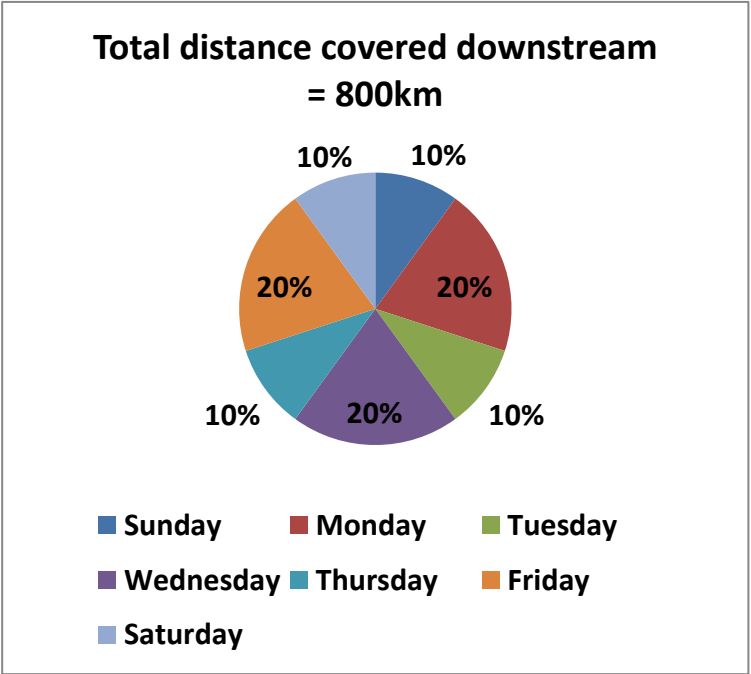
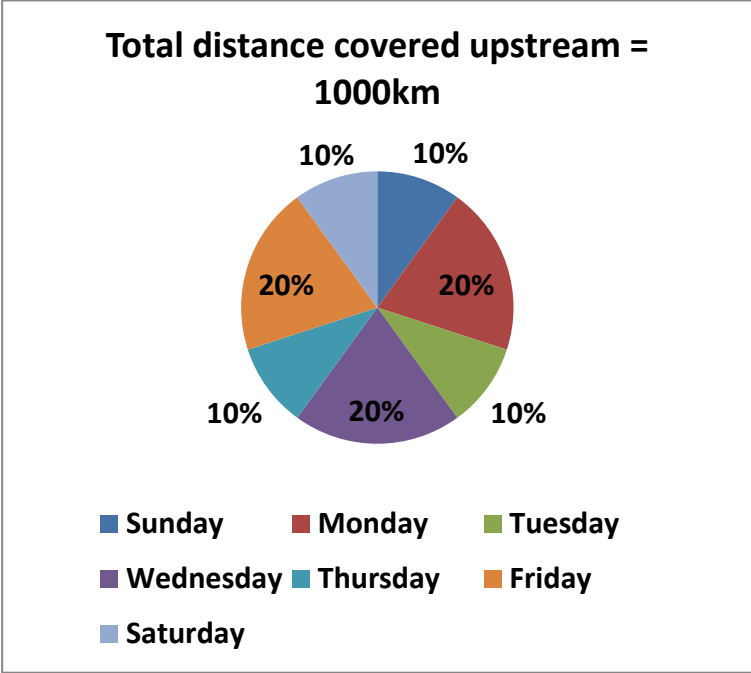
42. If the speed of the current for boat ‘C’ had been equal to that for boat ‘E’, then find the difference between the time taken by boat ‘C’ to cover 231 km downstream with new downstream speed and that of the same distance with original downstream speed.

- a) 16.5 minutes
- b) 22 minutes
- c) 18.5 minutes
- d) 12.5 minutes

- e) None of these
43. The speed of the boat ‘B’ in still water is how much percent more/less than the speed of the current for boat ‘D’?
- a) 10%
- b) 15%
- c) 17.5%
- d) 25%
- e) 12.5%
44. After travelling for 5 hours in upstream, boat ‘D’ increased its speed by 25% and then travelled for 6 more hours in the same direction. Find the total distance travelled by boat ‘D’.
- a) 90 km
- b) 84 km
- c) 124 km
- d) 132 km
- e) 96 km
45. Find the ratio of the sum of speed of boat ‘A’ and boat ‘C’ in still water to the sum of the speed of the current for boat ‘A’ and boat ‘D’.
- a) 11:7
- b) 6:5
- c) 9:5
- d) 5:3
- e) 7:4

Directions (46 – 50): 2 pie charts and 1 table are given. The pie charts shown below shows the distance

covered by a boat moving upstream and downstream in different days of a week, table shows the speed of stream in km/hr in different days of a week. Study them carefully and answer the following questions based on it.



Days	Speed of stream(km/hr)
Sunday	6
Monday	1
Tuesday	2
Wednesday	-
Thursday	2
Friday	1
Saturday	-

46. The time taken by boat to travel upstream on Monday is 5 hours more than the time taken by it to travel downstream on Monday if the downstream speed on Monday is 1 km/h more than the usual downstream speed, find the speed of boat in still water on Monday?

- a) 20.82 km/hr
- b) 18 km/hr
- c) 14.74 km/hr
- d) 7.74 km/hr
- e) None of these

47. If the time taken by boat to travel upstream on Thursday is equal to the time taken by it to travel downstream on Monday and the speed of boat in still water on Thursday is 22 km/hr then find the speed of boat in still water on Monday?

- a) 20 km/hr
- b) 31 km/hr
- c) 15 km/hr
- d) 18 km/hr
- e) None of these

48. The speed of boat in still water on Sunday was 10 km/hr and the speed of boat in still water on Saturday

was 10 km/hr more than that of Sunday. Also, time taken to travel upstream on Saturday is 2 times the time taken by it to travel downstream on Sunday, and then find the speed of stream (in km/hr) on Saturday?

- a) 1.5
- b) 2.5
- c) 2
- d) 10
- e) None of these

49. The distance travelled on Monday, Tuesday and Saturday is what percent less than the distance travelled on Wednesday, Thursday and Friday?

- a) 20%
- b) 30%
- c) 10%
- d) 5%
- e) 40%

50. If the time taken by boat to travel upstream on Friday is 2 hours more than the time taken by it to travel downstream on Wednesday and the speed of boat in still water on Friday is 21 km/hr, then find the downstream speed of boat on Wednesday.

- a) 27 km/hr
- b) 22 km/hr
- c) 20 km/hr
- d) 25 km/hr
- e) None of these

Solutions and Detailed Explanation:

1. Answer: A)

Distances upstream:

Monday = $15/100 \times 200 = 30$ km, Tuesday = $20/100 \times 200 = 40$ km. Wednesday = $25/100 \times 200 = 50$ km, Thursday = $30/100 \times 200 = 60$ km, Friday = $10/100 \times 200 = 20$ km

Similarly Distances downstream:

Monday = $20/100 \times 240 = 48$ km, Tuesday = $10/100 \times 240 = 24$ km, Wednesday = $20/100 \times 240 = 48$ km, Thursday = $25/100 \times 240 = 60$ km, Friday = $25/100 \times 240 = 60$ km

Let speed of boat in still water in upstream direction on Wednesday = x ,

then speed of the boat in downstream direction on

Monday = $(13-x)$

Now,

$$50/(x-2) = 48/[(13-x)+3]$$

$$x = 64/7$$

Hence, the required ratio = $64/7 : [13 - (64/7)] = 64/7 : 27/7 = 64 : 27$.

2. Answer: D)

Upstream distances:

Monday = $15/100 \times 200 = 30$ km, Tuesday = $20/100 \times 200 = 40$ km. Wednesday = $25/100 \times 200 = 50$ km, Thursday = $30/100 \times 200 = 60$ km, Friday = $10/100 \times 200 = 20$ km

Similarly Distances downstream:

Monday = $20/100 \times 240 = 48$ km, Tuesday = $10/100 \times 240 = 24$ km, Wednesday = $20/100 \times 240 = 48$ km, Thursday = $25/100 \times 240 = 60$ km, Friday = $25/100 \times 240 = 60$ km

total downstream traveled on Monday, Thursday and Friday = $48+60+60=168$ km

Total upstream traveled on Monday, Thursday and Friday = $30+60+20=110$ km

$$168/110 \times 100 = 152.72\%$$

3. Answer: D)

Total upstream distance travelled by boat on Wednesday and Thursday = $50+60=110$ km

Total downstream distance travelled by boat on Wednesday and Thursday = $48+60 = 108$ km

$$\text{Difference} = 110-108=2$$

4. Answer: B)

Total distance travelled by boat on Monday = $30+48=78$ km

Total distance travelled by boat on Tuesday = $40+24=64$ km

Total distance travelled by boat on Friday = $20+60 = 80$ km

$$\text{Total distance} = 78+64+80=222 \text{ km}$$

5. Answer: C)

Total distance travelled by boat on Monday = $30+48=78$ km

Total distance travelled by boat on Tuesday = $40+24=64$ km

Total distance = $78+64=142$ km

Total distance travelled by boat on Friday = $20+60 = 80$ km

Total distance travelled by boat on Wednesday = $50+48=98$ km

Total distance travelled by boat on Thursday = $60+60 = 120$ km

Total distance = $80+98+120=298$ km

$$\text{Required ratio} = 142/298 = 71:149$$

6. Answer: C)

Speed of boat in still water in Ganga = $8+1.5 = 9.5$ m/s = $9.5 \times (18/5) = 34.2$ km/h

Downstream speed of boat in Ganga = $8+1.5+1.5 = 11$ m/s = $11 \times (18/5) = 39.6$ km/h

So, time taken to cover 171 km in still water in river

Expected DI and Caselet Boats and Streams for Upcoming Mains Exam

Ganga = $171/34.2 = 5$ hours

So, the time taken by the boat to cover 257.4 km downstream in river Ganga = $257.4/39.6 = 6.5$ hours = 6 hours 30 minutes

Total time taken = $5+6.5=11$ hours 30 minutes

7. Answer: B)

Speed of boat in still water in Sutlej = $6.5+2=8.5$ m/s = $8.5 \times (18/5) = 30.6$ km/h

So, time taken by boat to cover 25.5 km in still water in river Sutlej = $25.5/30.6 \times 60 = 50$ minutes

Speed of boat in still water in Beas = $9.5+4=13.5$ m/s = $13.5 \times (18/5) = 48.6$ km/h

So, time taken by boat to cover 81 km in still water in river Beas = $81/48.6 \times 60 = 100$ minutes

So, total time taken = $100 + 50 = 150$ minutes = 2 hours 30 minutes = 2.5 hours

So, average speed in the whole journey = $(25.5+81)/2.5=42.6$ km/h

8. Answer: D)

Let the distance between point A and B = x km

So, the distance between point B and C = $0.90 \times x = 0.9x$ km

Downstream speed of the boat in river Yamuna = $7.5+2.5+2.5=12.5$ m/s = $12.5 \times (18/5) = 45$ km/h

Upstream speed of boat in river Yamuna = 7.5 m/s = $7.5 \times (18/5) = 27$ km/h

So, according to the question,

$$\frac{x}{45} + \frac{0.9x}{27} = \frac{15}{2}$$

$$\frac{3x + 4.5x}{135} = \frac{15}{2}$$

$$15x = 2025; x = 135$$

So, the total distance covered = $135+0.9 \times 135=135+121.5=256.5$ km

9. Answer: A)

Speed of boat in still water in river Beas = $9.5+4=13.5$ m/s

Downstream speed of boat in river Sutlej = $6.5+2+2=10.5$ m/s

Desired percentage = $(13.5 - 10.5)/10.5 \times 100 = 28.571 = 29\%$

10. Answer: D)

Speed of boat in still water in river Sindhu before rain = $8.5 + 4.5 = 13$ m/s

Speed of stream of river Sindhu after rain = $4.5 \times 1.2 = 5.4$ m/s = $5.4 \times (18/5) = 19.44$ km/h

Speed of boat in still water in river Sindhu before rain = $13 \times 0.80 = 10.4$ m/s = 37.44 km/h

Upstream speed of boat in river Sindhu after rain = $37.44 - 19.44 = 18$ km/h

Downstream speed of boat in river Sindhu after rain = $37.44 + 19.44 = 56.88$ km/h

Time taken to cover 1422 km downstream = $1422/56.88 = 25$ hours

Time taken to cover 1044 km upstream = $1044/18=58$ hours

Total time taken = $58 + 25 = 83$ hours

11. Answer: A)

Let speed of boat B in still water on Thursday = S km/h

Upstream speed of boat B in still water in Thursday = $(S-4)$ km/h

Upstream journey time of boat B in still water on Thursday = $80/(S-4) = 5$

$$(S-4) = 80/5 = 16$$

$$S = 20 \text{ km/h.}$$

$$\text{Speed of boat A in still water on Thursday} = 1.7 \times 20 = 34 \text{ km/h}$$

$$\text{Upstream speed of boat A on Thursday} = (34-4) = 30 \text{ km/h}$$

$$\text{Upstream journey time} = (75/30) = 2.5 \text{ hours}$$

12. Answer: C)

Let speed of boat in still water and speed of stream on Saturday are $9s$ and s respectively.

$$\text{Total upstream distance on Saturday} = (60 + 70 + 55 + 75 + 60)/5$$

$$= 320/5 = 64 \text{ km}$$

$$\text{Upstream time} = (64/ (9s - s)) = 2$$

$$(8/s) = 2$$

$$s = 4 \text{ km/h}$$

$$\text{Speed of boat in still water} = 36 \text{ km/h and speed of stream} = 4 \text{ km/h}$$

$$\text{Downstream journey time} = 64/ (36+4) = (64/40) = (8/5) = 1.6 \text{ hours.}$$

Shortcut:

As let distance be D and speed of boat in still water and speed of stream be s

Distance is constant, so time is inversely proportional to speed

$$(\text{Downstream time})/ (\text{Upstream time}) = (\text{Upstream speed})/ (\text{Downstream speed})$$

$$(\text{Downstream time})/ (\text{Upstream time}) = (8s/10s)$$

$$\text{Downstream time} = 0.8 \times 2 = 1.6 \text{ hours}$$

13. Answer: B)

$$\text{Average speed} = (\text{Total distance})/(\text{Total time})$$

$$20 = (80 + 50 + 60)/(\text{Total time})$$

$$\text{Total time} = 190/20 = 9.5 \text{ hours.}$$

Let speed of boat in still water be S km/h.

$$\text{Total time} = (80/(S-3)) + (50/(S-3)) + (60/(S-3)) = 9.5$$

$$(190/(S-3)) = 9.5$$

$$S-3 = 20$$

$$S = 23 \text{ km/h.}$$

14. Answer: B)

If on Friday speeds of boats A, B and C in still water be $6S$, $7S$ and $9S$ respectively.

Speed of stream be y km/h.

$$\text{Upstream journey time of boat A} = (50/(6S-y)) = 2$$

$$6S-y = 25 \dots\dots\dots(1)$$

$$\text{Upstream journey time of boat C} = (60/(9S-y)) = 1.5$$

$$9S-y = 40 \dots\dots\dots(2)$$

Subtracting (1) from (2) we get

$$3S = 15 \text{ km/h}$$

$$S = 5 \text{ km/h}$$

Substituting in (1) we get

$$y = 5 \text{ km/h.}$$

$$\text{Upstream journey time of boat B on Friday} = (65/(7S-5)) = (65/30)$$

$$= 2 \text{ hours } 10 \text{ minutes.}$$

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15. Answer: A)

Speed of stream on Monday = $(100/80) \times 4 = 5 \text{ km/h}$

Let speed of boat B in still water on Monday be $S \text{ km/h}$

Speed of boat A in still water on Monday = $1.4S \text{ km/h}$

Total upstream journey time of boats A and B on Monday = $8/11$

$$(60/(1.4S - 5))/(55/(S - 5)) = (8/11)$$

$$(12/11) \times ((S - 5)/(1.4S - 5)) = (8/11)$$

$$((S - 5)/(1.4S - 5)) = (2/3)$$

$$3S - 15 = 2.8S - 10$$

$$0.2S = 5$$

$$S = 25 \text{ km/h.}$$

Speed of boat A in still water = $1.4 \times 25 = 35 \text{ km/h.}$

16. Answer: C)

Speed of boat in still water in Nile = $8 + 1.5 = 9.5 \text{ m/s} = 9.5 \times (18/5) = 34.2 \text{ km/h}$

Downstream speed of boat in Nile = $8 + 1.5 + 1.5 = 11 \text{ m/s} = 11 \times (18/5) = 39.6 \text{ km/h}$

So, time taken to cover 171 km in still water in river Nile = $171/34.2 = 5 \text{ hours}$

So, the time taken by the boat to cover 257.4 km downstream in river Nile = $257.4/39.6 = 6.5 \text{ hours} = 6 \text{ hours } 30 \text{ minutes}$

Total time taken = $5 + 6.5 = 11 \text{ hours } 30 \text{ minutes}$

17. Answer: B)

Speed of boat in still water in Yangtze = $6.5 + 2 = 8.5 \text{ m/s} = 8.5 \times (18/5) = 30.6 \text{ km/h}$

So, time taken by boat to cover 25.5 km in still water in river Yangtze = $25.5/30.6 \times 60 = 50 \text{ minutes}$

Speed of boat in still water in Danube = $9.5 + 4 = 13.5 \text{ m/s} = 13.5 \times (18/5) = 48.6 \text{ km/h}$

So, time taken by boat to cover 81 km in still water in river Danube = $81/48.6 \times 60 = 100 \text{ minutes}$

So, total time taken = $100 + 50 = 150 \text{ minutes} = 2 \text{ hours } 30 \text{ minutes} = 2.5 \text{ hours}$

So, average speed in the whole journey = $(25.5 + 81)/2.5 = 42.6 \text{ km/h}$

18. Answer: D)

Speed of Boat = Upstream speed + Speed of Stream

Speed of Boat in the river of Nile = $8 + 1.5 = 9.5$

Speed of Boat in the river of Amazon = $7.5 + 2.5 = 10$

Downstream speed in the river of Danube = Upstream speed + $2 \times$ Speed of stream = $9.5 + 2 \times 4 = 17.5$

% more = $(9.5 + 10) - (17.5) / 17.5 \times 100 = 2/17.5 \times 100 = 11.43\%$

19. Answer: A)

A fisher man goes upstream in the river of Mekong at 10:30 AM, while come back to the starting point at 3:42 PM.

Total time taken to complete total journey = $5 \text{ Hr } 12 \text{ min}$

Give that,

Speed of Upstream = 8.5

And Speed of stream = 4.5

Speed of Downstream = Speed of Upstream + $2 \times$ Speed of stream = $8.5 + 2 \times 4.5 = 17.5$

According to the question

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Let total distance covered is $2x$

So,

$$X/17.5 + X/8.5 = 5 - 12/60$$

By solving above equation we will get

$$X = 29.75/2$$

$$\text{Total distance covered} = 2x = 2 \times 29.75/2 = 29.75 \text{ km}$$

20. Answer: D)

In the river of Nile

Given that,

Speed of Upstream = 8 and speed of stream = 1.5

Downstream speed = Speed of Upstream + 2* speed of stream = $8 + 2 \times 1.5 = 11$

Time taken by boat to cover 121 Km Downstream = $121/11 = 11\text{HR}$.

In the river of Danube time taken to cover same distance upstream = $121/9.5$

Difference in time = $121/9.5 - 11 = 121 - 104.5 / 11 = 16.5/11$ or 1.5 hr

21. Answer: C)

Given that,

$D1 = 2000\text{km}$

Speed of Q = 25km/hr

Speed of the river = 18 km/hr

Since every boat complete 100% distance comprising some percent distance from each of the given distance than

% of D1 completed by Q = $(100 - 30 - 25) \% = 45\%$

Distance completed by Q = 45% of D1 = $45/100 \times 2000 = 900 \text{ km}$

According to the question

Time taken by Q for upstream initially = $900 / (25 - 18) = 900/7$ hours

When the speed of boat Q in still water increases by 15%

Final speed of Q in still water = $115/100 \times 25 = 28.75 \text{ km/hr}$

Final time taken by Q for Upstream = $900 / (28.75 - 18) = 3600/43$ hours

\therefore Required difference of time = $(900/7) - (3600/43) = 44.85 \text{ hours} \approx 45 \text{ hours}$

22. Answer: A)

Given that

P covers 25% of D1 = $25/100 \times 2000 = 500 \text{ km}$

Q covers 30% of D2 = $30/100 \times 1000 = 300 \text{ km}$

R covers 15% of D3 = $15/100 \times 1500 = 225 \text{ km}$

\therefore The total distance covered is $500 + 300 + 225 = 1025 \text{ km}$

23. Answer: D)

$D2 = 1000 \text{ km}$

Speed of Q = 25km/hr

Speed of the river = 18 km/hr

Since every boat complete 100% distance comprising some percent distance from each of the given distance than

% of D2 completed by Q = 30%

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Distance completed by Q = 30% of D2 = $30/100 \times 1000$
= 300 km

According to the question

Time taken by Q for upstream = $300/(25 - 18) = 300/7$
hours

D3 = 1500 km

Speed of R = 30 km/hr

Speed of the river = 20 km/hr

Distance completed by R = 15% of D3 = $15/100 \times 1500$
= 225 km

According to the question

Time taken by R for upstream = $225/(30 - 20) = 225/10$
hours

\therefore required ratio = 40 : 21

24. Answer: E)

Speed of boat D = 30% of speed of boat R = $130/100 \times 30 = 39$ km/hr

Given that, Upstream and downstream distance is same
i.e. 1800km

$1800/(39 - 0) = 1800/(39 + 0)$

$\therefore y = 0$

25. Answer: A)

Total distance covered by Boat P in. D1 = 25% of D1 =
 $25/100 \times 2000 = 500$ km

Every boat travels some percent of each distance and
complete 100%

% of Distance D2 completed by R = $(100 - 75 - 15) \% =$
10%

Total distance covered by Boat R in D2 = 10% of D2 =
 $10/100 \times 1000 = 100$ km

\therefore Required percentage difference of distance = $(500 - 100)/100 \times 100 = 400\%$

26. Answer: A)

Total distance covered in upstream = $(4/9) \times 1800 = 800$
km

Total distance covered in downstream = $1800 - 800 =$
1000 km

Let the speed of the stream in 4th week = x km/hr

Speed of the boat in still water = 7 km/hr

Distance covered in 4th week along the flow(downstream)
= 16% of total distance downstream

$\Rightarrow (16/100) \times 1000 = 160$ km

Downstream speed of the boat = Speed of the boat in still
water + Speed of the stream = $(7 + x)$ km/hr

Time taken in downstream = Distance covered in
downstream/Downstream Speed = $160/(7 + x)$ hours

Distance covered in 4th week against the flow(upstream)
= 22% of total distance of upstream

$\Rightarrow (22/100) \times 800 = 176$ km

Upstream speed of the boat = Speed of the boat in still
water - Speed of the stream = $(7 - x)$ km/hr

Time taken in upstream = distance covered in
upstream/speed in upstream = $176/(7 - x)$ hours

Given ratio of the time for downstream to upstream = 3:5

$(\text{Time taken for downstream})/(\text{Time taken for upstream})$
 $= [160/(7 + x)]/[176/(7 - x)] = 3/5$

$\Rightarrow 160(7 - x)/176(7 + x) = 3/5$

$$\Rightarrow (1120 - 160x)/(1232 + 176x) = 3/5$$

$$\Rightarrow 5(1120 - 160x) = 3(1232 + 176x)$$

$$\Rightarrow 5600 - 800x = 3696 + 528x$$

$$\Rightarrow 5600 - 3696 = 528x + 800x$$

$$\Rightarrow 1328x = 1904$$

$$\Rightarrow x = 1904/1328 = 1.434 \text{ km/hr}$$

$$\therefore \text{Speed of the stream} = 1.434 \text{ km/hr}$$

27. Answer: C)

Total distance covered in upstream = $(4/9) \times 1800 = 800$ km

Total distance covered in downstream = $1800 - 800 = 1000$ km

Actual distance that can be covered by the boat in 3rd week:

Distance cover in upstream in 3rd week = 20% of total distance in upstream

$$\Rightarrow 20\% \text{ of } 800 = (20/100) \times 800 = 160 \text{ km}$$

Distance cover in downstream on 3rd week = 12% of total distance in downstream

$$\Rightarrow 12\% \times 1000 = (12/100) \times 1000 = 120 \text{ km}$$

Actual total distance that can be covered by the boat = $160 + 120 = 280$ km

Distance currently covered = 45% of Total distance = $45\% \times 280 = (45/100) \times 280 = 126$ km

Remaining distance = $280 - 126 = 154$ km

Total upstream distance covered on 4th, 5th and 6th week = $(22\% \text{ of } 800) + (18\% \text{ of } 800) + (10\% \text{ of } 800)$

$$\Rightarrow 176 + 144 + 80 = 400 \text{ km}$$

Total downstream distance covered on 4th, 5th and 6th week = $(16\% \text{ of } 1000) + (10\% \text{ of } 1000) + (24\% \text{ of } 1000) = 160 + 100 + 240 = 500$ km

Total distance covered on 4th, 5th and 6th week ideally = $500 + 400 = 900$ km

\therefore Actual distance that needs to be covered = $900 + 154 = 1054$ km

28. Answer: B)

Total distance covered in upstream = $4/9 \times 1800 = 800$ km

Total distance covered in downstream = $1800 - 800 = 1000$ km

Distance covered downstream in 1st week = 20% of total distance covered in downstream

$$\Rightarrow 20\% \times 1000 = (20/100) \times 1000 = 200 \text{ km}$$

Distance covered downstream in 2nd week = 18% of total distance covered in downstream

$$\Rightarrow 18\% \times 1000 = (18/100) \times 1000 = 180 \text{ km}$$

Distance covered downstream in 6th week = 24% of total distance covered in downstream

$$\Rightarrow 24\% \times 1000 = (24/100) \times 1000 = 240 \text{ km}$$

Average of distance covered downstream = $(200 + 180 + 240)/3 = (620/3) = 206.67$ km

Distance covered upstream in 3rd week = 20% of total distance covered in upstream = $20\% \times 800$

$$\Rightarrow (20/100) \times 800 = 160 \text{ km}$$

Distance covered upstream in 4th week = 22% of total distance covered in upstream = $22\% \times 800$

$$\Rightarrow (22/100) \times 800 = 176 \text{ km}$$

Distance covered upstream in 5th week = 18% of total distance covered in upstream = 18% × 800

$$\Rightarrow (18/100) \times 800 = 144 \text{ km}$$

Average of covered upstream = $(160 + 176 + 144)/3 = (480/3) = 160 \text{ km}$

$$\Rightarrow \text{Difference} = 206.67 - 160 = 46.67 \text{ km}$$

∴ Required difference = 46.67 km

29. Answer: D)

Total distance covered in upstream = $4/9 \times 1800 = 800 \text{ km}$

Total distance covered in downstream = $1800 - 800 = 1000 \text{ km}$

Let us assume, speed of the stream on 2nd week = $x \text{ km/hr}$

Distance covered in downstream on 2nd week = 18% of total distance covered in downstream

$$\Rightarrow 18\% \times 1000 = (18/100) \times 1000 = 180 \text{ km}$$

Downstream Speed on 2nd week = Speed of the boat + Speed of stream = $(7 + x) \text{ km/hr}$

Time taken to cover the distance in downstream = Distance/speed = $180/(7 + x) \text{ hour}$

Speed of the stream on 5th week = 5 km/hr

Speed of the upstream on 5th week = Speed of the boat - Speed of the stream = $7 - 5 = 2 \text{ km/hr}$

Distance covered in upstream on 5th week = 18% of total distance covered in upstream

$$\Rightarrow 18\% \text{ of } 800 = (18/100) \times 800 = 144 \text{ km}$$

Time taken in upstream = Distance covered in upstream/speed in upstream = $144/2 = 72 \text{ hours}$

As per the condition given in the question,

$$180/(7 + x) = (1/3) \times 72$$

$$\Rightarrow 180 = 24(7 + x)$$

$$\Rightarrow 180 = 168 + 24x$$

$$\Rightarrow 180 - 168 = 24x$$

$$\Rightarrow 12 = 24x$$

$$\Rightarrow x = 0.5 \text{ km/hr}$$

Speed of the upstream on 2nd week = $(7 - 0.5) = 6.5 \text{ km/hr}$

Speed of the downstream on 5th week = $(7 + 5) = 12 \text{ km/hr}$

∴ Required difference = $12 - 6.5 = 5.5 \text{ km/hr}$

30. Answer: E)

Total distance covered in upstream = $4/9 \times 1800 = 800 \text{ km}$

Total distance covered in downstream = $1800 - 800 = 1000 \text{ km}$

Let the speed of the stream on 6th week is $x \text{ km/hr}$

Distance covered in downstream in 5th week = 10% of total distance covered in downstream

$$\Rightarrow 10\% \times 1000 = (10/100) \times 1000 = 100 \text{ km}$$

Distance covered in downstream in 6th week = 24% of total distance covered in downstream

$$\Rightarrow 24\% \times 1000 = (24/100) \times 1000 = 240 \text{ km}$$

Speed of the downstream in 5th week = $7 + 5 = 12 \text{ km/hr}$

Speed of the downstream in 6th week = $(7 + x) \text{ km/hr}$

Distance covered in upstream in 1st week = 14% of total distance covered in upstream

$$\Rightarrow 14\% \times 800 = (14/100) \times 800 = 112 \text{ km}$$

Distance covered in upstream in 3rd week = 20% of total distance covered in upstream

$\Rightarrow 20\% \times 800 = (20/100) \times 800 = 160 \text{ km}$

Speed of the upstream in 1st week = $7 - 4 = 3 \text{ km/hr}$

Speed of the upstream in 3rd week = $7 - 3 = 4 \text{ km/hr}$

Time taken for downstream = $100/12 + 240/(7 + x)$

Time taken for upstream = $112/3 + 160/4 = 77.33$

Difference in time = 20 hours

$\Rightarrow [100/12 + 240/(7 + x)] - 77.33 = 20$

$\Rightarrow x = -4.3 \text{ km/hr}$

$\Rightarrow x = \text{speed of the stream in 6th week} = -4.3 \text{ km/hr}$

New speed of the boat = $7 + 3 = 10 \text{ km/hr}$

Speed of the boat in upstream(Actually downstream) = $10 - (-4.3) = 14.3 \text{ km/hr}$

Speed of the boat in downstream(Actually upstream) = $10 + (-4.3) = 5.7 \text{ km/hr}$

$\therefore \text{required ratio} = \text{downstream/upstream} = 14.3/5.7 = 5 : 2$

(31 – 32): Common Explanation:

Let the speed of boat A in still water be $x \text{ km/hr}$

And, the speed of current be $y \text{ km/hr}$

Therefore, speed of boat C in still water = downstream speed of boat A

Speed of boat C in still water = $(x + y) \text{ km/hr}$

Speed of boat B in still water = upstream speed of boat C

Speed of boat B in still water = $(x + y) - y = x \text{ km/hr}$

According to the question,

$192/(x + y + y) = 12$

Or, $x + 2y = 16$ (1)

Also, $150/(2x - y) = 12.5$

Or, $2x - y = 12$ (2)

On solving equation (1) and (2), we get

$x = 8 \text{ km/hr}$ and $y = 4 \text{ km/hr}$

Speed of current = 4 km/hr

Speed of boat A in still water = 8 km/hr

	Boat A	Boat B	Boat C
Speed in still water	8 km/hr	8 km/hr	12 km/hr
Upstream speed	4 km/hr	4 km/hr	8 km/hr
Downstream speed	12 km/hr	12 km/hr	16 km/hr

31. Answer: B)

Speed of boat A in still water = $1.5 \times 8 = 12 \text{ km/hr}$

Let the speed of the river ‘R’ = $b \text{ km/hr}$

Therefore,

$290/(12 + b) = 14.5$

Or, $12 + b = 290/14.5$

Or, $b = 20 - 12 = 8 \text{ km/hr}$

Let the speed of boat C in still water in the river ‘R’ be $p \text{ km/hr}$

According to the question,

$612/(p + 8) = 36$

Or, $p + 8 = 612/36$

Or, $p = 17 - 8 = 9 \text{ km/hr}$

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Therefore, percentage decrease = $\{(12 - 9)/12\} \times 100 = 25\%$

Speed of boat B in still water = $1.25 \times 8 = 10 \text{ km/hr}$

Therefore, time taken to cover 225 km downstream by boat B in river 'R' = $225/(10 + 8) = 12.5 \text{ hours}$

32. Answer: B)

Speed of boat 'D' in still water = $(12 + 8)/2 = 10 \text{ km/hr}$

Speed of the stream in which boat D is travelling = $1.25 \times 4 = 5 \text{ km/hr}$

Therefore,

Time taken by boat 'D' = $480/(10 + 5) = 32 \text{ hours}$

Time taken by boat C = $480/16 = 30 \text{ hours}$

Required percentage = $\{(32 - 30)/30\} \times 100 = (20/3)\%$

33. Answer: D)

Let speed of stream is 'x' km/h

Downstream speed of boat A = Speed of boat A in still water + Speed of stream = $(15 + x + x)$

Downstream speed of boat A = $(15 + 2x)$

Time taken to cover 40 km in downstream = $40/(15 + 2x) = 96/60$

$$15 + 2x = 25$$

$$2x = 10$$

$$x = 5$$

Time taken to cover 40 km with the speed of stream only = $40/5 = 8 \text{ hours}$

34. Answer: B)

Speed of stream = 2.5 km/h

Upstream speed of boat C = 10 km/h

Downstream speed of boat C = $10 + (2 \times 2.5) = 15 \text{ km/h}$

Total distance covered in downstream = $(15 \times 54)/60 = 13.5 \text{ km}$

Time taken to cover 13.5 km by boat C in upstream = $(13.5/10) \times 60 = 81 \text{ minutes}$

35. Answer: B)

Let speed of stream = 'x' km/h

Downstream speed of boat E = $(15 + 2x)$

$$(48/60) = 20/(15 + 2x)$$

$$15 + 2x = 25$$

$$x = 5$$

Downstream speed of boat D = $25 + (2 \times 5) = 35 \text{ km/h}$

Since, boat E covers 20 km in downstream in 48 minutes.

Distance covered by boat D downstream in 48 minutes = $(35 \times 48)/60 = 28 \text{ km}$

36. Answer: A)

Upstream speed of boat B = 20 km/h

Total distance covered by boat B in upstream in 84 minutes = $(20 \times 84)/60 = 28 \text{ km}$

Let speed of stream = 'x' km/h

Downstream speed of boat B = $(20 + 2x) \text{ km/h}$

Time taken in downstream = $28/(20 + 2x) = (60/60)$

$$28 = 20 + 2x$$

$$2x = 8$$

$$x = 4 \text{ km/h}$$

37. Answer: A)

Here speed of speed of stream is not given. But both the boats are travelling in opposite direction.

Let the speed of the stream = x km/h

Effective speed of boat C and E = (10+x) + (15+x) = 25+2x km/h

Distance to be covered together by both the boats = 40 km

Time after both the boats met = 40/(25+2x)

As the speed of stream is not given, so we cannot calculate the required time.

38. Answer: A)

Speed of boat C after 40% increase in its speed = 10 X 140/100 = 14 km/hr

Speed of stream after decrease of 20% = 6 X 80/100 = 4.8 km/hr

Time taken to cover 200 km upstream = 200/(14-4.8) = 21 (17/23) hours

Time taken by boat previously = 200/(10-6) = 50 hours

Diff = 50 - 21 (17/23) = 28 (6/23)

39. Answer: B)

New boat speed = 14 X 110/100=15.4 km/hr

Time = 500/(15.4-10)=92.6 (approx)

40. Answer: E)

Time taken by boat C = x/((10+6))

Time taken by boat D = x/((10+14))

Ratio = x/16 :x/24 = 3: 2

(41 – 45): Common Explanation:

For boat A:

Let the speed of the boat in still water and the speed of the current be ‘x’ km/hr and y km/hr respectively.

According to the question,

(x – y) = 4..... (1)

And, (x + y) = 20..... (2)

On solving equation (1) and (2), we get

Speed of boat in still water = x = 12 km/hr

Speed of the current = y = 8 km/hr

Similarly,

	Speed of the boat in still water	Speed of the current
A	12	8
B	18	6
C	30	12
D	24	16
E	16	10

41. Answer: C)

New speed of boat ‘A’ in still water = 1.25 × 12 = 15 km/hr

Therefore, time taken to cover 276 km downstream = 276/(15 + 8) = 12 hours

42. Answer: A)

Time taken by boat ‘C’ to cover 231 km with the original speed of the current = 231/42 = 5.5 hours

New speed of the current = 10 km/hr

Time taken to cover 231 km downstream with new speed = 231/(30 + 10) = 5.775 hours

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Required difference = $5.775 - 5.5 = 0.275$ hours = 16.5 minutes

43. Answer: E)

Required percentage = $\{(18 - 16)/16\} \times 100 = 12.5\%$

44. Answer: C)

In 5 hours, upstream distance covered by boat 'D' = $8 \times 5 = 40$ km

New speed of the boat in still water = $1.25 \times 24 = 30$ km/hr

Therefore, upstream distance covered in 6 hours = $(30 - 16) \times 6 = 84$ km

Total distance travelled = $40 + 84 = 124$ km

45. Answer: E)

Required ratio = $(12 + 30):(8 + 16) = 7:4$

46. Answer: C)

Let x km/hr be the speed of boat in still water.

Time taken to travel upstream on Monday = $200/(x - 1)$

Time taken to travel downstream on Monday = $160/(x + 1 + 1)$

According to question, $\{200/(x - 1)\} = \{160/(x + 2)\} + 5$

On solving, we will get a quadratic equation

$$200x + 400 = 160x - 160 + (5x + 10)(x - 1)$$

$$40x + 560 - 5x^2 - 10x + 5x + 10$$

$$-5x^2 + 35x + 570 = 0$$

$$x^2 - 7x - 114 = 0$$

On solving we will get 2 solutions for this quadratic equation

$$x = -7.74 \text{ and } 14.74$$

So, we will consider 14.74, as speed cannot be negative.

47. Answer: B)

Initially we will calculate the distance of upstream and downstream which is given in %

Speed of downstream = Speed of boat in still water + Speed of stream

Speed of upstream = Speed of boat in still water - Speed of stream

Time taken to travel upstream on Thursday = Distance/Speed = $100/(22 - 2) = 5$ hours

Time taken to travel downstream on Monday = $160/(x + 1)$

So, they are equal

$$5 = 160/(x + 1)$$

$$5x = 155$$

$$x = 31$$

Solving the equation we will get $x = 31$ km/hr

48. Answer: D)

Speed of boat in still water on Sunday = 10 km/hr

Speed of boat in still water on Saturday = 20 km/hr

Here, speed of stream be x km/hr

Time taken to travel upstream on Saturday = $100/(20 - x)$

Time taken to travel downstream on Sunday = $80/(10 + 6) = 80/16$

According to question

$$100/(20 - x) = 2 \times 5$$

Expected DI and Caselet Boats and Streams for Upcoming Mains Exam

$$200 - 10x = 100$$

$$10x = 100$$

On solving, we will get $x = 10$

49. Answer: A)

Distance travelled on Monday, Tuesday and Saturday =
40% of 1000 + 40% of 800

$$\Rightarrow 400 + 320 = 720$$

Distance travelled on Wednesday, Thursday and Friday
= 50% of 1000 + 50% of 800

$$\Rightarrow 500 + 400 = 900$$

$$\therefore \text{Required Percentage} = (900 - 720)/900 \times 100 = 20\%$$

50. Answer: C)

Time taken by boat to travel upstream on Friday =
 $200/(21 - 1) = 10$ hours

Time taken by boat to travel downstream on Wednesday
= $160/x$

According to question,

$$160/x = 10 - 2$$

On solving we will get x to be 20

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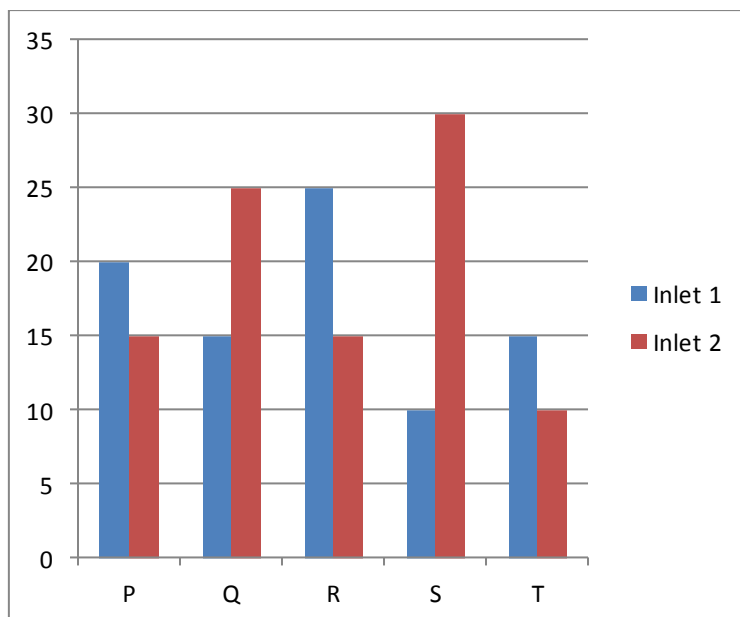
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DI and Caselet Pipes and cistern

Directions (1 – 5): Study the following graph carefully to answer the given questions

Time taken by pipes to fill tanks in minutes



1. A large tank P can be filled by pipe having two inlets. How many minutes (approximately) will it take to fill the tank from an empty state if Inlet 1 and Inlet 2 fill it together?

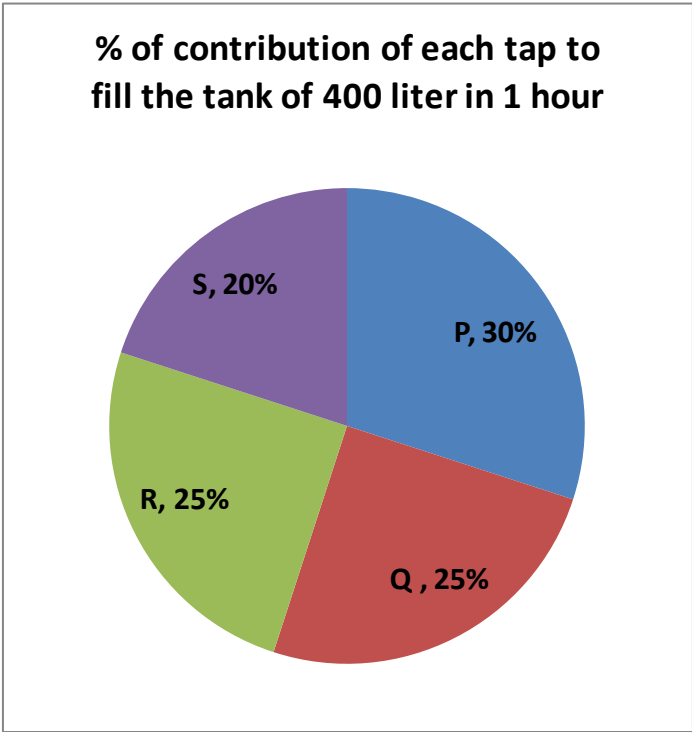
- a) 6.6 minutes
- b) 7.6 minutes
- c) 8.6 minutes
- d) 9.6 minutes
- e) 8 minutes

2. Two pipes can fill a tank Q. If both the pipes are opened simultaneously, after how much time should inlet 2 be closed so that the tank is full in 12 minutes?

- a) 5 minutes
- b) 6 minutes

- c) 7 minutes
- d) 8 minutes
- e) 9 minutes
3. Three pipe, two inlets of tank R and pipe A can fill a tank. If Pipe A alone can fill a tank in 20 minutes and the pipe A is closed 8 minutes before the tank is filled. In what aproximate time the tank is full?
- a) 8 minutes
- b) 9 minutes
- c) 10 minutes
- d) 11 minutes
- e) 12 minutes
4. A waste pipe W can empty tank S in 15 minutes. Find the time in which the tank S will be full if all the pipes are opened together.
- a) 10 minutes
- b) 12 minutes
- c) 15 minutes
- d) 16 minutes
- e) 18 minutes
5. Two inlets of tank T are opened simultaneously and it is found that due to leakage in the bottom of the tank it took 1 more minute to fill the tank. When the tank is full, in what time will the leak empty it?
- a) 42 minutes
- b) 45 minutes
- c) 48 minutes
- d) 44 minutes

- e) 40 minutes
- Directions (6 – 10): Study the pie chart carefully and answer the following questions.



6. Time taken to fill the tank by tap P and S is _____ min.
- a) 240
- b) 360
- c) 120
- d) 100
- e) 80
7. Tap Q opens for 21 min and tap R opens for 18 min after that tap P used to empty the tank and open for 10 min. Amount of water in tank is _____ litre. Consider tank was initially empty.
- a) 32
- b) 37

- c) 45
- d) 50
- e) 48
8. Tap Q and R start to empty the full tank at 10:00 PM.
At what time, tank will be empty?

- a) 11:50 PM
- b) 12:00 AM
- c) 12:00 PM
- d) 11:30 PM
- e) 11:45 PM

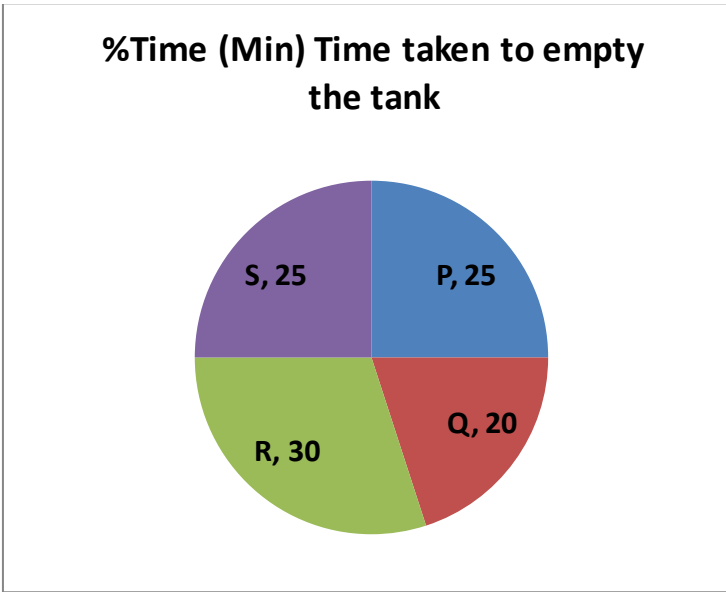
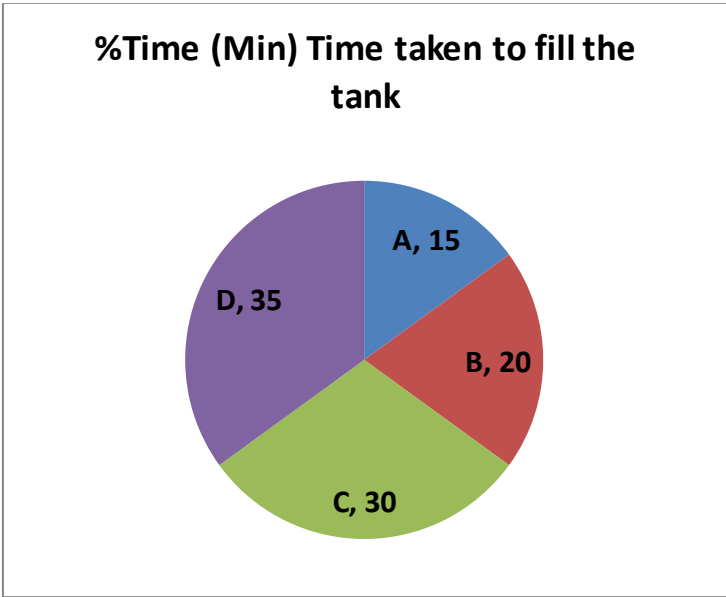
9. Initially tank was $\frac{3}{5}$ filled. After empty the tank by 30 liter using the tap S, tap Q open to fill. How much time tap Q takes to fill the tank?

- a) 1 hour 30 min
- b) 1 hour 40 min
- c) 1 hour 54 min
- d) 1 hour 25 min
- e) 1 hour 35 min

10. Tap P and R open to fill the tank at the same time tap Q and S open to empty the tank. Under this condition, how much time it take fill the tank till mid level?

- a) 2 hours 50 min
- b) 3 hours 15 min
- c) 4 hours 40 min
- d) 5 hours
- e) 4 hours 45 min

Directions (11 – 15): Chart 1 shows the percentage of time taken to fill the tank (Total time = 60 minutes) and Chart 2 shows the time taken to empty the tank. Table 1 shows the capacity of water carried by the leak pipe. Study the charts and table and answer the below questions.



Leak Pipe	Capacity of leak pipe (litres)
K	5
L	10
M	15

N	20
---	----

A large cistern can be filled by three pipes A, B and C. How many minutes will it take to fill the cistern from an empty state if C is used to fill half the tank, A and B fill it together the other half?

- a) 8 minutes
- b) 5 minutes
- c) 4 minutes
- d) 10 minutes
- e) None of these

12. A tank was $\frac{3}{5}$ th empty. To fill it completely, pipe D was to be opened, but accidentally pipe Q was opened. When it was noticed after 4 minutes, pipe Q was closed. And now to fill the tank quickly, pipe C was opened. What is the extra time taken to fill the tank due to the opening of pipe Q?

- a) 10 minutes
- b) 8.2 minutes
- c) 11 minutes
- d) 5.75 minutes
- e) None of these

13. If the pipes C, D and L are opened when the tank is full and it takes 2 hours to empty the tank. Find the capacity of the tank?

- a) 154.87 litres
- b) 34.98 litres
- c) 89.68 litres
- d) 80 litres

e) None of these

14. To fill a tank, pipes A and C were opened at 3 : 10 PM. After 5 minutes pipe A was closed and at the same time pipe P got opened. After some time it was found that tank was $\frac{2}{3}$ rd empty, at what time it was observed?

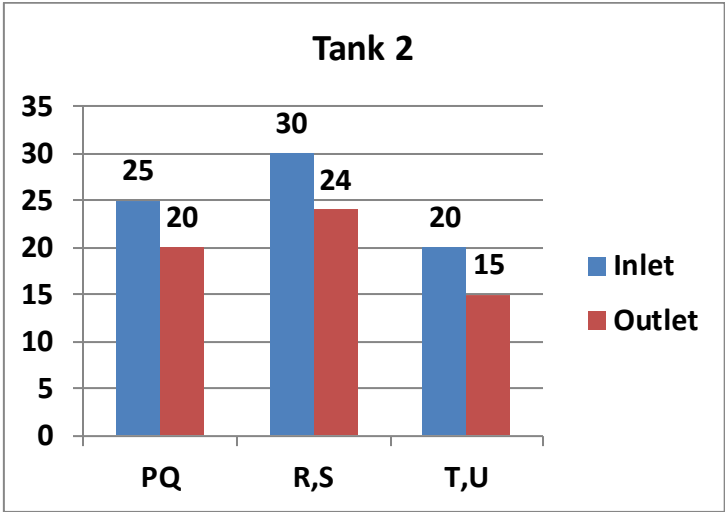
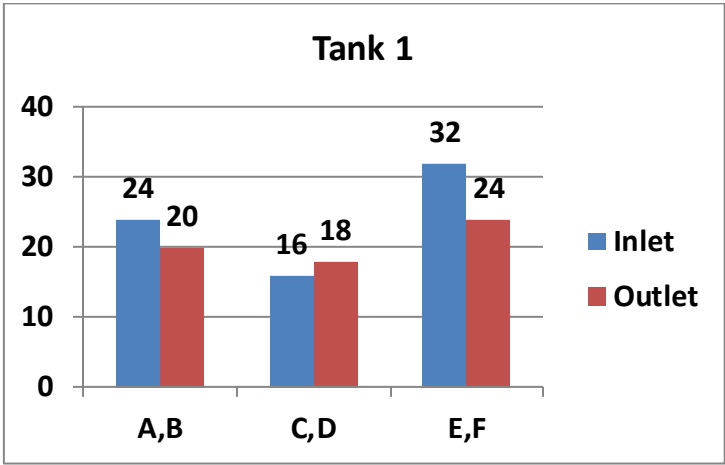
- a) 5 : 45 pm
- b) 5 : 00 pm
- c) 4 : 35 pm
- d) 4 : 00 pm
- e) None of these

15. If the pipes A, R and M are opened when the tank is full and it takes 30 minutes to empty the tank. And pipes D and N are opened when another tank is full and it takes 1 hour to empty the tank. Find the difference in capacities of the tanks?

- a) 77.72 litres
- b) 50 litres
- c) 45.54 litres
- d) 33.89 litres
- e) None of these

Direction (16 – 20): Study the following bar graph and table carefully and answer the following questions.

Time taken (in minutes) by different pipes to fill or empty Tanks 1 and Tank 2 is given in the following graphs. Inlet pipe is to fill the tank and outlet pipe is to empty the tank. 2 bar graphs are for 2 different tanks (Tank-1 and Tank-2).



16. To fill Tank 1, pipes A and E were opened at 4:50 PM. After 8 minutes pipe A was closed and at the same time pipe F got opened. After some time it was found that tank was $\frac{2}{3}$ rd empty, at what time it was observed?

- a) 5:27 PM
- b) 5:17 PM
- c) 5:12 PM
- d) 5:32 PM
- e) 5:22 PM

17. If the capacity of tank 2 is 1500 litres and pipe P of tank 2 is shifted to tank 1 then, find the capacity of tank

1 if Inlet P and outlet D together can empty the tank 1 in 72 minutes.

- a) 1200 litres
- b) 1440 litres
- c) 1680 litres
- d) 1320 litres
- e) None of these

18. Using the data from bar graphs, which of the following combination of pipes will fill the tank in less time as compared to other combinations given?

- a) A - C - F
- b) P - S - T
- c) B - D - E
- d) Q - S - T
- e) A - D - E

19. Tank 2 was $\frac{2}{5}$ th full. To fill it more, pipe R was to be opened, but accidentally pipe S got opened. It was noticed after 6 minutes and then pipe S was immediately closed. And now to fill tank quickly, pipe P was opened. What time could have been saved if pipe S was not opened?

- a) 8.25 minutes
- b) 7.75 minutes
- c) 9.25 minutes
- d) 8.75 minutes
- e) None of these

20. The time taken to fill the tank 1 with Inlet C and outlet G together is 56 minutes less than the time taken

by inlet T and outlet S together to fill tank 2. In how much time outlet G will empty the full tank 1?

- a) 18 minutes 40 seconds
- b) 21 minutes 20 seconds
- c) 22 minutes 40 seconds
- d) 24 minutes 10 seconds
- e) None of these

Directions (21 – 25): There are four floor in Sahara Tower Lucknow. On each of the floor there is one inlet motor and one outlet tap. There is a supply tank kept on the terrace of fourth floor whose capacity is 5000 litre. All the motors and outlet taps of all the floors are connected to the tank. Further information is given below: -

First floor - Inlet motor can fill the tank in 15 minutes, and outlet tap can empty the tank in 20 minutes.

Second floor -Outlet tap can empty the tank in 16 minute. Inlet motor can fill the tank in 18 minutes.

Third floor - Inlet motor can fill the tank in 25 minutes.

Fourth floor - Inlet motor can fill the tank in 30 minutes.

21. To fill the tank, inlet motor of 1st and 3rd floor were opened at 8:00 AM. After 5 minutes motor and tap of 1st floor was closed and at the same time outlet tap of 1st floor also got opened. After some time it was found that tank was $\frac{2}{3}$ rd empty, at what time it was observed?

- a) 8:25 PM
- b) 9:30 AM
- c) 8:35 PM
- d) 8:35 AM
- e) 8:25 AM

22. The tank was $\frac{2}{5}$ th full. To fill it more, inlet motor of 4th floor was to be opened, but accidentally outlet tap of 2nd floor got opened. When it was noticed after 4 minutes, it was closed. And now to fill tank quickly, inlet motor of 3rd floor was opened. What time could have been saved if outlet tap of 2nd floor was not opened?

- a) 7.45 minutes
- b) 5.35 minutes
- c) 5.25 minutes
- d) 8.35 minutes
- e) 7.25 minutes

23. There was some garbage in a tank. To remove the garbage, inlet motor of 1st floor and Outlet tap of 3rd floor worked alternately for 3 minutes each starting with inlet motor of 1st floor. The procedure continued for 24 minutes, after which, inlet motor of 1st and 4th floor were opened to fill the tank. If the tank was filled in next 7 minutes, find the time in which Outlet tap of 3rd floor can empty the full tank.

- a) 24 minutes
- b) 28 minutes
- c) 18 minutes
- d) 20 minutes
- e) 32 minutes

24. The tank is to be filled by using inlet motor of 2nd and 4th floor simultaneously. After 9 minutes, some garbage was observed in tank so inlet motor of 2nd and 4th floor were closed and outlet tap of 4th floor was opened. After 6 minutes, it was found, that tank is clean so outlet tap of 4th floor was closed and again inlet motor of 2nd and 4th floor were opened, after which they filled the tank in 6 minutes. If outlet tap of 4th floor

alone can empty $\frac{2}{9}$ th tank in 4 minutes, in how much time inlet motor of 2nd floor can fill the fill tank?

- a) 20 minutes
- b) 16 minutes
- c) 15 minutes
- d) 24 minutes
- e) 18 minutes

25. Using the data from given information and above questions, which of the following combination of taps will fill the tank in less time as compared to other combinations given?

[Given that: - A, B, C, and D are inlets of 1st, 2nd, 3rd, and 4th floor respectively

P, Q, R, and S are outlets of 1st, 2nd, 3rd, and 4th floor respectively] Note: If the outlet taps of 3rd and 4th floors can empty the tank in 18 and 24 mins respectively.

- a) A-B-S
- b) B-C-P
- c) A-D-Q
- d) A-B-P
- e) B-D-R

Directions (26 – 28): Study the paragraph and answer the questions that follow.

There were two similar tanks X and Y with five similar pipes P, Q, R, S and T. Pipes P, Q and R can fill the empty tank in 10 minutes, 15 minutes and 30 minutes respectively, while pipes S and T can empty the filled tank in 20 minutes and 30 minutes respectively. Tank X had no leaks, but tank Y had a leak, such that when pipe P was opened in the empty tank Y, it took 12 minutes to fill the tank Y.

26. Pipes P, Q, and R were simultaneously opened into the empty tank X, such that pipes P and Q were discharging milk and pipe R was discharging water into the tank. So, the tank will be 60% filled after ____ minutes and the mixture in the tank will contain ____ part of milk.

Which of the following options satisfies the two blanks in the question?

- A. 2, $\frac{3}{4}$
- B. 2, $\frac{4}{5}$
- C. 3, $\frac{5}{6}$
- D. 3, $\frac{6}{7}$

- a) Only A
- b) Only B
- c) Only C
- d) Only D

e) None of the above

27. When pipes P and Q were simultaneously opened into a 20% filled tank X, it will be ____% filled after 3 minutes, while if pipes Q and R were simultaneously opened into a 25% filled tank X, it will be 65% after ____ minutes.

Which of the following options satisfies the two blanks in the question?

- A. 60, 2
- B. 60, 3
- C. 70, 3
- D. 70, 4

- a) Only A

- b) Only B
- c) Only C
- d) Only D
- e) None of the above

28. When pipes Q and S were simultaneously opened in the empty tank X, 40 gallons of liquid was filled in the tank after 12 minutes. This means that the tank has a capacity of ____ gallons and pipe S can empty it at a rate of ____ gallons per minute.

Which of the following options satisfies the two blanks in the question?

- A. 200, 10
- B. 240, 12
- C. 280, 15
- D. 320, 20

- a) Only A
- b) Only B
- c) Only C
- d) Only D
- e) None of the above

Directions (29 – 30): P, Q, R and S four pipes can fill a cistern ‘N’ in 7 minutes if all are opened together. P is 25% less efficient then Q which is 100% more efferent than R. ‘S’ filled 25% of the cistern. P and Q together can fill the cistern in ‘x’ minutes while P and S can fill half cistern in ‘y’ minutes.

29. Pipe A and B together can fill another cistern ‘M’ in (x+12) minutes while pipe B and C together can fill cistern ‘M’ in (y+5) minutes. If pipe A, B and C together

can fill cistern ‘M’ in (6x/y) minutes, then find efficiency of ‘B’ is what % more/less than efficiency of ‘A’ ?

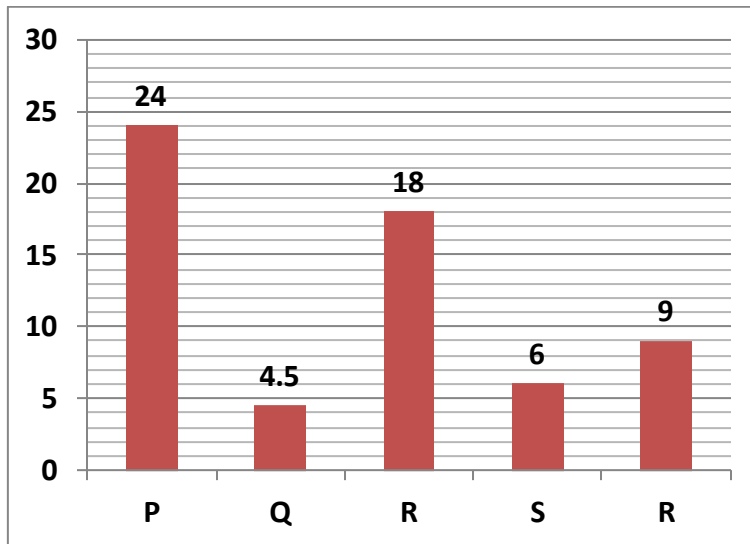
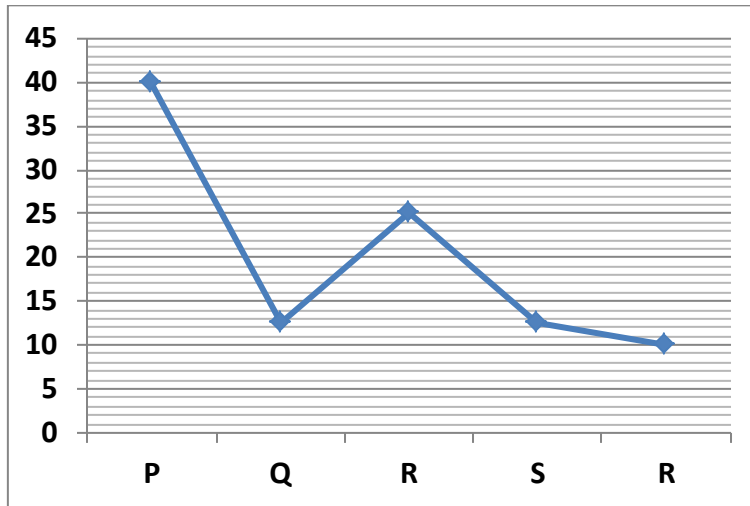
- a) 50%
- b) 75%
- c) 100%
- d) 150%
- e) 200%

30. ‘D’ men can complete a work in (x+9) day while (y+7) men can complete same work in ‘E’ days. If y men can complete same work in (E+12) days then find in how many day (E–D) men can complete the same work?

- a) 21 days
- b) 42 days
- c) 35 days
- d) 14 days
- e) 84 days

Directions (31 – 35): Study the following information carefully and answer the questions given below:

Line graph given below shows percentage of a tank filled by each pipe and bar graph shows hours taken by each pipe to do fill that part of tank.



31. Pipe P and pipe T Start filling the tank together and fill it for 't' hours after that both pipes replaced by R and S, who fill for next (t + 2) hours and 50/9% of total tank still unfilled. If pipe A can fill with the efficiency of (t + 2) unit/hours, then find the time taken by pipe A to fill tank alone?

- a) 36 hours
- b) 24 hours
- c) 30 hours
- d) 39 hours
- e) 45 hours

32. Pipe Q and T start filling tank alternatively starting with pipe Q and fill the tank for 25 hours, after that both are pipe replaced by pipe P and R and both pipe start filling alternatively starting with pipe R. Find in how much time remaining tank will be filled?

- a) 28 1/6hrs
- b) 33 1/6hrs
- c) 46 1/3hrs
- d) 38 1/6hrs
- e) 42 1/3hrs

33. Pipe P and S start filling the tank together and fill it for y hours, after that pipe Q fill for (y - 4) hours and remaining tank filled by pipe T in (y - 10) hours. If all four pipes P, Q, S & T for (y - 3) hours together, then what portion of tank will be unfilled?

- a) 1/36
- b) 1/124
- c) 1/128
- d) 1/144
- e) 1/148

34. If for first 15 hours pipe P start filling with its 25% less efficiency and pipe S fill the tank with 33 1/3% more its efficiency together and remaining tank filled by another pipe B in 57 hours. Find in how much time pipe B can fill the tank alone? (2 Mark)

- a) 102 hours
- b) 128 hours
- c) 108 hours
- d) 144 hours
- e) 162 hours

35. Five pipes P and T, Q and R and S work alternatively in such a manner that on first hour P and T fill together, on second hour Q and R fill together and third hour S fill alone, find in how much time whole tank will be filled?

- a) 54 $\frac{3}{4}$ hrs
- b) 33 $\frac{1}{4}$ hrs
- c) 22 $\frac{1}{2}$ hrs
- d) 36 $\frac{1}{4}$ hrs
- e) 42 $\frac{3}{4}$ hrs

Directions (36 – 38): Three pipes A, B, and C can fill a tank from empty to full in 40 minutes, 30 minutes, and 20 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P, Q and R respectively.

36. What is the proportion of the solution Q in the liquid in the tank after 6 minutes?

- a) $\frac{3}{13}$
- b) $\frac{6}{13}$
- c) $\frac{7}{13}$
- d) $\frac{4}{13}$
- e) $\frac{9}{13}$

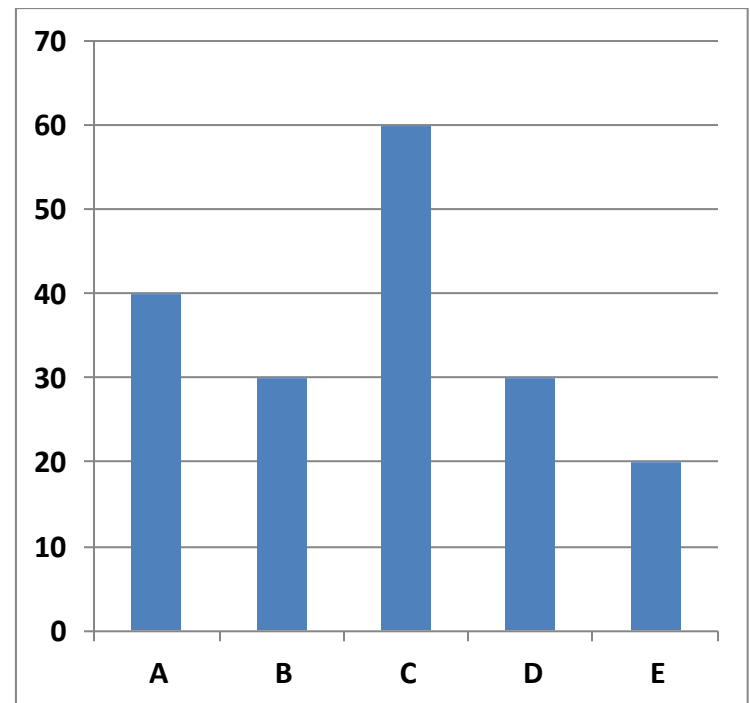
37. What is the proportion of the solution R in the liquid in the tank after 3 minutes?

- a) $\frac{5}{13}$
- b) $\frac{6}{13}$
- c) $\frac{7}{13}$
- d) $\frac{8}{13}$
- e) $\frac{9}{13}$

38. What is the proportion of the solution P in the liquid in the tank after 4 minutes?

- a) $\frac{3}{13}$
- b) $\frac{5}{13}$
- c) $\frac{6}{13}$
- d) $\frac{7}{13}$
- e) $\frac{2}{13}$

Directions (39 – 43): Bar graph given below shows time (in hours) taken by five different pipes to fill a tank 'T' alone. Ratio of efficiency of all five pipes remain same throughout any situation. Study the data carefully and answer the following questions.



39. All five-pipe start filling another tank 'X' together and E closed after 8 hours. Tank filled by B is same as tank filled by C, while A and C fill the tank for same time. D fill the tank for 'p' hours. If B, C & D together can fill the tank 'X' in 24 hours and B fill the tank for only 10 hours, then find the value of 'p'.

- a) 7 hours
- b) 9 hours
- c) 11 hours
- d) 13 hours
- e) 15 hours

40. A and C together can fill another tank 'P' in $(T + 42)$ hours, while B and D together can fill the tank 'P' in $(T + 15)$ hours. Find how many hours B fill the tank 'P'.

- a) 100 hours
- b) 90 hours
- c) 85 hours
- d) 50 hours
- e) 60 hours

41. All five pipes started together to fill another tank M. E fill the tank for 6 hours and then closed. After 3 hours more both B and D closed too. 40% of total tank is filled by A and C together but after 'x' more hours 'A' left. Remaining tank is completed by 'C' in 'd' more hours. If ' $d - x = 3$ ', then number of hours for which 'C' fill the tank is what percent more than number of hours for which 'A' fill the tank.

- a) $33 \frac{1}{3}\%$
- b) 50%
- c) $66 \frac{2}{3}\%$
- d) 75%
- e) 100%

42. A, B and C together starts to fill tank 'T'. After seven hours 'C' closed and after three hours more 'A' and 'B' also closed. If remaining tank is filled by D and E

alternatively in 'd' hours. If 'd' is integer, then find 'E' filled for how many hours ?

- a) 3 hours
- b) 4 hours
- c) 5 hours
- d) 6 hours
- e) Cannot be determined

43. A, B and D together started filling tank 'T'. After five hours, B and D replaced by C and E and after five more hours A also close. After one more hour E close too. C fill the tank for total 't' hours. In other case A and B starts filling together to tank 'T'. After four hours both pipes are replaced by E. If E fill the tank for five hours and replaced by D who fill the tank for eight hours. Remaining tank filled by C in 'd' hours. Find $(d - t)$?

- a) 4 hours
- b) 10 hours
- c) 6 hours
- d) 8 hours
- e) 12 hours

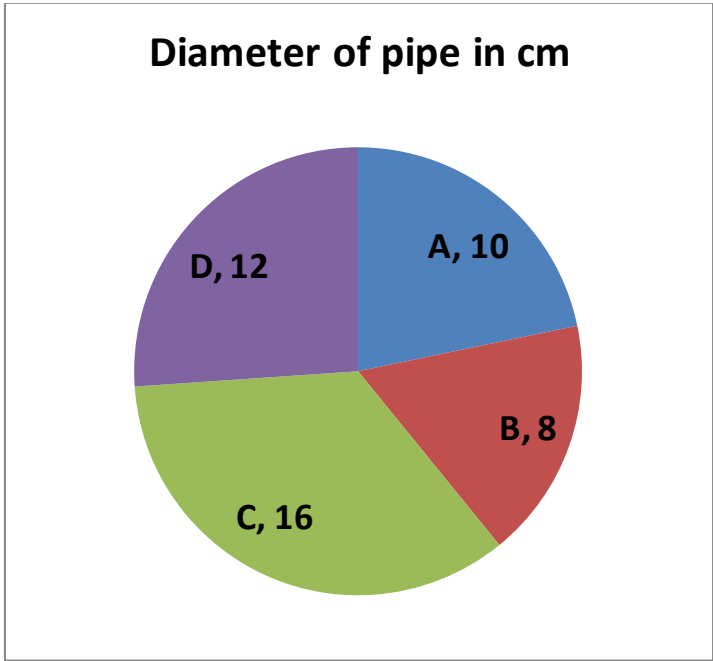
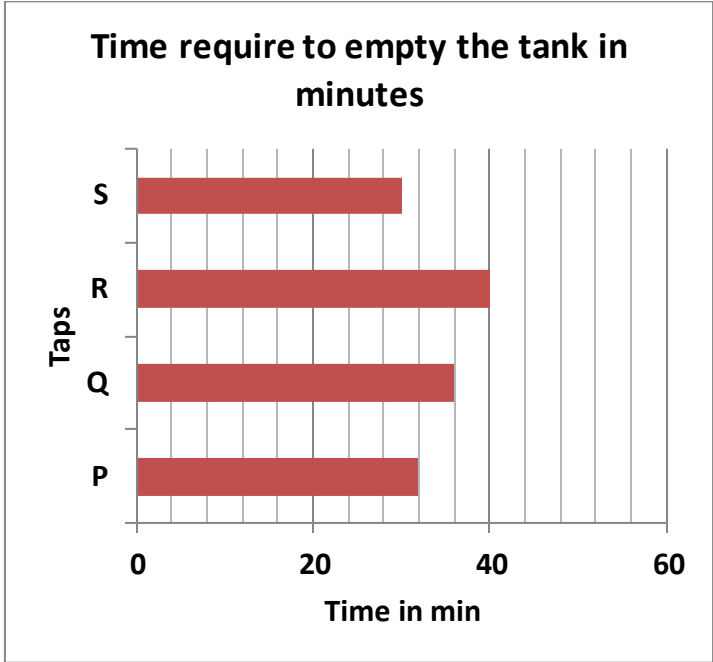
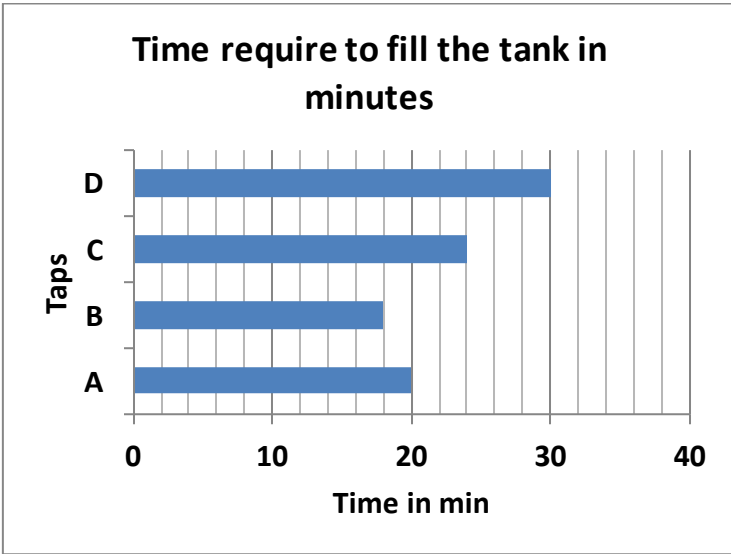
Directions (44 – 45): Two taps 'A' and 'B', drops two types of chemical x and y respectively. In every drop they drop 1 ml chemical. By the reaction of 'x' and 'y' in a proportion of 5 : 3, a chemical formed z. If ratio of x and y become 10 : 7 then a poisonous chemical formed.

44. Find the speed of tap B in terms of per drop, if tap 'A' drops 1 ml chemical x per second such that chemical does not become poisonous

- a) 1 drop/2 sec.
- b) 1 drop/ $\frac{5}{2}$ sec.

- c) 1 drop/7/3 sec
- d) 1 drop/ 5/3 sec.
- e) 1 drop/ 5/4 sec.
45. If 2.5 liter of chemical ‘x’ already present in jar, then what will be the speed of tap A and tap B to make perfectly chemical z in 5 minutes of 6 liter.
- a) 0.25 & 0.45 liter/min
- b) 0.2 & 0.4 liter/min
- c) 0.5 & 0.3 liter/min
- d) 0.75 & 0.45 liter/min
- e) 0.1 & 0.2 liter/min

Directions (46 – 50): Study the following bar graph and answer the questions.



46. To fill the tank, tap C and D are opened at the same time. After 10 minutes, tap D is closed and the tap S is opened. How much time will it require to completely fill the tank after that?
- a) 45 min
- b) 30 min

- c) 20 min

d) 10 min

e) None of these

47. All the taps are opened for 5 minutes. After that tap B and C are closed and same time tap R is opened for emptying the tank, the amount of time taken to fill the tank? [Correct up to 3 decimal places]

a) 1.32 min

b) 1.66 min

c) 1.86 min

d) 1.011 min

e) 1.23 min

48. If the diameter of tap P is 44% of twice of the average of the radius of filing pipe. The radius of tap R which is two third of the diameter P is?

a) 20.67 mm

b) 2.45 mm

c) 33.7 mm

d) 44.52 mm
- e) 3.723 mm

49. Due to choking of mud in pipe A and B, its filling time increased by 30%. If the tank needs to be empty by pipe Q and R which is completely filled by A and B, the difference in the time taken for filling and emptying the tank is?

a) 7.90 min

b) 9.25 min

c) 12.31 min

d) 6.63 min

e) None of these

50. The ratio of combine time taken to fill the tank to combine time taken to empty the tank is?

a) 98/72

b) 78/120

c) 72/98

d) 95/78

e) None of these

Solution and Detailed explanation

1. Answer: C)

Total time taken to fill tank P = $1/(1/15 + 1/20) = 300/35 = 60/7 = 8.57 \text{ min}$

2. Answer: A)

Time taken to fill tank Q = 12 min

Work of inlet 1 = $1/15$

Work of inlet 2 = $1/25$
- Inlet 1 works for 12 min and inlet 2 works for $(12 - x) \text{ min}$

$12/15 + (12 - x)/25 = 1$

$12 - x = 5$

$x = 7$

So, $12 - 7 = 5 \text{ minutes}$

3. Answer: B)

Work of all pipes = $(1/25 + 1/15 + 1/20)$

Work of inlet pipes of tank R = $1/25 + 1/15$

Let T is the time taken by the pipes to fill the tank

$(1/25 + 1/15 + 1/20) \times (T - 8) + (1/25 + 1/15) \times 8 = 1$

T = 8.93 min

4. Answer: C)

Total time taken = $1/(1/10 + 1/30 - 1/15) = 1/(2/30) = 15$ min

5. Answer: A)

Work done by the two pipes in 1 min = $(1/15) + (1/10) = (25/150)$.

Time taken by these pipes to fill the tank = $(150/25) = 6$ min

Due to leakage, time taken = $6 + 1$ min = 7 min

Work done by two pipes and leak in 1 min = $1/7$

Work done by the leak in 1 min = $1/6 - 1/7 = 1/42$

Leak will empty the full tank in 42 minutes

6. Answer: C)

Amount of tank filled by tap P in 60 min = 30% of 400 = 120 l

Amount of tank filled by tap S in 60 min = 20% of 400 = 80 l

Amount of tank filled by tap P and S = $120 + 80 = 200$ l

\therefore Time taken to fill 400 l = $400/200 = 2$ hours = 120 min

7. Answer: C)

Amount of water fill by tap Q in 60 min = 25% of 400 = 100 l

Flow rate of tap Q = $100/60 = 5/3$ l/m

Amount of tank filled in 21 min = $(5/3) \times 21 = 35$ l

For the flow rate of tap R,

Amount of water fill by tap R in 60 min = 25% of 400 = 100 l

Flow rate of tap R = $100/60 = 5/3$ l/m

Amount of water filled in 18 min = $(5/3) \times 18 = 30$ l

For the flow rate of tap P,

Amount of water filled by tap P = 30% of 400 = 120 l

Flow rate of tap P = $120/60 = 2$ l/m

Amount empty by tap P in 10 min = $10 \times 2 = 20$ l

\therefore Final volume in tank = $35 + 30 - 20 = 45$ l

8. Answer: B)

For the flow rate of Q and R,

Amount of water empty by tap Q = Amount of water empty by tap R = 25% of 400 = 100

Flow rate of Q = flow rate of R = $100/60 = 5/3$ l/m

Combine flow rate = $5/3 + 5/3 = 10/3$ l/m

For the time taken to empty the tank,

Time taken to empty 400 l = $400 \times 3/10 = 120$ min. = 2 hour

\therefore Time when tank empty = 10:00 + 2:00 = 12:00 AM

9. Answer: D)

Water in tank = $(3/5) \times 400 = 240$ l

Water in tank after closing tap S = $240 - 30 = 210$ l

Amount need to fill = $400 - 210 = 190$ l

For the flow rate of Q,

Amount of tank filled in 60 min = 25% of 400 = 100 l

Flow rate of tap Q = $100/60 = 5/3$ l/m

∴ time taken to fill the tank = $190 \times (3/5) = 114$ min = 1 hour 54 min

10. Answer: D)

Filling till mid-level i.e. fill half tank = $400/2 = 200$ l

For the combine flow rate of P and R,

⇒ Amount of water fill by tap P in 60 min = 30% of 400 = 120 l

⇒ Amount of water fill by tap R in 60 min = 25% of 400 = 100 l

⇒ Flow rate of P = $120/60 = 2$ l/m

⇒ Flow rate of R = $100/60 = 5/3$ l/m

⇒ Combine flow rate = $2 + (5/3) = 11/3$ l/m

For the flow rate of Q and S,

⇒ Amount of water empty by tap Q in 60 min = 25% of 400 = 100 l

⇒ Amount of water empty by tap S in 60 min = 20% of 400 = 80 l

⇒ flow rate of tap Q = $100/60 = 5/3$ l/m

⇒ flow rate of tap S = $80/60 = 4/3$ l/m

⇒ Combine flow rate = $5/3 + 4/3 = 9/3 = 3$ l/m

⇒ Actual filling rate = $11/3 - 3 = (11 - 9)/3 = 2/3$ l/m

∴ Time taken to fill 200 l = $200 \times (3/2) = 300$ min = 5 hour

Alternative Method:

P fills 120 l in 60 minutes

R fills 100 l in 60 minutes

Q empty 100 l in 60 minutes

S empty 80 l in 60 minutes

Total 40 l is filled using all four pipes in 60 minutes

Time to fill 200 liters = $200/40 = 5$ hours

(11 – 15): Common Explanation:

Pipe	% Time taken	Time taken in minutes
A	15	9
B	20	12
C	30	18
D	35	21

Pipe	% Time taken	Time taken in minutes
P	25	15
Q	20	12
R	30	18
S	25	15

11. Answer: E)

Let the capacity of the cistern = 36 L (LCM of 9, 12 and 18)

Efficiency of pipe C = $36/18 = 2$ L/min

Time taken by C to fill the half cistern = $18/2 = 9$ min

Efficiency of pipe A and B = $36/9 + 36/12 = (4 + 3) = 7$ L/min

Time taken by A and B to fill the half cistern = $18/7$ min

∴ Time taken to fill the cistern = $9 + 18/7 = 81/7$ minutes

12. Answer: B)

Tank is $3/5^{\text{th}}$ empty which means it is $2/5^{\text{th}}$ full

So to fill $3/5^{\text{th}}$ tank time taken by D = $(3/5) \times 21 = 12.6$ minutes

Pipe Q was opened for 4 minutes, so it emptied = $(1/12) \times 4 = 1/3^{\text{rd}}$ of the tank

Now the tank filled = $(2/5) - (1/3) = 1/15$

Now pipe C was opened, to fill $14/15^{\text{th}}$ portion of the tank

Thus pipe C takes = $(14/15) \times 18 = 16.8$ minutes

So the total time taken to fill the tank = $4 + 16.8 = 20.8$ minutes

\therefore The extra time taken to fill the tank = $20.8 - 12.6 = 8.2$ minutes

13. Answer: C)

Let the time taken by leak pipe L to empty the tank be x

Work done by the three pipes to empty the tank in a minute = $1/18 + 1/21 - 1/x$

It takes 2 hours i.e. 120 minutes to empty the tank

Thus,

$$(1/18 + 1/21 - 1/x) \times 120 = -1$$

$$\Rightarrow 6.666 + 5.714 - 120/x = -1$$

$$\Rightarrow -120/x = -13.38$$

$$\Rightarrow x = 8.968 \text{ min}$$

Thus the total capacity of the tank = $8.968 \times 10 = 89.68$ litres

14. Answer: D)

Pipes A and C work for 5 min = $(1/9 + 1/18) \times 5 = 5/6$ tank is filled

Now A is closed and C and P work

In one minute they work = $(1/18 - 1/15) = -1/90$

Let C and P work for x minutes upto when tank was found $2/3^{\text{rd}}$ empty

Thus,

$$5/6 + (-1/90) \times x = 1/3$$

$$\Rightarrow x/90 = 1/2$$

$$\Rightarrow x = 45 \text{ minutes}$$

\therefore Time when $2/3^{\text{rd}}$ of the tank was observed = 3 : 10 pm
+ 5 min + 45 min = 4 : 00 pm

15. Answer: E)

Case I:

Let the time taken by leak pipe M to empty the tank be x_1

Work done by the three pipes A, R and M to empty the tank in a minute = $(1/9) - (1/18) - (1/x_1)$

It takes 30 minutes to empty the 1st tank

Thus,

$$[(1/9) - (1/18) - (1/x_1)] \times 30 = -1$$

$$\Rightarrow 5/3 - 30/x_1 = -1$$

$$\Rightarrow -30/x_1 = -8/3$$

$$\Rightarrow x_1 = 90/8 \text{ min}$$

Thus the total capacity of the tank = $90/8 \times 15 = 168.75$ litres

Case II:

Let the time taken by leak pipe N to empty the tank be x_2

Work done by the two pipes D and N to empty the tank in a minute = $(1/21) - (1/x_2)$

It takes 1 hour i.e. 60 minutes to empty the 2nd tank

Thus,

$$[(1/21) - (1/x_2)] \times 60 = -1$$

$$\Rightarrow 20/7 - 60/x_2 = -1$$

$$\Rightarrow 60/x_2 = 27/7$$

$$\Rightarrow x_2 = 420/27 \text{ min}$$

Thus the total capacity of the tank = $420/27 \times 20 = 311.11$ litres (Approx)

\therefore Difference in capacities of tanks = $311.11 - 168.75 = 142.36$ litres

16. Answer: E)

Part of tank filled by pipe A in one minute = $1/24$

Part of tank filled by pipe E in one minute = $1/32$

As, A and E together work for 8 minutes,

$$\Rightarrow \text{Part of the tank 1 filled in 5 minutes} = \{(1/24) + (1/32)\} \times 8 = 7/12$$

$$\Rightarrow \text{Part of tank emptied by pipe F in one minute} = 1/24$$

Now, A is closed and E and F are working,

$$\Rightarrow \text{Work done in 1 minute} = (1/32 - 1/24) = -1/96 \text{ (that means tank is getting empty)}$$

Let Pipes E and F work for X minutes up to when tank was found $2/3^{\text{rd}}$ empty (or $1/3^{\text{rd}}$ full);

$$\Rightarrow 7/12 + (-1/96) \times X = 1/3$$

$$\Rightarrow X/96 = 1/4$$

$$\Rightarrow X = 24$$

So, the time when $2/3^{\text{rd}}$ tank was empty was observed is 4:50 + 8 minutes + 24 minutes = 5:22 PM

17. Answer: B)

Capacity of tank 2 = 1500 litres

$$\Rightarrow \text{Rate of filling of Inlet pipe P} = 1500/25 = 60 \text{ litre/min}$$

$$\Rightarrow \text{Part of tank emptied by pipe D} = 1/18$$

As, the capacity of 2 tanks is different, time taken by inlet P to fill tank-1 will also be different so let us suppose it be X mins

Now, Inlet P and outlet D together can empty the tank 1 in 72 mins,

$$\Rightarrow (1/x) - (1/18) = -1/72$$

$$\Rightarrow 1/x = 1/24$$

$$\Rightarrow x = 24$$

$$\Rightarrow \text{Time taken by inlet P alone to fill tank-1} = 24 \text{ mins}$$

$$\Rightarrow \text{Capacity of tank-1} = 24 \times (\text{Rate of filling of Inlet pipe P}) = 24 \times 60 = 1440 \text{ litres}$$

18. Answer: A)

$$\text{For combination A - C - F the rate of filling tank will be} = (1/24) + (1/16) - (1/24) = 1/16$$

$$\text{Time to fill the tank} = 16 \text{ minutes}$$

$$\Rightarrow \text{For combination P - S - T the rate of filling tank will be} = (1/25) - (1/24) + (1/20) = 29/600$$

$$\Rightarrow \text{Time to fill the tank} = 600/29 = 20.68 \text{ minutes}$$

$$\Rightarrow \text{For combination B - D - E the rate of filling the tank will be} = (-1/20) + (-1/18) + (1/32) = -107/1440$$

So, this combination will empty the tank and hence it is of no use

⇒ For the combination Q - S - T the rate of filling the tank will be = $(-1/20) + (-1/24) + (1/20) = -1/24$

So, this combination will empty the tank and hence it is of no use

⇒ For the combination A - D - E the rate of filling the tank will be = $(1/24) + (-1/18) + (1/32) = 5/288$

⇒ Time to fill the tank = $288/5 = 57.6$ minutes

∴ Combination A - C - F will take least time

19. Answer: C)

Now, Tank 2 was $2/5^{\text{th}}$ full so to fill $3/5^{\text{th}}$ tank,

⇒ Time taken by R will be = $(3/5) \times 30 = 18$ minutes

Now, Pipe S was opened for 6 minutes, so

⇒ Part of tank emptied by pipe S = $(1/24) \times 6 = 1/4$

Now,

⇒ Part of tank filled = $(2/5) - (1/4) = 3/20$

Now, when pipe P was opened, to fill the remaining $17/20^{\text{th}}$ part of the tank,

⇒ Time taken by P = $(17/20) \times 25 = 85/4 = 21.25$ minutes

⇒ Total time now taken to fill the tank = $6 + 21.25 = 27.25$ minutes

⇒ Time that could have been saved = $27.25 - 18 = 9.25$ minutes

20. Answer: B)

Time taken by inlet T and outlet S together to fill tank-2 = $1/\{(1/20) - (1/24)\} = 120$ minutes

Time taken to fill the tank-1 with Inlet C and outlet G together will be = $120 - 56 = 64$ minutes

As, inlet C takes 16 minutes to fill the tank-1. Let us suppose outlet G will take x minutes to empty the tank 1.

⇒ $(1/16) - (1/x) = 1/64$

⇒ $1/x = 3/64$

⇒ $x = 21.33$

∴ Time taken by outlet G to empty the tank-1 is 21 minutes 20 seconds

21. Answer: E)

Inlet motor of 1st and 3rd floor work for 5 minutes – $(1/15 + 1/25) \times 5 = 8/15$ tank fill

Now Inlet motor of 1st floor was closed and inlet motor of 3rd floor and Outlet tap of 1st floor working

In 1 minute they work = $(1/25 - 1/20) = -1/100$ — means empty

let they (inlet motor of 3rd floor and Outlet tap of 1st floor) work for x minutes up to when the tank was found $2/3^{\text{rd}}$ empty

⇒ $8/15 + (-1/100) \times x = 1/3$ [1/3rd tank is fill at this time]

Solve, $x = 20$ mins

∴ The time when $2/3^{\text{rd}}$ empty tank was observed – 8:00 + 5 minutes + ⇒ 20 minutes = 8:25 AM

22. Answer: E)

Tank was $2/5^{\text{th}}$ full. So to fill $3/5^{\text{th}}$ tank, inlet motor of 4th floor will take ⇒ $3/5 \times 30 = 18$ minutes ----(1)

Now

Outlet tap of 2nd floor was opened for 4 minutes, so it emptied = $1/16 \times 4 = 1/4^{\text{th}}$ tank

Now tank filled is = $2/5 - 1/4 = 3/20$

Now, inlet motor of 3rd floor was opened, to fill 17/20th tank, it takes $\Rightarrow 17/20 * 25 = 85/4 = 21.25$ minutes

\therefore Total time now taken to fill tank $= 4 + 21.25 = 25.25$ minutes -----(2)

\therefore Time that could have been saved $= 25.25 - 18 = 7.25$ minutes

23. Answer: A)

Procedure continued for 24 minutes, so and Outlet tap of 3rd floor both worked for 12 minutes each, giving 3 minutes each in turn.

\therefore In 12 minutes, inlet motor of 1st floor work $= 1/15 * 12 = 4/5$

In 12 minutes, Outlet tap of 3rd floor work $= 1/x * 12 = 12/x$ [Let x = time in which Outlet tap of 3rd floor can empty the tank]

Now inlet motor of 1st and 4th floor worked for 7 minutes, so their work in 7 minutes

$$= (1/15 + 1/30) * 7 = 7/10$$

$$\therefore 4/5 - 12/x + 7/10 = 1$$

Solve, $x = 24$ minutes

24. Answer: E)

Outlet tap of 4th floor can empty 2/9th tank in 4 minutes, so full tank in $\Rightarrow 9/2 * 4 = 18$ minutes

So now

$$\Rightarrow (1/(2nd \text{ f inlet}) + 1/30) * 9 + (-1/18) * 6 + (1/(2nd \text{ f inlet}) + 1/30) * 6 = 1$$

$$\Rightarrow (1/(2nd \text{ f inlet}) + 1/30) * 15 = 1 + 1/3$$

$$\Rightarrow (1/(2nd \text{ f inlet}) + 1/30) * 15 = 4/3$$

Solve, (2nd f inlet) = 18

25. Answer: D)

\Rightarrow 1) A-B-S

$\Rightarrow [1/15 + 1/18 - 1/18] \text{ --- } 1/15$ so this combination will fill tank in 15 minutes

\Rightarrow 2) B-C-P

$\Rightarrow [1/18 + 1/25 - 1/20] \text{ --- } 41/900$ so this combination will fill tank in $900/41 = 21.9$ minutes

Similarly

\Rightarrow 3) A-D-Q --- $80/3 = 26.6$ minutes

\Rightarrow 4) A-B-P --- $180/13 = 13.8$ minutes

\Rightarrow 5) B-D-R --- $360/17 = 21.2$ minutes

26. Answer: C)

Part of tank X filled by pipes P, Q and R in 1 min. $= 1/10 + 1/15 + 1/30 = 1/5$

\Rightarrow The tank will be completely filled in $= 5$ min.

\Rightarrow Tank will be 60% filled in $= 60\%$ of $5 = 3$ min.

Now,

Part of milk filled by pipes P and Q in 1 min. $= 1/10 + 1/15 = 1/6$

\Rightarrow Part of milk filled in 3 min. $= 3 \times 1/6 = 1/2$

But, part of tank filled in 3 min. $= 3/5$

\Rightarrow Part of milk in the mixture $= (1/2)/(3/5) = 5/6$

\therefore Only option C satisfies the two blanks in the question

27. Answer: D)

Part of tank filled by pipes P and Q in 1 min. $= 1/10 + 1/15 = 1/6$

\Rightarrow Part of tank filled in 3 min. $= 3 \times 1/6 = 1/2 = 50\%$

∴ The tank was initially 20% filled, it is $20 + 50 = 70\%$ filled after 3 minutes

Similarly,

Part of tank filled by pipes Q and R in 1 min. $= \frac{1}{15} + \frac{1}{30} = \frac{1}{10}$

∴ The tank was initially 25% filled, part of tank to be filled $= 65 - 25 = 40\% = \frac{2}{5}$

⇒ Time taken to fill 40% of tank $= (\frac{2}{5}) / (\frac{1}{10}) = 4$ min.

∴ Only option D satisfies the two blanks in the question

28. Answer: A)

When pipes Q and S were simultaneously opened,

Part of tank filled in 1 min. $= \frac{1}{15} - \frac{1}{20} = \frac{1}{60}$

⇒ Part of tank filled in 12 min. $= 12 \times \frac{1}{60} = \frac{1}{5}$

⇒ $\frac{1}{5} \times \text{Capacity of tank} = 40$

⇒ Capacity of tank $= 40 \times 5 = 200$ gallons

∴ Pipe S can empty $\frac{1}{20}$ part of tank in 1 min.,

⇒ Rate at which pipe S can empty tank $= \frac{1}{20} \times 200 = 10$ gallons per minute

∴ Only option A satisfies the two blanks in the question

29. Answer: C)

Let efficiency of R is 2 units/ minute

⇒ Efficiency of Q is 4 units/ minute

So Efficiency of P is 3 units/ minute

P + Q + R together completed 75% of work

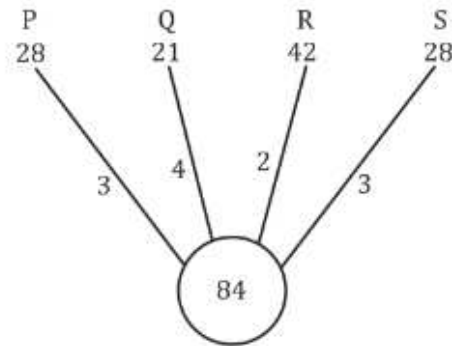
⇒ 75% of work = 9 units

⇒ 100% of work = 12 units

Efficiency of S is 3 units/minute

Total work $= 7 \times (12) = 84$ unit

Number of days taken by P, Q, R and S individually: -



$$\begin{aligned} \text{P and Q together can fill the cistern} &= \frac{28 \times 21}{28 + 21} \\ &= \frac{28 \times 21}{49} \end{aligned}$$

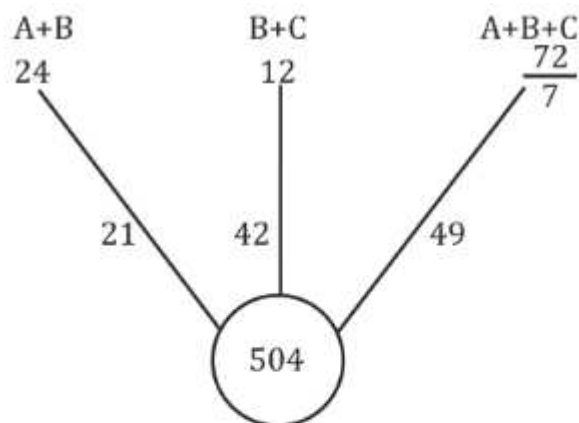
$x = 12$ min.

$$\begin{aligned} \text{P \& S together can fill half cistern} &= \frac{28 \times 28}{28 + 28} \\ y &= 7 \text{ min.} \end{aligned}$$

A and B together can fill cistern 'M' in $(x+12)$ minutes $= 12+12=24$ minutes

B and C together can fill cistern 'M' in $(y+5)$ minutes $= 7 + 5 = 12$ minutes

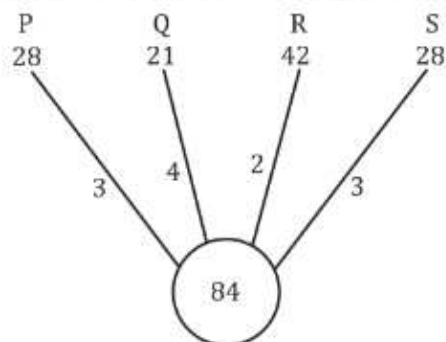
A, B and C together can fill cistern 'M' in $\left(\frac{6x}{y}\right)$ minutes $= \frac{6 \times 12}{7} = \frac{72}{7}$ minutes



A's efficiency = $49 - 42 = 7$ units/minute
 C's efficiency = $49 - 21 = 28$ units/ minute
 B's efficiency = $49 - 7 - 28 = 14$ units/minute
 Required % = $\frac{14-7}{7} \times 100$
 $= \frac{7}{7} \times 100 = 100\%$

30. Answer: B)

Let efficiency of R is 2 units/ minute
 \Rightarrow Efficiency of Q is 4 units/ minute
 So Efficiency of P is 3 units/ minute
 P + Q + R together completed 75% of work
 \Rightarrow 75% of work = 9 units
 \Rightarrow 100% of work = 12 units
 Efficiency of S is 3 units/minute
 Total work = $7 \times (12) = 84$ unit
 Number of days taken by P, Q, R and S individually: -



P and Q together can fill the cistern = $\frac{28 \times 21}{28 + 21}$
 $= \frac{28 \times 21}{49}$

$x = 12$ min.

P & S together can fill half cistern = $\frac{28 \times 28}{28 + 28}$

$y = 7$ min.

ATQ,

$D \times (12+9) = (7+7) \times E$

$\Rightarrow D \times \frac{3}{2} = E$

And $(7+7) \times E = 7 \times (E+12)$

$\Rightarrow 2E = E + 12$

$\Rightarrow E = 12$

$\Rightarrow D = 8$

Let $(E - D)$ men can complete same work in 'a' days

ATQ,

$(12-8) \times a = 8 \times (12+9)$

$a = 2 \times 21 = 42$ days

(31 – 35): Common Explanation:

Time taken by P to fill the tank alone

$$= \frac{24}{40} \times 100 = 60 \text{ hours}$$

Time taken by Q to fill the tank alone

$$= \frac{4.5}{12.5} \times 100 = 36 \text{ hours}$$

Time taken by R to fill the tank alone

$$= \frac{18}{25} \times 100 = 72 \text{ hours}$$

Time taken by S to fill the tank alone

$$= \frac{6}{12.5} \times 100 = 48 \text{ hours}$$

Time taken by T to fill the tank alone

$$= \frac{9}{10} \times 100 = 90 \text{ hours}$$

Let Capacity of tank = 720 units

(LCM of time taken by all five pipes to fill tank alone)

$$\text{Efficiency of P} = \frac{720}{60} = 12 \text{ units/hours}$$

$$\text{Efficiency of Q} = \frac{720}{36} = 20 \text{ units/hours}$$

$$\text{Efficiency of R} = \frac{720}{72} = 10 \text{ units/hours}$$

$$\text{Efficiency of S} = \frac{720}{48} = 15 \text{ units/hours}$$

$$\text{Efficiency of T} = \frac{720}{90} = 8 \text{ units/hours}$$

31. Answer: E)

ATQ—

$$(12 + 8) \times t + (10 + 15) \times (t + 2) = 720 \times \left(100 - \frac{50}{9}\right) \times \frac{1}{100}$$

$$20t + 25t + 50 = 720 \times \frac{850}{9} \times \frac{1}{100}$$

$$45t = 680 - 50$$

$$t = 630$$

$$t = 14$$

$$\text{Efficiency of pipe A} = (14 + 2) \text{ units/hours} = 16 \text{ units/hours}$$

$$\text{Pipe A can fill the tank alone} = \frac{720}{16} = 45 \text{ hours}$$

32. Answer: B)

If Q and R start filling tank alternatively

First hour by Q = 20 units

Second hours by T = 8 units

So, in two hours = 28 units

Total tank filled by pipe Q and T in 25 hr

$$= 20 \times 13 + 8 \times 12$$

$$= 260 + 96$$

$$= 356 \text{ units}$$

Remaining portion of tank = 720 - 356

$$= 364 \text{ units}$$

Remaining portion of tank filled by pipe

P and R alternatively

First hour by R = 10 units

Second hour by P = 12 units

So, in two hours = 22 units

Total tank filled by pipe P and R in 32 hours

$$= \frac{32}{2} \times 22$$

$$= 352 \text{ units}$$

Remaining portion of tank = 364 - 352 = 12 units

In 33 hours, tank filled by R = 10 = 362 units

Remaining 2 units by P = $\frac{2}{12} = \frac{1}{6}$ hours

$$\text{Total time} = \left(32 + 1 + \frac{1}{6}\right) = 33\frac{1}{6} \text{ hours}$$

33. Answer: D)

Efficiency of pipe P and pipe S $\times y$ + Efficiency of

pipe Q $\times (y - 4)$ + Efficiency of pipe T $\times (y - 10) = 720$

$$(12 + 15)y + 20(y - 4) + 8(y - 10) = 720$$

$$27y + 20y - 80 + 8y - 80 = 720$$

$$55y = 880$$

$$y = 16 \text{ hours}$$

ATQ—

Efficiency of (P + S + Q + T) $\times (y - 3)$

$$= (12 + 20 + 15 + 8) \times (16 - 3) = 715 \text{ units}$$

$$\text{Required portion} = \frac{5}{720} = \frac{1}{144}$$

34. Answer: D)

First 15 hours work of P and S together

$$= \left[\left(12 \times \frac{3}{4} \right) + \left(15 \times \frac{4}{3} \right) \right] \times 15$$

$$= 29 \times 15$$

$$= 435 \text{ units}$$

$$\text{Remaining unfilled tank} = 720 - 435 = 285 \text{ units}$$

$$\text{Efficiency of pipe B} = \frac{285}{57} = 5 \text{ units/hours}$$

$$\text{Pipe B alone can complete whole work in} = \frac{720}{5} = 144 \text{ hours}$$

35. Answer: B)

ATQ—

In First hour, tank filled by P & T together

$$= (12 + 8) = 20 \text{ units}$$

In Second hour, tank filled by Q & R together

$$= (20 + 10) = 30 \text{ units}$$

In Third hour, tank filled by S = 15 units

Total tank filled in three hours

$$= (20 + 30 + 15) = 65 \text{ units}$$

$$\text{In total 33 hours tank filled} = \frac{33}{3} \times 65 = 715 \text{ units}$$

Remaining tank filled by P & T together

$$= \frac{720 - 715}{20} = \frac{1}{4} \text{ hours}$$

$$\text{Total time} = 33 \frac{1}{4} \text{ hours}$$

36. Answer: D)

$$\text{Part filled by (A + B + C) in 6 minutes} = 6 \left(\frac{1}{40} + \frac{1}{30} + \frac{1}{20} \right) = 6 \times \frac{13}{120} = \frac{13}{20}$$

$$\text{Part filled by B in 6 minutes} = \frac{6}{30} = \frac{1}{5}$$

$$\therefore \text{required ratio} = \left(\frac{1}{5} \right) \times \left(\frac{20}{13} \right) = \frac{4}{13}$$

37. Answer: B)

$$\text{Part filled by (A + B + C) in 3 minutes} = 3 \left(\frac{1}{40} + \frac{1}{30} + \frac{1}{20} \right) = 3 \times \frac{13}{120} = \frac{13}{40}$$

$$\text{Part filled by C in 3 minutes} = \frac{3}{20}$$

$$\therefore \text{required ratio} = \left(\frac{3}{20} \right) \times \left(\frac{40}{13} \right) = \frac{6}{13}$$

38. Answer: A)

$$\text{Part filled by (A + B + C) in 4 minutes} = 4 \left(\frac{1}{40} + \frac{1}{30} + \frac{1}{20} \right) = 4 \times \frac{13}{120} = \frac{13}{30}$$

$$\text{Part filled by A in 4 minutes} = \frac{4}{40} = \frac{1}{10}$$

$$\therefore \text{required ratio} = \left(\frac{1}{10} \right) \times \left(\frac{30}{13} \right) = \frac{3}{13}$$

39. Answer: D)

$$\text{Total capacity of tank X} = 24 \times (4x + 2x + 4x) = 240x \text{ units}$$

Given, B fill the tank for first 10 hours

$$\Rightarrow \text{tank filled by B} = 40x \text{ units}$$

$$\Rightarrow \text{Time taken by C} = \frac{40x}{2x} = 20 \text{ hours}$$

$$\Rightarrow \text{C and A filled the tank for 20 hours}$$

And E fill the tank for 8 hours

$$20 \times 3x + 10 \times 4x + 20 \times 2x + p \times 4x + 8 \times 6x = 240x$$

$$\Rightarrow 188x + p \times 4x = 240x$$

$$\Rightarrow p = \frac{240x - 188x}{4x}$$

$$\Rightarrow p = \frac{52x}{4x} = 13 \text{ hours}$$

40. Answer: B)

$$5x \times (T + 42) = 8x \times (T + 15)$$

$$\Rightarrow 5T + 210 = 8T + 120$$

$$\Rightarrow T = 30 \text{ hours}$$

$$\text{Capacity of tank 'P'} = 5x (30 + 42) = 5x(72)$$

$$= 360x \text{ units}$$

$$\text{B fill the tank 'P' in} \frac{360x}{4x} = 90 \text{ hours}$$

41. Answer: B)

E, B, and D fill the tank for 6 hours, 9 hours and 9 hours respectively and total 60% of tank filled by them

$$\Rightarrow 60\% \text{ of tank} = 4a \times 9 + 4a \times 9 + 6a \times 6 = 108a \text{ units}$$

$$\Rightarrow \text{Total capacity of tank } M = \frac{108a}{3} \times 5 = 180a \text{ units}$$

'A' fill the tank for $(9 + x)$ hours & 'C' fills the tank for $(9 + x + d)$ hours and fill 40% of tank

$$\Rightarrow 72a = 3a(9 + x) + 2a(9 + x + d)$$

$$72 = 27 + 3x + 18 + 2x + 2d$$

$$27 = 5x + 2d \quad \dots(i)$$

And,

$$\text{Given, } d - x = 3 \quad \dots(ii)$$

On solving (i) & (ii)

$$d = 6 \text{ hours, } x = 3 \text{ hours}$$

$$\text{'A' fill tank for } = (9 + 3) = 12 \text{ hours}$$

$$\text{'C' fills the tank for } (9 + x + d) = 9 + 3 + 6 = 18 \text{ hours}$$

$$\text{Required \%} = \frac{18-12}{12} \times 100$$

$$= \frac{6}{12} \times 100 = 50\%$$

42. Answer: B)

There are two possibilities

First - D fill first

Second - E fill first

When D fill first

$$\text{Remaining tank} = 120x - 10(3x+4x) - 7(2x) = 36x \text{ units}$$

$$\text{D and E fill tank in 6 hours} = 30x \text{ units}$$

$$7^{\text{th}} \text{ hours D filled tank} = 4x \text{ units}$$

$$\text{Remaining by E in } \frac{1}{3} \text{ hours}$$

Now 'd' cannot be in fraction

2nd case-

When E filled first-

$$\text{E and D fill the tank in first 6 hours} = 30x \text{ units}$$

$$\text{Remaining tank by E} = 6x/6x = 1 \text{ hours}$$

$$\text{So, E filled for 4 hours.}$$

43. Answer: D)

In first case

ATQ,

$$\frac{10}{40} + \frac{5}{30} + \frac{t}{60} + \frac{5}{30} + \frac{6}{20} = 1$$

$$\Rightarrow \frac{t}{60} + \frac{53}{60} = 1$$

$$\Rightarrow \frac{t}{60} = \frac{7}{60}$$

$$\Rightarrow t = 7 \text{ hours}$$

In second case

ATQ,

$$\frac{4}{40} + \frac{4}{30} + \frac{d}{60} + \frac{8}{30} + \frac{5}{20} = 1$$

$$\Rightarrow \frac{d}{60} + \frac{3}{4} = 1$$

$$\Rightarrow \frac{d}{60} = \frac{1}{4}$$

$$\Rightarrow d = 15 \text{ hours}$$

$$(d - t) = (15 - 7) = 8 \text{ hours}$$

44. Answer: D)

Perfect solutions

$$x : y \rightarrow Z$$

$$5 : 3 \rightarrow 8$$

Imperfect solution

$$x : y$$

$$10 : 7 \rightarrow 17$$

So, for perfect solution

If speed of A is $\rightarrow 10$ drop/time

\Rightarrow Speed of B for poisonous solution = 7 drop/time

Speed of B for 'Z' = 6 drop/time

Now speed of A $\Rightarrow 1$ ml/second

$$\text{So Speed of B} \Rightarrow \frac{1}{10} \times 6 \text{ ml/sec}$$

$$\Rightarrow 0.6 \text{ ml/second}$$

$$\text{or, } 1 \text{ drop per } \frac{5}{3} \text{ second.}$$

45. Answer: A)

Final quantity of $z = 6$ liter

So

x and $y \rightarrow 5 : 3$

$x = 3.75$ liter

$y = 2.25$ liter

Speed of A should be $\Rightarrow \frac{3.75-2.5}{5} = 0.25$ liter/min

Speed of B should be $\Rightarrow \frac{2.25}{5} = 0.45$ liter/min

46. Answer: B)

Time taken by tap C to fill the tank = 24 min

Part filled in 1 min = $1/24$

Time taken by tap D to fill the tank = 30 min

Part filled in 1 min = $1/30$

Part of tank filled in 10 min by C and D together =
 $[(1/24) + (1/30)] \times 10 = [(5 + 4)/120] \times 10 = 9/12 = 3/4$

Time taken to empty the tank by S = 30 min

Part of water removed by S per min = $1/30$

Part of tank emptied in 1 min = $[(1/24) - (1/30)]$
 $= (1/120)$

Time taken to completely fill the tank = $(1 - 3/4)/(1/120)$
 $= 30$

\therefore Time taken to completely fill the tank = 30 min = 30 min

47. Answer: B)

Part filled by Tap A in 1 min = $1/20$

Part filled by Tap B in 1 min = $1/18$

Part filled by Tap C in 1 min = $1/24$

Part filled by Tap D in 1 min = $1/30$

Part of the tank filled in 1 min by all the tap simultaneously = $(1/20) + (1/18) + (1/24) + (1/30) = 13/72$

Part of tank filled in 5 min = $(13/72) \times 5 = 65/72$

Amount of water emptied by P in 1 min = $1/32$ part

Amount of water emptied by R in 1 min = $1/40$ part

Part of tank empty in 1 min = Water added by A in 1 min
 $+ \text{Water added by D in 1 min} - \text{Water emptied by R in 1 min}$

$\Rightarrow (1/20) + (1/30) - (1/40)$

$\Rightarrow (5/60) - (1/40)$

$\Rightarrow ((1/12) - (1/40))$

$\Rightarrow 7/120$

\therefore Time required to Fill the tank = $(1 - 65/72)/(7/120) = 1.66$ min

48. Answer: C)

Radius of the pipe = (Diameter of pipe)/2

Sum of radius of filling pipe = $5 + 4 + 8 + 6 = 23$ cm

Average of filling pipes = (Sum of filling pipes)/(Number of pipes) = $23/4 = 5.75$ cm

Twice of the average = $5.75 \times 2 = 11.5$ cm

Diameter of pipe P = 44% of 11.5 = $(44/100) \times 11.5 = 5.06$ cm

\therefore Radius of R = $(2/3) \times 5.06 = 3.37$ cm = 33.7 mm

49. Answer: D)

Tap A to fill the tank in 1 min = $1/20$ part

Tap B to fill the tank in 1 min = $1/18$ part

Filling the tank by A and B together in 1 min = $(1/20) + (1/18) = (9 + 10)/180 = (19/180)$ part

Time require to fill the tank completely = $180/19 = 9.47$ min

The filling time increased by 30% = $9.47 \times 1.30 = 12.31$ min

Time taken to empty the tank combine by Q and R -

Tap R to empty the tank in 1 min = $(1/40)$ part

Tap Q to empty the tank in 1 min = $(1/38)$ part

Emptying the tank combine by Q and R in 1 min = $(1/40) + (1/36) = (18 + 20)/720 = (38/720) = 19/360$

Time required to empty the tank completely = $360/19 = 18.94$ min

\therefore Difference in time = $18.94 - 12.31 = 6.63$ min

50. Answer: B)

Tank fill by all tap in 1 min = $(1/20) + (1/18) + (1/24) + (1/30) = (1/20 + 1/30) + (1/18 + 1/24)$

$\Rightarrow (5/60) + (7/72) = (1/12) + (7/72) = (6 + 7)/72 = (13/72)$

Total time require to fill the tank = $(72/13)$ min

Time taken to empty the tank by all tap in 1 min = $(1/32) + (1/36) + (1/30) + (1/40) = (1/36 + 1/30) + (1/32 + 1/40)$

$\Rightarrow (5 + 6)/180 + (5 + 4)/160 = (11/180) + (9/160)$

$\Rightarrow (88 + 81)/1440 = 169/1440$

Total emptying time = $(1440/169)$ min

Required ratio = Total fill time/Total empty time

$\Rightarrow (72/13)/(1440/169)$

$\Rightarrow (72 \times 169)/(1440 \times 13)$

$\Rightarrow 936/1440$

$\Rightarrow (156 \times 6)/(240 \times 6)$

$\Rightarrow 156/240 = (78 \times 2)/(120 \times 2)$

$\Rightarrow 78/120$

\therefore Required ratio = $78/120$

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Data Interpretation & Caselet Questions Based on Probability

Directions (1 – 3): Study the following information and answer the following questions:

A bunch of 10 bulbs contains 4 defective ones. Two bulbs are selected at random from the bunch. Out of 10, 6 are red colour and 3 are red colour defective bulbs. What is the probability that –

1. Both the bulbs selected are defective?

- a) $\frac{5}{6}$
- b) $\frac{1}{5}$
- c) $\frac{2}{5}$
- d) $\frac{2}{15}$
- e) $\frac{1}{6}$

2. Red colour bulb but No one is defective?

- a) $\frac{1}{2}$

b) $\frac{1}{60}$

c) $\frac{1}{15}$

d) $\frac{2}{25}$

e) $\frac{1}{3}$

3. One is red colour defective and other is other colour non defective

a) $\frac{3}{5}$

b) $\frac{2}{5}$

c) $\frac{1}{3}$

d) $\frac{2}{3}$

e) $\frac{1}{10}$

Directions (4 – 5): Study the following information and answer the following questions:

A bag has 24 mangoes, oranges and blue Apples. Number of each type of fruit is different in the bag and difference between number of apples & number of mangoes is same as difference between number of mangoes & number of oranges in the bag. Probability of selecting one orange from the bag is greater than 0.20 and number of apples are maximum in the bag. (Mangoes > Oranges)

4. Number of oranges in the bag can be?

- (A) 6
- (B) 7
- (C) 8
- (D) 5
- (E) 9
- a) Only option A, B, C possible
- b) Only option B, D & E possible
- c) Only option A, B, & D possible
- d) All of above options are possible
- e) Only option C, D & E possible

5. Find the maximum possible probability of selecting two mangoes from the bag?

- a) 7/69
- b) 7/64
- c) 7/72
- d) 7/82
- e) 7/81

Directions (6 – 10): Answer the questions based on the information given below.

There are five different bags namely P, Q, R, S and T, all of them contain different number of four different coloured balls viz. Pink, Red, Black and Green. The table

given below gives information about the probability of drawing two pink balls, probability of drawing two red balls, probability of drawing two black balls and probability of drawing two green balls from these bags. Some of the data in the given table is missing, you will have to find the missing data.

Bag	Probability of drawing two pink ball	Probability of drawing two red ball	Probability of drawing two black ball	Probability of drawing two green ball
P	14/495	1/15	1/22	-
Q	9/119	2/119	-	4/85
R	2/87	1/29	2/145	-
S	7/282	-	15/376	35/376
T	-	51/590	11/295	91/1770

Added Information:

1. Total number of balls in bag P is 10 more than total number of balls in bag Q.
2. Total number of balls in bag T is 33.33% more than number of balls in bag P.
3. The ratio of number of balls in bag Q and bag R is 7:6 respectively.
5. Total number of balls in bag R is 37.5% less than total number of balls in bag S and total number of balls in bag S is 48.
6. What is the probability of drawing two red balls from the bag S?
- a) 15/376
- b) 35/376
- c) 39/376

- d) 33/376
- e) None of these
7. What is the total number of black balls in all five bags together?
- a) 46
- b) 44
- c) 42
- d) 48
- e) None of these
8. In the question, two quantities I and II are given. You have to solve both the quantities to establish the correct relation between Quantity-I and Quantity-II and choose the correct option.
- Quantity-I: Probability of drawing two green balls from bag P.
- Quantity-II: Probability of drawing two black balls from bag Q.
- a) Quantity-I > Quantity-II
- b) Quantity-I < Quantity-II
- c) Quantity-I ≤ Quantity-II
- d) Quantity-I = Quantity-II or No relation
- e) Quantity-I ≥ Quantity-II
9. If two balls are drawn from the bag T, then what is the probability of getting one pink and one green ball?
- a) 112/885
- b) 117/885
- c) 107/885
- d) 104/885
- e) None of these
10. What is the total number of pink balls in all the five bags together?

- a) 41
- b) 43
- c) 48
- d) 44
- e) None of these

Directions (11 – 13): Answer the questions based on the information given below.

There are three bags viz. Bag A, Bag B, and Bag C containing 36, 32 and 48 balls respectively, each containing balls of three colours viz. Black, White and Grey. The ratio of number of Black balls to White balls in bag A and bag B is 3:2 and 2:3 respectively. The number of Grey balls in Bag A is equal to the number of White balls in bag C, and number of Black balls in bag C is three times to the number of Grey balls in bag C. The ratio of number of Grey balls in bag A to the number of Grey balls in bag B is 4:3 and ratio of number of Grey balls in bag B to the number of Grey balls in bag C is 3:2.

11. If _____ Pink balls are added to bag B and then a ball is randomly drawn from the bag, then the probability that a White ball is drawn is _____.

The values given in which of the following options will fill the blanks in the same order in which is it given to make the above statement true:

- A. 4, 1/3
- B. 8, 3/11
- C. 20, 3/13
- D. 16, 1/4
- a) Only B and C
- b) Only A and C

- c) Only C and D

d) Only A, C and D

e) Only A, B and D
12. If two balls are randomly drawn from bag A then the probability that both the balls are Grey in colour is ____?
- The value given in which of the following options will fill the blank to make the above statement true:
- a) 4/21

b) 3/35

c) 2/17

d) 1/11

e) None of these
13. A ball is transferred from bag A to bag C and then a ball is drawn from bag C. Find the probability that a White ball is drawn from bag C if it is known that the ball which is transferred from bag A to bag C is either Black or White.
- a) 16/49

b) 52/147

c) 67/441

d) 82/441

e) None of these

Directions (14 – 18): Study the following information and answer the questions that follow:

In a bilateral cricket series between India and Australia, the probability that India wins the first game is 0.4. If India wins any game, the probability that it wins the next game is 0.3; otherwise the probability is 0.2.

14. Find the probability that India wins the first two games.

- A) 0.08

B) 0.32

C) 0.18

D) 0.12

E) None of these
15. Find the probability that India wins at least one of the first two games.
- A) 0.48

B) 0.32

C) 0.56

D) 0.52

E) 0.58
16. Find the probability that India wins the first three games.
- A) 0.028

B) 0.030

C) 0.032

D) 0.036

E) 0.044
17. Find the probability that India wins exactly one of the first three matches.
- A) 0.416

B) 0.396

C) 0.096

D) 0.404

E) 0.214
18. Find the probability that India wins exactly one of the first two games.
- A) 0.20

B) 0.40

C) 0.44

D) 0.36

E) 0.28

Directions (19 – 20): Study the following information and answer the questions that follow:

Three letters are written to three different persons and addresses on three envelop are also written without looking at the addresses.

19. What is the probability that all the letters go to right address?

a) 1/3

b) 2/3

c) 1/6

d) 1/9

e) None of these

20. What is the probability that none of the letter goes to right address?

a) 5/6

b) 1/3

c) 2/3

d) 1/6

e) None of these

Directions (21 – 23): Study the information carefully and answer the question asked below.

A Gems packet contains 5 Red, 4 Blue and 6 Yellow gem stones.

21. If two are picked randomly, then what is the probability that either two balls are Red or Yellow?

a) 6/21

b) 10/21

c) 12/21

d) 5/21

e) none of these

22. If 3 chocolates ate by Varun. What is the probability that all the gemstones are in same color?

a) 36/455

b) 34/455

c) 421/455

d) 419/455

e) none of these

23. If three gem stones are taken out at random, what is the probability that at least one is blue?

a) 33/91

b) 58/91

c) 55/91

d) 36/91

e) None of these

Directions (24 – 25): Read the following carefully and Answer the Questions.

Bag A contains 3 different color tiles.i.e, Yellow, white and brown. In that, there are 12 yellow tiles, 8 white tiles and X brown tiles. The probability of choosing Brown tiles 2/7. In Another Bag B, it contains, 12 blue tiles and number of red tiles was equal to five more tiles than brown tiles in Bag A.

24. What is the probability of not choosing white color tiles in Bag A?

a) 2/7

b) 3/7

c) 5/7

d) 1/7

e) None of these

25. What is probability choosing 2 tiles from bag B, if both are same in color?
- a) 12/25
 - b) 13/25
 - c) 1/2
 - d) 14/25
 - e) None of these

Directions (26 – 30): Read the following information carefully and answer the following questions carefully. The table shows different kinds of balls in each bag.

Types of Balls	Bag A	Bag B	Bag C
White	2	4	8
Red	4	3	3
Green	6	2	6
Yellow	3	4	5

26. Three balls are drawn at random from Bag A. What is the probability that all the three are of same color?
- a) 5/91
 - b) 9/91
 - c) 15/91
 - d) 19/91
 - e) 14/93
27. Two balls are picked at random from Bag B. What is the probability that both the balls are white color?
- a) 1/13
 - b) 9/91
 - c) 15/91
 - d) 19/91

- e) 14/93
28. Three Balls are drawn at random from Bag A. What is the probability that at least two red balls are drawn?
- a) 1/13
 - b) 2/13
 - c) 4/13
 - d) 8/13
 - e) 7/13
29. Three balls are drawn at random from Bag B. What is the probability that at least one ball is of Red color?
- a) 42/143
 - b) 44/143
 - c) 46/143
 - d) 83/143
 - e) None of these
30. Four balls are drawn at random from Bag A. What is the probability that all the balls are of different colors?
- a) 42/455
 - b) 44/455
 - c) 46/455
 - d) 48/455
 - e) None of these

Directions (31 – 35): Read the following information carefully and answer the following questions given below. The table below shows no of balls in different bags

Bags	Red	Yellow	Blue	Green
A	4			7
B	2	3		5
C	6	4	8	5
D		4	2	8

E	2			4
F	3	5		4

Note: All the questions are independent from each other

31. If the probability of getting a red from bag A is $\frac{1}{5}$ when one ball is picked random and the number of yellow balls are twice the blue balls then find the probability of getting both yellow balls when 2 balls are picked from bag A randomly?

- a) $\frac{3}{38}$
- b) $\frac{3}{10}$
- c) $\frac{1}{7}$
- d) $\frac{6}{11}$
- e) None of these

32. If the number of red balls in bag D is $\frac{3}{4}$ of the yellow balls in bag C and 3 green balls are transferred from bag B to bag D then find the probability of getting at least one yellow ball from bag D when two balls are picked at random from bag D?

- a) $\frac{3}{38}$
- b) $\frac{3}{10}$
- c) $\frac{7}{19}$
- d) $\frac{6}{11}$
- e) None of these

33. If 'x' number of blue balls are added in Bag C then the probability of getting a green ball when one ball is picked at random is $\frac{1}{6}$ then find the value of x?

- a) 3
- b) 10
- c) 7
- d) 6

e) None of these

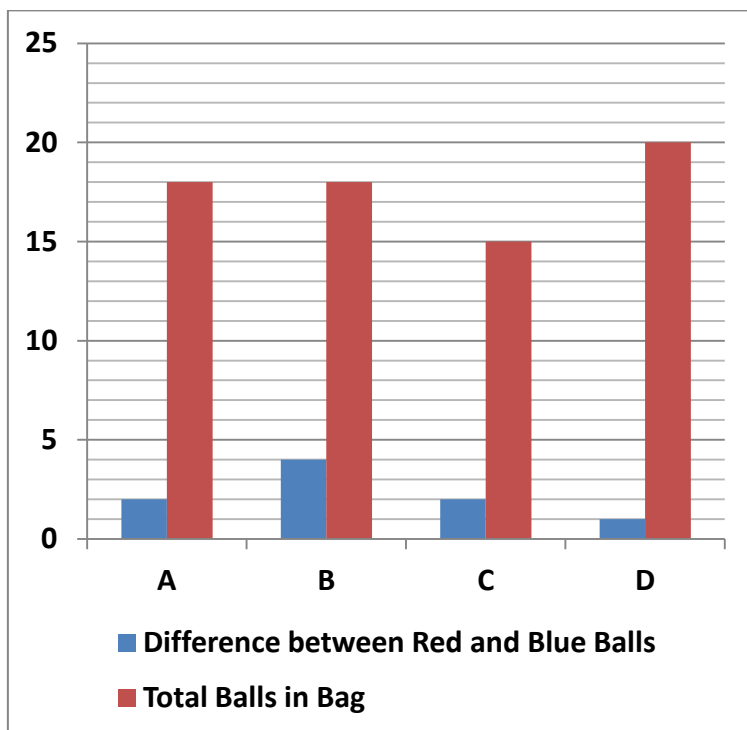
34. If the number of total balls in bag E is 16 and yellow and blue balls are in the ratio of 2:3 then find what is the probability of getting one blue ball and two green balls when three balls are picked at random?

- a) $\frac{9}{140}$
- b) $\frac{3}{121}$
- c) $\frac{11}{73}$
- d) $\frac{6}{117}$
- e) None of these

35. If 3 blue balls are taken out from bag F and then one ball is picked at random from bag F then the probability of getting a blue ball is $\frac{1}{3}$ then find how many balls were there in the bag initially?

- a) 8
- b) 30
- c) 17
- d) 21
- e) None of these

Directions (36 – 39): Bar graph given below shows difference between red and blue balls in four different bags and total number of balls in these four bags. Read the data carefully and answer the questions.



Note – Each bag contains three color of balls = Red + Blue + Green

36. If three balls are taken out form the bag C, then what will be probability such that maximum red balls are left in the bag?

- a) $\frac{2}{3}$
- b) $\frac{8}{15}$
- c) $\frac{2}{5}$
- d) $\frac{3}{5}$
- e) None of these

37. If one ball is taken out from each bag C & D and probability of both the balls being Red is $\frac{13}{15}$, then find difference between Green balls in both the bags? (Given- red balls > blue balls in both bags and ratio of red balls in bag C to that of in bag D is 7 : 8)

- a) 0
- b) 4
- c) 3

d) 1

e) 2

38. If one ball is taken out from bag B and probability of that ball being blue is $\frac{2}{9}$, then find the ratio of green balls to red balls in the bag B?

- a) 1 : 2
- b) 3 : 4
- c) 3 : 8
- d) 2 : 3
- e) 4 : 5

39. Red balls are more than blue balls in both bags A & C and ratio of blue balls in bag A to that of in bag C is 6:5. If One ball from the bag A and two balls from the bag C are taken out and difference between probability of balls taken out from both the bag being red is $\frac{11}{45}$, then what is the total number of green balls in bag A & bag C together?

- a) 9
- b) 5
- c) 6
- d) 7
- e) 8

Directions (40 – 44): There are total 5 different showroom of cars J, K, L, M and N each showroom has 4 types of cars – Dzire, Baleno, Ciaz and Ertige.

Ratio of numbers of Dzire cars to Ciaz cars in showroom is 3 : 2 and number of Baleno cars in showroom K is 3 less than the Ertiga Car in that showroom.

Number of Dzire cars in showroom L is half of number of Ertiga cars in that showroom which is same as the number of Dzire cars in showroom J.

Number of Ciaz cars in showroom M is same number of Dzire in showroom L which 4 less than the number of Baleno cars in showroom M.

Number of Ertiga cars in showroom N is 3 which is same as the number of Baleno in showroom K.

Note: Total Number of Ciaz cars in showroom J and Baleno cars in showroom M together is 18.

40. If probability of drawing Ertiga cars in showroom L is $\frac{2}{15}$ then find the total numbers of cars in showroom L.

- a) 60
- b) 75
- c) 90
- d) 100
- e) 105

41. Average of Dzire cars in showroom J, K and L is 9 and the average of the all 4 types in showroom K is 6. Find the probability that drawing Ciaz cars in showroom K.

- a) $\frac{1}{2}$
- b) $\frac{1}{3}$
- c) $\frac{1}{4}$
- d) $\frac{2}{3}$
- e) None of these

42. The total number of Dzire cars in showroom J and L is equal the Ertiga cars in showroom J and K. If the probability of drawing Ertiga cars in showroom J is $\frac{6}{15}$ then find the total number of cars in showroom J

- a) 20
- b) 25
- c) 30

- d) 35
- e) None of these

43. If the probability of drawing Ciaz cars in showroom J is twice to the probability of drawing Baleno cars in showroom M then find the ratio of total cars in showroom J and M.

- a) 2 : 5
- b) 5 : 2
- c) 4 : 9
- d) 9 : 4
- e) None of these

44. The ratio of Baleno cars and Ciaz cars is 4 : 3 in showroom L and probability of drawing Dzire cars in showroom L is $\frac{2}{20}$. What is the probability of drawing Baleno cars in that showroom.

- a) $\frac{1}{5}$
- b) $\frac{2}{5}$
- c) $\frac{3}{5}$
- d) $\frac{4}{5}$
- e) None of these

Directions (45 – 46): Two cards are drawn from a well shuffled pack of cards. If both card are spade, then a dice is thrown and if 2 diamond cards are drawn, then a coin is tossed. Otherwise operation is stopped.

45. What is the probability of getting 2 on dice.

- a) $\frac{1}{17}$
- b) $\frac{1}{6}$
- c) $\frac{23}{102}$
- d) $\frac{1}{102}$
- e) $\frac{1}{51}$

46. What is the Probability of getting a head?

- a) $1/17$
- b) $19/34$
- c) $1/12$
- d) $1/2$
- e) $1/34$

Directions (47 – 48): A bag has 24 yellow, pink and blue balls. Number of each balls is different in the bag and difference between number of blue balls & yellow balls is same as difference between number of yellow balls & pink balls (yellow balls > pink balls) in the bag. Probability of selecting one pink ball from the bag is greater than $1/5$ and number of blue balls are maximum in the bag.

47. Number of pink balls in the bag can be?

- (A) 6
- (B) 7
- (C) 8
- (D) 5
- (E) 9
- a) Only option A, B, C possible
- b) Only option B, D & E possible
- c) Only option A, B, & D possible
- d) All of above options are possible
- e) Only option C, D & E possible

48. Find the maximum possible probability of selecting two yellow ball from the bag?

- a) $7/69$
- b) $7/64$
- c) $7/72$
- d) $7/82$
- e) $7/81$

Directions (49 – 50): A mathematician is called for a birthday party of a child to show some tricks. The mathematician has three things to assist him in his tricks, which are a coin, a dice and a deck of cards. He does his tricks with the combination of the three or either two of the three. He uses coin and cards to determine the age of a guest, dice and cards to count the number of guests in the party. He uses all the three things to play a number game. He pulls off all the tricks by assigning specific consecutive values to each outcome of the dice roll, coin toss and card draw.

49. In the number game, the mathematician asks a guest to choose a number greater than zero and less than 1000 and then uses the outcome of dice roll, coin toss and card draw to guess the number. What is the probability that the number chosen by the guest is one of the possible outcomes of the mathematician's method of determining the number?

- a) $601/504$
- b) $611/999$
- c) $654/935$
- d) $624/999$
- e) $999/624$

50. What is the probability that the mathematician will guess the right age of a guest given that the correct age is one of the possible outcomes of the trick he uses to determine age?

- a) $1/54$
- b) $1/40$
- c) $1/35$
- d) $1/125$

e) 1/104

Solutions and Detailed Explanations

1. Answer: D)

Given,

Total number of bulbs = 10

Number of defective bulbs = 4

Required probability =

$$= 4/10 \times 3/9$$

$$= 2/15$$

2. Answer: C)

Given,

Number of red colours bulb = 6

Number of defective red colours bulb = 3

Number of good condition red bulbs = 6 - 3 = 3

Required probability =

$$= 3/10 \times 2/9$$

3. Answer: E)

Number of bulbs = 10

Number of red colours bulb = 6

Number of defective red colours bulb = 3

Number of other than red colours bulb = 10 - 6 = 4

Number of non defective other than red colours bulb = 4 - 1 = 3

Required probability =

$$= 3/10 \times 3/9$$

$$= 1/10$$

4. Answer: C)

Let mangoes, oranges and apples in the bag be x, y & z respectively

$$(z - x) = (x - y)$$

$$2x = (y + z)$$

$$\text{Now, } x + y + z = 24$$

$$3x = 24$$

$$x = 8$$

$$\text{Given, } \frac{y}{x+y+z} > \frac{1}{5} \text{ (this means oranges can't be less than 5)}$$

$$\text{Or, } \frac{y}{3x} > \frac{1}{5}$$

$$5y > 3x$$

Possible cases -

Mangoes	Oranges	Apples
8	6	10
8	7	9
8	5	11

Number of oranges in the bag can be = 6, 7 or 5

5. Answer: A)

The maximum possible probability of selecting two Mangoes from the bag.

$$= (8 \times 7)/(24 \times 23) = 7/69$$

(6 - 10): Common Explanation:

Total number of balls in bag S = 48

Total number of balls in bag R = 0.625 × 48 = 30

Total number of balls in bag Q = 30/6 × 7 = 35

Total number of balls in bag P = 35 + 10 = 45

Total number of balls in bag T = 45/3 × 4 = 60

For Bag P:

Total number of balls in bag P = 45

Let number of pink balls in the bag be x

According to question:

$${}^x C_2 / {}^{45} C_2 = 14/495$$

$$x(x - 1) = 14/495 \times 45 \times 44$$

$$x(x - 1) = 56$$

$$x^2 - x - 56 = 0$$

$$x^2 - 8x + 7x - 56 = 0$$

$$x(x - 8) + 7(x - 8) = 0$$

$$(x + 7)(x - 8) = 0$$

$$x = -7 \text{ or } x = 8$$

Since, the number of balls cannot be negative.

So, Number of pink balls = 8

Similarly, Let number of red balls = 'y'

$${}^yC_2 / {}^{45}C_2 = 1/15$$

$$y(y - 1) = 1/15 \times 45 \times 44$$

$$y^2 - y = 132$$

$$y^2 - y - 132 = 0$$

$$\text{So, } y = 12 \text{ or } y = -11$$

So, number of red balls = 12

Similarly, Let the number black balls = 'z'

$${}^zC_2 / {}^{45}C_2 = 1/22$$

$$z(z - 1) = 1/22 \times 45 \times 44$$

$$z^2 - z - 90 = 0$$

$$\text{So, } z = 10 \text{ or } z = -9$$

So, number of black balls in the bag = 10

Number of green balls in the bag = $45 - (8 + 12 + 10) = 15$

Probability of drawing two green balls = ${}^{15}C_2 / {}^{45}C_2 = (15 \times 14) / (45 \times 44) = 7/66$

For Bag Q:

Total number of balls in bag Q = 35

Let number of pink balls in the bag be x

According to question:

$${}^xC_2 / {}^{35}C_2 = 9/119$$

$$x(x - 1) = 9/119 \times 35 \times 34$$

$$x(x - 1) = 90$$

$$x^2 - x - 90 = 0$$

$$x = 10 \text{ or } x = -9$$

Since, the number of balls cannot be negative.

So, Number of pink balls = 10

Similarly, Let number of red balls = 'y'

$${}^yC_2 / {}^{35}C_2 = 2/119$$

$$y(y - 1) = 2/119 \times 35 \times 34$$

$$y^2 - y = 20$$

$$y^2 - y - 20 = 0$$

$$\text{So, } y = 5 \text{ or } y = -4$$

So, number of red balls = 5

Similarly, Let the number green balls = 'z'

$${}^zC_2 / {}^{35}C_2 = 4/85$$

$$z(z - 1) = 4/85 \times 35 \times 34$$

$$z^2 - z - 56 = 0$$

$$\text{So, } z = 8 \text{ or } z = -7$$

So, number of green balls in the bag = 8

Number of black balls in the bag = $35 - (10 + 5 + 8) = 12$

Probability of drawing two black balls = ${}^{12}C_2 / {}^{35}C_2 = (12 \times 11) / (35 \times 34) = 66/595$

For Bag R:

Total number of balls in bag R = 30

Let number of pink balls in the bag be x

According to question:

$${}^xC_2 / {}^{30}C_2 = 2/87$$

$$x(x - 1) = 2/87 \times 30 \times 29$$

$$x(x - 1) = 20$$

$$x^2 - x - 20 = 0$$

$$x^2 - 5x + 4x - 20 = 0$$

$$x(x - 5) + 4(x - 5) = 0$$

$$(x + 4)(x - 5) = 0$$

$$x = -4 \text{ or } x = 5$$

Since, the number of balls cannot be negative.

So, Number of pink balls = 5

Similarly, Let number of red balls = 'y'

$${}^yC_2/{}^{30}C_2 = 1/29$$

$$y(y - 1) = 1/29 \times 30 \times 29$$

$$y^2 - y = 30$$

$$y^2 - y - 30 = 0$$

$$\text{So, } y = 6 \text{ or } y = -5$$

So, number of red balls = 6

Similarly, Let the number black balls = 'z'

$${}^zC_2/{}^{30}C_2 = 2/145$$

$$z(z - 1) = 2/145 \times 30 \times 29$$

$$z^2 - z - 12 = 0$$

$$\text{So, } z = 4 \text{ or } z = -3$$

So, number of black balls in the bag = 4

Number of green balls in the bag = $30 - (5 + 6 + 4) = 15$

Probability of drawing two green balls = ${}^{15}C_2/{}^{30}C_2 = (15 \times 14)/(30 \times 29) = 7/29$

For Bag S:

Total number of balls in bag S = 48

Let number of pink balls in the bag be x

According to question:

$${}^xC_2/{}^{48}C_2 = 7/282$$

$$x(x - 1) = 7/282 \times 48 \times 47$$

$$x(x - 1) = 56$$

$$x^2 - x - 56 = 0$$

$$x^2 - 8x + 7x - 56 = 0$$

$$x(x - 8) + 7(x - 8) = 0$$

$$(x + 7)(x - 8) = 0$$

$$x = -7 \text{ or } x = 8$$

Since, the number of balls cannot be negative.

So, Number of pink balls = 8

Similarly, Let number of black balls = 'y'

$${}^yC_2/{}^{48}C_2 = 15/376$$

$$y(y - 1) = 15/376 \times 48 \times 47$$

$$y^2 - y = 90$$

$$y^2 - y - 90 = 0$$

$$\text{So, } y = 10 \text{ or } y = -9$$

So, number of black balls = 10

Similarly, Let the number green balls = 'z'

$${}^zC_2/{}^{48}C_2 = 35/376$$

$$z(z - 1) = 35/376 \times 48 \times 47$$

$$z^2 - z - 210 = 0$$

$$\text{So, } z = 15 \text{ or } z = -14$$

So, number of green balls in the bag = 15

Number of red balls in the bag = $48 - (8 + 10 + 15) = 15$

Probability of drawing two red balls = ${}^{15}C_2/{}^{48}C_2 = (15 \times 14)/(48 \times 47) = 35/376$

For Bag T:

Total number of balls in bag T = 60

Let number of red balls in the bag be x

According to question:

$${}^xC_2/{}^{60}C_2 = 51/590$$

$$x(x - 1) = 51/590 \times 60 \times 59$$

$$x(x - 1) = 306$$

$$x^2 - x - 306 = 0$$

$$x^2 - 18x + 17x - 306 = 0$$

$$x(x - 18) + 17(x - 18) = 0$$

$$(x + 17)(x - 18) = 0$$

$x = -17$ or $x = 18$

Since, the number of balls cannot be negative.

So, Number of red balls = 18

Similarly, Let number of black balls = ‘y’

${}^yC_2/{}^{60}C_2 = 11/295$

$y(y - 1) = 11/295 \times 60 \times 59$

$y^2 - y = 132$

$y^2 - y - 132 = 0$

So, $y = 12$ or $y = -11$

So, number of black balls = 12

Similarly, Let the number green balls = ‘z’

${}^zC_2/{}^{60}C_2 = 91/1770$

$z(z - 1) = 91/1770 \times 60 \times 59$

$z^2 - z - 182 = 0$

So, $z = 14$ or $z = -13$

So, number of green balls in the bag = 14

Number of pink balls in the bag = $60 - (18 + 12 + 14) = 16$

Probability of drawing two pink balls = ${}^{16}C_2/{}^{60}C_2 = (16 \times 15)/(60 \times 59) = 4/59$

Distribution of number of balls in different bags can be summarized as:

Bags	Pink balls	Red balls	Black balls	Green Balls	Total
P	8	12	10	15	45
Q	10	5	12	8	35
R	5	6	4	15	30
S	8	15	10	15	48
T	16	18	12	14	60

The missing table can be summarized as:

Bag	Probabilit	Probabilit	Probabilit	Probabilit
-----	------------	------------	------------	------------

s	y of drawing two pink ball	y of drawing two red ball	y of drawing two black ball	y of drawing two green ball
P	14/495	1/15	1/22	7/66
Q	9/119	2/119	66/595	4/85
R	2/87	1/29	2/145	7/29
S	7/282	35/376	15/376	35/376
T	4/59	51/590	11/295	91/1770

6. Answer: B)
Desired Probability = 35/376
7. Answer: D)
Total number of black balls in all five bags together = 48
8. Answer: B)
Quantity I = 7/66 = 0.106
Quantity II = 66/595 = 0.11
So, Quantity II > Quantity I
9. Answer: A)
Desired Probability = $({}^{16}C_1 \times {}^{14}C_1)/{}^{60}C_2 = 112/885$
10. Answer: E)
Total number of pink balls in all the five bags together = 47
11. Answer: D)
Let the number of Black balls and White balls in bag A be 3x and 2x respectively,
So the number of Grey balls in bag A = $36 - (3x + 2x) = (36 - 5x)$
Let the number of Black balls and White balls in bag B be 2y and 3y respectively.

So the number of Grey balls in bag B = $32 - (2y + 3y) = (32 - 5y)$

Let the number of Black balls and Grey balls in bag C be $3z$ and z respectively.

So the number of White balls in bag C = $(48 - 4z)$

According to question,

$$36 - 5x = 48 - 4z$$

$$4z - 5x = 12 \dots (i)$$

$$\text{Also, } (36 - 5x)/(32 - 5y) = 4/3$$

$$108 - 15x = 128 - 20y$$

$$20y - 15x = 20$$

$$4y = 3x + 4 \dots (ii)$$

$$\text{Also, } (32 - 5y)/z = 3/2$$

$$64 - 10y = 3z \dots (iii)$$

Solving equations (i), (ii), and (iii), we get,

$$x = 4, y = 4, z = 8$$

So, bag A contains 12 Black, 8 White and 16 Grey balls, bag B contains 8 Black, 12 White and 12 Grey balls and bag C contains 24 Black, 16 White and 8 Grey balls.

For option A:

$$\text{Probability that a White ball is drawn} = 12/(32 + 4) = 12/36 = 1/3$$

So, option A can be the answer.

For option B:

$$\text{Probability that a White ball is drawn} = 12/(32 + 8) = 12/40 = 3/10$$

So, option B can't be the answer.

For option C:

$$\text{Probability that a White ball is drawn} = 12/(32 + 20) = 12/52 = 3/13$$

So, option C can be the answer.

For option D:

$$\text{Probability that a White ball is drawn} = 12/(32 + 16) = 12/48 = 1/4$$

So, option D can be the answer.

12. Answer: A)

Let the number of Black balls and White balls in bag A be $3x$ and $2x$ respectively,

$$\text{So the number of Grey balls in bag A} = 36 - (3x + 2x) = (36 - 5x)$$

Let the number of Black balls and White balls in bag B be $2y$ and $3y$ respectively.

$$\text{So the number of Grey balls in bag B} = 32 - (2y + 3y) = (32 - 5y)$$

Let the number of Black balls and Grey balls in bag C be $3z$ and z respectively.

$$\text{So the number of White balls in bag C} = (48 - 4z)$$

According to question,

$$36 - 5x = 48 - 4z$$

$$4z - 5x = 12 \dots (i)$$

$$\text{Also, } (36 - 5x)/(32 - 5y) = 4/3$$

$$108 - 15x = 128 - 20y$$

$$20y - 15x = 20$$

$$4y = 3x + 4 \dots (ii)$$

$$\text{Also, } (32 - 5y)/z = 3/2$$

$$64 - 10y = 3z \dots (iii)$$

Solving equations (i), (ii), and (iii), we get,

$$x = 4, y = 4, z = 8$$

So, bag A contains 12 Black, 8 White and 16 Grey balls, bag B contains 8 Black, 12 White and 12 Grey balls and bag C contains 24 Black, 16 White and 8 Grey balls.

$$\text{Therefore, required probability} = {}^{16}C_2/{}^{36}C_2 = 4/21$$

13. Answer: D)

Let the number of Black balls and White balls in bag A be $3x$ and $2x$ respectively,

So the number of Grey balls in bag A = $36 - (3x + 2x) = (36 - 5x)$

Let the number of Black balls and White balls in bag B be $2y$ and $3y$ respectively.

So the number of Grey balls in bag B = $32 - (2y + 3y) = (32 - 5y)$

Let the number of Black balls and Grey balls in bag C be $3z$ and z respectively.

So the number of White balls in bag C = $(48 - 4z)$

According to question,

$$36 - 5x = 48 - 4z$$

$$4z - 5x = 12 \dots (i)$$

$$\text{Also, } (36 - 5x)/(32 - 5y) = 4/3$$

$$108 - 15x = 128 - 20y$$

$$20y - 15x = 20$$

$$4y = 3x + 4 \dots (ii)$$

$$\text{Also, } (32 - 5y)/z = 3/2$$

$$64 - 10y = 3z \dots (iii)$$

Solving equations (i), (ii), and (iii), we get,

$$x = 4, y = 4, z = 8$$

So, bag A contains 12 Black, 8 White and 16 Grey balls, bag B contains 8 Black, 12 White and 12 Grey balls and bag C contains 24 Black, 16 White and 8 Grey balls.

Case I: If a Black ball is transferred from bag A

So the probability that a White ball is drawn = $(12/36) \times (16/49) = 16/147$

Case II: If a White ball is transferred from bag A

So the probability that a White ball is drawn = $(8/36) \times (17/49) = 34/441$

Probability that ball drawn is White in colour = $(16/147) + (34/441) = (48 + 34)/441 = 82/441$

14. Answer: D)

$$P(\text{Win first game}) * P(\text{Win second game}) = 0.4 * 0.3 = 0.12$$

15. Answer: D)

$$P(\text{won at least 1 game}) = 1 - P(\text{won no games})$$

$$= 1 - [P(\text{lost 1st game}) * P(\text{lost second game})]$$

$$= 1 - [(1 - 0.4) * (1 - 0.2)] = 0.2$$

in the second bracket because after losing the first game the probability of winning the second match is 0.2. So $1 - 0.2$ is the probability of losing that game too.

16. Answer: D)

$$0.4 * 0.3 * 0.3 = 0.036$$

17. Answer: D)

This problem can be solved in three parts

Part 1- India wins first game and loses second and third

part 2= Lose + Win + Lose

Part 3= Lose + Lose+ Win

P (Part 1)= India wins first game * India loses second game * India loses third game

$$= 0.4 * (1 - 0.3) * (1 - 0.2) = 0.4 * 0.7 * 0.8 = 0.224$$

P (Part2)= India loses first game * Wins second game * Loses third game

$$= (1 - 0.4) * 0.2 * (1 - 0.3) = 0.6 * 0.2 * 0.7 = 0.084$$

$$P(\text{Part 3}) = L * L * W = (1 - 0.4) * (1 - 0.2) * 0.2 = 0.6 * 0.8 * 0.2 = 0.096$$

$$P = P_1 + P_2 + P_3 = 0.404$$

18. Answer: B)

$$\begin{aligned} \text{Part 1} &= \text{Won first} * \text{Lost Second} = 0.4 * (1-0.3) = \\ &= 220 + 66 + 4 \\ &= 290 \end{aligned}$$

$$\begin{aligned} \text{Part 2} &= \text{Lost First} * \text{Won second} = (1-0.4) * 0.2 = \\ &= 0.6 * 0.2 = 0.12 \end{aligned}$$

$$P = 0.28 + 0.12 = 0.40$$

19. Answer: C)

There are 6 combination of letters put into the envelop,
 $n(s) = 6$

All the letters put into right envelop is only in E1.

Hence, required probability = $1/6$

20. Answer: B)

There are 6 combination of letters put into the envelop,
 $n(s) = 6$

None of the letters put into right envelop is E4 and E5

Hence, required probability = $2/6 = 1/3$

21. Answer: D)

$$\text{All are Red} = {}^5C_2 = (5 * 4 / 2) = 10$$

$$\text{All are Yellow} = {}^6C_2 = (6 * 5 / 2) = 15$$

$$\text{Total probability} = {}^{15}C_2 = (15 * 14 / 2) = 105$$

$$\begin{aligned} \text{Either all are Red or all are yellow} &= 10/105 + 15/105 \\ &= 25/105 = 5/21 \end{aligned}$$

22. Answer: B)

$$\text{All are in blue} = {}^4C_3 = (4 * 3 * 2 / 2 * 3) = 4$$

$$\text{All are in Red} = {}^5C_3 = (5 * 4 * 3 / 2 * 3) = 10$$

$$\text{All are in Yellow} = {}^6C_3 = (6 * 5 * 4 / 2 * 3) = 20$$

$$\text{Total probability} = {}^{15}C_3 = (15 * 14 * 13 / 3 * 2 * 1) = 455$$

$$\begin{aligned} \text{Possible probability} &= 4/455 + 10/455 + 20/455 \\ &= 34 / 455 \end{aligned}$$

23. Answer: B)

$$\begin{aligned} \text{Possible probability} &= ({}^4C_1 * {}^{11}C_2) + ({}^4C_2 * {}^{11}C_1) + \\ &({}^4C_3 * {}^{11}C_0) \end{aligned}$$

$$\begin{aligned} \text{Total probability} &= {}^{15}C_3 = (15 * 14 * 13 / 3 * 2 * 1) = 455 \\ \text{Possible probability} &= 290 / 455 = 58 / 91 \end{aligned}$$

Another Method:

Probability atleast one is blue = 1 - Probability of None is blue

$$\text{Probability of None is blue} = {}^{11}C_3 / {}^{15}C_3$$

$$\Rightarrow 11 * 10 * 9 / 15 * 14 * 13$$

$$\Rightarrow 33 / 91$$

Probability atleast one is blue = 1 - Probability of None is blue

$$\Rightarrow 1 - (33 / 91)$$

$$\Rightarrow 58 / 91$$

24. Answer: C)

First we have to find the no. of brown tiles,

$$2/7 = X / (12 + 8 + X)$$

$$2 * (20 + X) = 7X$$

$$40 + 2X = 7X$$

$$5X = 40$$

$$X = 8$$

Probability of choosing white color tiles,

$$= 8 / (8 + 8 + 12)$$

$$= 2/7.$$

$$\text{Not Choosing} = 1 - (2/7) = 5/7$$

25. Answer: A)

$$\text{Red tiles} = X + 5 = 8 + 5 = 13$$

$$\text{Blue tiles} = 12$$

$$\text{Total probability} = {}^{13}C_2 + {}^{12}C_2$$

$$= [(13 * 12) / 2] + [(12 * 11) / 2]$$

$$= [78 + 66] = 144$$

No. of probability = $25C_2$

$$= [(25 \times 24) / 2]$$

$$= 25 \times 12 = 300$$

$$\text{Probability} = 144/300 = 12/25.$$

26. Answer: a)

The probability that all the three balls are of same color

$$= ({}^4C_3 + {}^6C_3 + {}^3C_3) / {}^{15}C_3$$

$$= (4+20+1) \times 6 / (15 \times 14 \times 13)$$

$$= 25 \times 6 / (15 \times 14 \times 13)$$

$$= 5/91$$

27. Answer: a)

Probability of both the balls of white color

$$= {}^4C_2 / {}^{13}C_2$$

$$= 6/78$$

$$= 1/13$$

28. Answer: b)

The probability that at least two red balls are drawn

$$= ({}^4C_1 \times {}^{11}C_1 + {}^4C_3) / {}^{15}C_3$$

$$= (66+4) \times 6 / (15 \times 14 \times 13)$$

$$= 70 \times 6 / (15 \times 14 \times 13)$$

$$= 2/13$$

29. Answer: d)

Probability of picking no red balls

$$= {}^{10}C_3 / {}^{13}C_3$$

$$= 120/286$$

So, Probability of at least two red balls

$$= 1 - 120/286$$

$$= 166/286$$

$$= 83/143$$

30. Answer: d)

The probability that all the balls are of different colors

$$= ({}^2C_1) \times ({}^4C_1) \times ({}^6C_1) \times ({}^3C_1) / {}^{15}C_4$$

$$= (2 \times 4 \times 6 \times 3 \times 4 \times 3 \times 2) / (15 \times 14 \times 13 \times 12)$$

$$= 48/455$$

31. Answer (a)

Let the number of blue balls in the bag A be x

Yellow balls = 2x

So,

$$\text{Total balls} = 4 + 7 + x + 2x = 3x + 11$$

$${}^4C_1 / (3x + 11)C_1 = 1/5$$

$$4 / (3x + 11) = 1/5$$

$$3x + 11 = 20$$

$$3x = 20 - 11$$

$$3x = 9$$

$$x = 3$$

Blue balls = 3

Yellow balls = 6

Probability of getting two yellow balls = ${}^6C_2 / {}^{20}C_2 =$

$$15/190 = 3/38$$

32. Answer: C)

Number of red balls in bag D = $3 \times 4/4 = 3$

Number of green balls in bag D = $8 + 3 = 11$

Probability of not getting a yellow ball = ${}^{16}C_2 / {}^{20}C_2 =$

$$120/190 = 12/19$$

Probability of getting at least one yellow ball = $1 - 12/19 =$

$$7/19$$

33. Answer: C)

Total number of balls in bag C = 23

After addition = $23 + x$

So,

$${}^5C_1 / (23 + x)C_1 = 1/6$$

$$5 / (23 + x) = 1/6$$

$$30 = 23 + x$$

$$x = 7$$

Number of blue balls added(x) = 7 balls

34. Answer: A)

Number of blue and yellow balls = $16 - 6 = 10$

Number of blue balls = $2 \times 10 / 5 = 4$

Number of yellow balls = $10 - 4 = 6$

So,

Required probability = $(6C1 \times 4C2) / 16C3 = 9/140$

35. Answer: D)

Let the number of blue balls in bag F initially be x

Balls taken out = x-3

Balls left = $3 + 5 + 4 + x - 3 = x + 9$

So,

$$(x-3)C1 / (x+9)C1 = 1/3$$

$$x-3 / x+9 = 1/3$$

$$3x-9 = x+9$$

$$2x = 18$$

$$x = 9$$

So, number of blue balls initially = 9

Total balls in the bag initially = $9 + 3 + 4 + 5 = 21$ balls

36. Answer: A)

Let total number of blue balls in the bag C = a

So, total number of red balls in the bag C = a + 2

And, (a + 2) will be maximum when green balls in the bag C is 1

$$\text{So, } a + (a + 2) = 15 - 1$$

$$a = 6$$

So, red balls in bag C = 8

Three balls are taken out from the bag C and for probability such that maximum red balls are left in the bag C, there will be two cases. First, all three balls taken out are of blue color and second, two blue and one green color ball is taken out.

$$\text{So, Required probability} = \frac{8}{15-3} = \frac{2}{3}$$

37. Answer: E)

Let total number of red balls in C = 7x

Total number of blue balls in C = $(7x - 2)$

So, total number of red balls in D = 8x

Total number of blue balls in D = $(8x - 1)$

ATQ -

$$\frac{7x}{15} + \frac{8x}{20} = \frac{13}{15}$$

$$\frac{28x + 24x}{60} = \frac{13}{15}$$

$$x = 1$$

Total number of green balls in C

$$= 15 - (7 \times 1 + 7 \times 1 - 2) = 3$$

Total number of green balls in D

$$= 20 - (8 \times 1 + 8 \times 1 - 1) = 5$$

$$\text{Required difference} = 5 - 3 = 2$$

38. Answer: B)

Let total number of blue balls in bag B be 'a'

Then total number of red balls in the bag B will be either (a-4) or (a+4)

$$\text{ATQ, } \frac{a}{18} = \frac{2}{9}$$

$$a = 4$$

Hence, red balls in the bag B will be either 0 or 8.

Since number of red balls cannot be 0

So, number of blue balls are 4 and number of red balls are 8

Number of green balls = $18 - (4 + 8) = 6$

$$\text{Required Ratio} = \frac{6}{8} = 3:4$$

39. Answer: D)

Let total number of blue balls in A = 6x

Then total number of red balls in A = $6x + 2$

Let total number of blue balls in bag C = 5x

Then total number of red balls in bag C = $5x + 2$

$$\frac{(6x+2)}{18} - \frac{(5x+2)(5x+1)}{15 \times 14} = \frac{11}{45}$$

$$\frac{(3x+1)}{9} - \frac{(25x^2 + 15x + 2)}{210} = \frac{11}{45}$$

$$x = 1$$

$$\text{Green balls in A} = 18 - (6 \times 1 + 6 \times 1 + 2) = 4$$

$$\text{Green balls in C} = 15 - (5 \times 1 + 5 \times 1 + 2) = 3$$

$$\text{Required sum} = 4 + 3 = 7$$

(40 – 44): Common Explanation:

	Dzire	Baleno	Ciaz	Ertiga
J	$3x = 12$	-	$2x = 8$	-
K	-	$y - 3 = 3$	-	$y = 6$
L	$\frac{3}{2}x = 6$	-	-	$3x = 12$
M	-	$\frac{3}{2}x + 4 = 10$	$\frac{3}{2}x = 6$	-
N	-	-	-	3

40. Answer: C)
 $\Rightarrow 2x + 3x/2 + 4 = 18$
 $\Rightarrow 7x / 2 = 14$
 $\Rightarrow x = 4$
Let the total number of cars in showroom L be N.
So, probability of drawing Ertiga cars = $2/15$
According to question,
 $\Rightarrow 12/N = 2/15$
 $\Rightarrow N = 90$
 \therefore The total cars in showroom L is 90.

41. Answer: C)
 $\Rightarrow 2x + 3x/2 + 4 = 18$
 $\Rightarrow 7x / 2 = 14$
 $\Rightarrow x = 4$
Average of Dzire cars in showroom J, K, L = 9
 $\Rightarrow (12 + x + 6)/3 = 9$
 $\Rightarrow x = 9$
Dzire cars in showroom L = 9
Average of all 4 types cars in showroom L = 6
 $\Rightarrow (9 + 3 + C + 6)/4 = 6$

$\Rightarrow C = 6$
Ciaz cars in showroom L = 6
Probability that drawing of Ciaz cars in showroom K =
Favourable outcome/Total outcomes
 $= 6/24 = 1/4$
42. Answer: C)
 $\Rightarrow 2x + 3x/2 + 4 = 18$
 $\Rightarrow 7x / 2 = 14$
 $\Rightarrow x = 4$
According to question,
Dzire cars in showroom J and L = Ertiga cars in
showroom J and K
 $12 + 6 = n + 6$
 $\Rightarrow n = 12$
Probability of drawing Ertiga cars in showroom J = $6/15$
 $\Rightarrow 12/x = 6/15$
 $\Rightarrow x = 30$
 \therefore Total number of cars 30 in showroom J.
43. Answer: A)
 $\Rightarrow 2x + 3x/2 + 4 = 18$
 $\Rightarrow 7x / 2 = 14$
 $\Rightarrow x = 4$
Let total cars in showroom J be x_1 and showroom M be
 x_2
Probability of drawing Ciaz cars in showroom J = $8/x_1$
Probability of drawing Baleno cars in showroom M =
 $10/x_2$
According to question,
 $\Rightarrow 8/x_1 = 2 \times 10/x_2$
 $\Rightarrow x_1/x_2 = 2/5$
 $\Rightarrow x_1 : x_2 = 2 : 5$

44. Answer: B)

$$\Rightarrow 2x + 3x/2 + 4 = 18$$

$$\Rightarrow 7x/2 = 14$$

$$\Rightarrow x = 4$$

Probability of drawing Dzire cars in showroom L = 2/20

$$\Rightarrow 6/x = 2/20$$

$$\Rightarrow x = 60$$

Total number of cars = 60

Number of (Dzire cars + Baleno cars + Cias cars + Ertiga cars) = 60

Number of (Baleno cars + Ciaz cars) = 60 - 6 - 12 = 42

Ratio of number of Baleno cars and Ciaz cars = 4 : 3

$$\Rightarrow \text{Baleno cars} = 4/7 \times 42 = 24$$

Probability of drawing Baleno cars = 24/60 = 2/5

45. Answer: D)

2 Come on a dice is thrown, and a dice is thrown when two spade cards occur

\Rightarrow Probability of getting 2 spade cards

$$= \frac{{}^{13}C_2}{{}^{52}C_2} = \frac{1}{17}$$

Getting 2 on dice = $\frac{1}{6}$

$$\text{Required probability} = \frac{1}{17} \times \frac{1}{6} = \frac{1}{102}$$

46. Answer: E)

To get a head, two diamonds should occur.

$$\text{Required probability} = \frac{1}{17} \times \frac{1}{2} = \frac{1}{34}$$

(47 – 48): Common Explanation:

Let yellow, pink and blue balls in the bag is a, b & c respectively

$$(c - a) = (a - b)$$

$$2a = (b + c)$$

$$\text{Now, } a + b + c = 24$$

$$3a = 24$$

$$a = 8$$

$$\text{Given, } \frac{b}{a+b+c} > \frac{1}{5} \text{ (this means pink balls can't be less than 5)}$$

$$\text{Or, } \frac{b}{3a} > \frac{1}{5}$$

$$5b > 3a$$

Possible cases -

Yellow	Pink	Blue
8	6	10
8	7	9
8	5	11

47. Answer: C)

Number of pink balls in the bag can be = 6, 7 or 5
So, Only option A, B, & D possible

48. Answer: A)

The maximum possible probability of selecting two yellow ball from the bag.

$$= \frac{8 \times 7}{24 \times 23}$$

$$= \frac{7}{69}$$

49. Answer: D)

The mathematician uses coin, dice and cards to guess the number

Number of possible outcomes of a dice roll = 6

Number of possible outcomes of a card draw = 52

Number of possible outcomes of a coin toss = 2

Total number of possible outcomes = 6 × 52 × 2 = 624

Number of options available to the guest = 1 to 999

\therefore Required Probability = 624/999

50. Answer: E)

The mathematician uses coin and cards to determine age of the person

Number of possible outcomes of a coin toss = 2

Number of possible outcomes of a card draw = 52

Total number of possible outcomes = $2 \times 52 = 104$

Mathematician assigns 1 value to each outcome therefore, he assigns 104 values to the outcomes

Only 1 out of all the possible outcomes is correct, therefore the probability that the mathematician will guess the correct age = $1/104$

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Expected Aptitude Data sufficiency Questions

Direction(1-50): The question below consists of a question and three statements numbered I, II and III given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read all the statements and give answer.

1. Find the respective ratio of the efficiencies of pipe P and pipe Q.

Statement I: Pipe P and pipe R together can fill the tank in 48 minutes. With pipe Q, they can fill the tank in $80\frac{2}{3}$ minutes.

Statement II: Pipe Q and pipe R with double of their efficiency can fill the tank in $120\frac{2}{7}$ minutes.

Statement III: Pipe P and pipe Q together can fill the tank in 40 minutes. Respective ratio of the efficiencies of pipe P and pipe R is 2:3.

a) Only II and III

b) Only I and either II or III

c) Any two of the three

d) All I, II and III

e) Cannot be answered even after combining all the statements.

2. The question is followed by four/five statements. Read all the statements carefully and find which of the following statement alone is sufficient to answer the question.

Three cars A, B and C covered a total distance of 858 km in 19.5 hours. Speeds of car A and B are in the ratio 4: 5 respectively. Car C covered total 378 km distance in 8.4 hours. Find the distance covered by car B.

Which of the following option alone is *not* sufficient to find the answer?

- a) Speed of car C is 90% of the speed of car B.
- b) Speed of car C is 45 km/hr.
- c) Time taken by car B is 3.9 hours less than time taken by car A.
- d) Speed of car A is 40 km/hr.
- e) None of these

3. There are two mixtures A and B of milk and water which are mixed together to form another mixture C. In what ratio mixtures A and B are mixed to form another mixture C?

I: Quantity of milk in both the mixtures is 10 litres more than the quantity of water in those two mixtures.

II: When mixture B is sold at the cost of pure milk, then profit percent earned is $77\frac{7}{9}\%$.

III: When mixture C is sold at the cost equal to 75% cost of the pure milk, then profit percent earned is 31.25%.

- a) Any two of them together are sufficient.
- b) All three of them together are sufficient.
- c) All three of them together are not sufficient.
- d) Only I and II together or only II and III together are sufficient.
- e) Only I and III together are sufficient.

4. In each of the following questions, each question is followed by three statements. Read all the statements carefully and find which of the following statement(s) is/are sufficient to answer the question.

Stream is flowing with speed 12 km/hr. Boat A covers 4 km more downstream distance in one hour than boat C in same time period. Distance between two points X and Y is 380 km which is double the distance

between X and Z. What is the speed of boat B in still water?

Statement I: Difference between upstream speed of boat A and downstream speed of boat B is 2 km/hr less than the difference between downstream speed of boat A and upstream speed of boat C.

Statement II: Boat A covers covered the distance between point X to Z in 5 hours while moving downstream. Upstream speed of boat B and C are in the ratio 8: 5 respectively.

Statement III: Sum of time taken by boat B to cover the distance between point X and Z while travelling upstream and the time taken by boat A to cover the distance between point X and Y while travelling downstream is 21.875 hours.

- a) Only statement I and III together are sufficient.
- b) Either statement II and III together are sufficient or statement I alone is sufficient.
- c) Any of the two statements together are sufficient.
- d) Either statement I and III together are sufficient or statement II alone is sufficient.
- e) All statements I, II and III together are sufficient.

5. In each of the following questions, each question is followed by three statements. Read all the statements carefully and find which of the following statement(s) is/are sufficient to answer the question.

A metallic cylinder and a metallic cone are melted to form a solid sphere. Radius of cylinder and cone are in the ratio 3: 2 respectively. What is the radius of sphere? (Take $\pi = 22/7$)

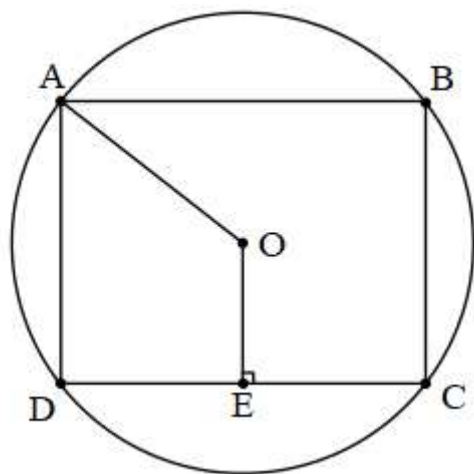
Statement I: Height of cylinder and cone are in the ratio 4: 5 respectively and sum of volume of cylinder and cone is 39424 cm^3 .

Statement II: Volume of cone is 27104 cm^3 less than the volume of cylinder and sum of their heights is 54 cm.

Statement III: Curved surface area of cylinder is 3168 cm^2 and its radius and height are in the ratio 7: 8 respectively.

- a) Only statement I alone is sufficient.
- b) Either statement II alone is sufficient or statement I and III together are sufficient.
- c) Either statement I alone is sufficient or statement II and III together are sufficient.
- d) Any of the two statements together are sufficient.
- e) Only statements II and III together are sufficient.

6. A rectangle ABCD is inscribed in the circle with centre O as shown below. AB is the length (longer side) whereas AD is the breadth (shorter side) of the rectangle.



What is the area of AOED? [Note: OE is perpendicular to DC]

I: Radius, length and breadth of the rectangle are integers when counted in cm. Length of the rectangle is less than 15 cm.

II: The area of the circle is $25\pi \text{ cm}^2$.

III: The area of the pentagon ABCEO is 12 cm^2 more than the area of AOED.

- a) Either I alone is sufficient or II and III together are sufficient and necessary.
- b) Either statement alone is sufficient.
- c) Either III alone or I and II together are sufficient and necessary.
- d) Either I alone or III alone is sufficient but II alone is not sufficient.
- e) Any 2 statements together are sufficient and necessary

7. In the following problem, a question is followed by three statements. Read all the statements carefully and find that which of the following statement(s) is/are sufficient to answer the question.

Three workers A, B and C complete a work together in 4 days. The time taken by A and B together to complete the 25% of the whole work is equal to the time taken by D and C together to complete the 150% more than the $1/10^{\text{th}}$ of the whole work. In how many days, D will complete the whole work alone?

Statement I: Efficiencies of A and D are in the ratio 5: 3 respectively.

Statement II: Efficiencies of B and C are in the ratio 2: 3 respectively.

Statement III: Efficiency of D and C are in the ratio 1: 2 respectively.

- a) Either statement I or II or III alone is sufficient.
- b) Either statement III alone is sufficient or statement I and II together are sufficient.
- c) Either statement II alone is sufficient or statement I and III together are sufficient.

d) Either statement I and II or statement II and III together are sufficient.

e) Any of the two statements together are sufficient.

8. In the following problem, each question is followed by three statements. Read all the statements carefully and find that which of the following statement(s) is/are sufficient to answer the question.

Rashmi bought a radio and a watch from a shop such that shopkeeper sold both the items together to Rashmi for Rs.14760. The actual cost price of radio was 64% more than the actual cost price of watch. What is the cost price of radio?

Statement I: After giving a discount of 12% on marked price of radio, shopkeeper sold the radio at Rs.2020 more than the marked price of watch.

Statement II: Shopkeeper marked radio at 40% above its cost price and allowed a discount of Rs.1260 on its marked price.

Statement III: Rashmi bought watch at Rs.3280 less than radio and shopkeeper received a profit of 14.8% on watch.

- a) All statements I, II and III together are sufficient.
- b) All statements I, II and III together are not sufficient.
- c) Both statements I and II together are sufficient.
- d) Only statement III alone is sufficient.
- e) Either statement I and III together are sufficient or statement I and II together are sufficient.

9. In each of the following questions, each question is followed by three statements. Read all the statements carefully and find that which of the following statement(s) is/are sufficient to answer the question.

LCM of ages of Priya and Vishnu is 45 and HCF of ages of Vishnu and Malti is 5. What is the HCF of ages of Priya, Malti and Vishnu? (Note: Ages of Priya, Vishnu and Malti are in years)

Statement I: Average of ages of Priya, Malti and Vishnu is $11\frac{1}{3}$.

Statement II: LCM of ages of Priya, Malti and Vishnu is 90.

Statement III: Product of ages of Priya and Malti is 90 and age of Priya after 3 years will be 12.

- a) Either statements I and III together are sufficient or statements II and III together are sufficient.
- b) Either statements I and II together are sufficient or statements II and III together are sufficient.
- c) Any two of the given statements together are sufficient.
- d) All statements I, II and III together are sufficient.
- e) All statements I, II and III together are not sufficient.

10. "What is the difference between height and radius of solid cylinder?"

Which of the following option is sufficient alone to find the answer?

- a) A solid cylinder is made by melting a solid sphere. The radius of cylinder is three times the radius of a circle whose area is 154 sq.m. Height of cylinder is equal to the height of cone whose volume is 2772 cubic meters.
- b) Area of a rectangle whose longer side is $\frac{3}{4}$ times the radius of a solid cylinder, is 168 sq.m. Volume of solid cylinder is 2772 cubic meters and its height is 18 m.
- c) A metallic cone of radius 15 m and height 35 m is melted into the solid cylinder of radius equal to the

radius of a circle whose area is equal to the area of rectangle whose sides are in the ratio 4:3 respectively.

d) The curved surface area of the solid cylinder is 3 times the surface area of a sphere of radius 7 m and height of cylinder is equal to the height of a metallic cone whose curved surface area is 308 sq.m.

e) None of the given option is sufficient to find the answer.

11. Respective ratio of age of P after 6 years and twice of ages of R before 3 years are in the ratio 5: 6 respectively. T is 12 years younger than S. The age of Q after 8 years and age of U before 4 years are in the ratio 3: 1 respectively. What is the difference between ages of P and Q?

Which of the following option alone is not sufficient to find the answer?

a) Present ages of P, T and S are in the ratio 2: 2: 3 respectively and the ratio of age of S before 6 years and the ratio of age of U after 4 years is 3: 2 respectively.

b) Average of present ages of P, R and T is 23 years and the ratio of ages of Q and U before 4 years was in the ratio 2: 1 respectively. Difference between ages of S and U is 20 years.

c) Average of present ages of P, U and S is $25\frac{1}{3}$ years and the difference between ages of T and U is 8 years.

d) Present ages of T and U are in the ratio 3: 2 respectively and the difference between ages of P and R who is 15 years younger than S is 3 years.

e) Sum of ages of P and Q is 52 years and present age of R is 5 years more than the present age of U.

12. Each of the questions below consists of a question and three statements numbered I, II and III given below it. You have to decide whether the data

provided in the statements are sufficient to answer the question. Read all the statements and give answer.

In a basket, there are 21 balloons of four different colours. The basket contains 4 yellow balloons, some red, some blue and some orange balloons. Find the probability of drawings two balloons from the basket such that both the balloons are of same colour.

Statement I: Probability of drawing one red and one orange balloon from the basket is $\frac{8}{35}$.

Statement II: Probability of drawing one blue balloon from the basket is $\frac{1}{7}$.

Statement III: Probability of drawing one red balloon from the basket is $\frac{2}{7}$.

a) Only I and III

b) Only I and either II or III

c) Any two of the three

d) All I, II and III

e) Only I and II

13. In the following question read all the statements carefully and find which of the following statement alone is sufficient to answer the question.

Three friends P, Q and R are given a work to complete in 18 days. If Q starts work and from second day, P and R joined him, then in how many days the whole work will be completed?

A. Time taken by P to complete the whole work alone is 5 days more than the time taken by Q and R together.

B. 50% of the work can be completed by P and R in 20 days.

C. Q can complete the whole work in 50 days.

D. Total time taken by Q and R together to complete the whole work is 27 days.

- a) Either statement A or C alone is sufficient.
- b) Only statement D alone is sufficient.
- c) Only statement C alone is sufficient.
- d) Either statement A or C or D alone is sufficient.
- e) Either statement B or C alone is sufficient.

14. In each of the following questions, each question is followed by four/five statements. Read all the statements carefully and find which of the following statement alone is sufficient to answer the question.

Speed of two boats A and B in still water are 4 km/hr and 3 km/hr more than speed of boat C in still water. Downstream speed of boat B and C are in the ratio 11: 10 respectively. What is the upstream distance covered by boat C in 6.5 hours?

Which of the following option **alone** is **not** sufficient to find the answer?

- A. Stream is flowing with speed 9 km/hr.
- B. Difference between upstream speed of boat A and C is 4 km/hr.
- C. Ratio of upstream speeds of boat A and C is 4: 3 respectively.
- D. Boat C covers 105 km downstream in 3.5 hours.
- a) Either A or C alone is not sufficient.
- b) Only B alone is not sufficient.
- c) Either B or D alone is not sufficient.
- d) Only C alone is not sufficient.
- e) Only D alone is not sufficient.

15. Pankaj invested 'x + y' in scheme A and 'y - x' in scheme B, then what is the ratio of total amount invested by Pankaj in scheme A to that in scheme B if scheme A offers 20% annual rate of simple interest and scheme B offers 40% annual rate of compound interest?

I: Interest amount received from scheme B is 48% of that received from scheme A after 2 years.

II: Total amount invested in both the schemes together is Rs.24000 and amount of interest received from scheme A at the end of 3 years is Rs.12000.

III: Difference between amount invested in both the schemes is Rs.16000 and interest amount from scheme B after 3 years is Rs.6976.

- a) Any two of them together are sufficient.
- b) Only II alone is sufficient.
- c) All three of them together are sufficient.
- d) Only I and II together are sufficient.
- e) Any one of them alone is sufficient.

Directions (16 – 17): Kavita and Shreya invested Rs.3000 together. Kavita invested her amount at compound interest for 'a/10' years at a% rate of interest and Shreya invested half of her amount at compound interest and remaining half at simple interest at the same rate of interest for the same time period. [It is given that 'a/10' is a natural number]

16. What is the value of 'a'?

Statement I: Ratio of investments of Kavita and Shreya is 1: 2 respectively and total sum received by them together after a particular time at a% rate of interest is Rs.4280.

Statement II: Simple interest received by Shreya is Rs.40 less than compound interest received by her.

Statement III: Sum of simple interest and compound interest received by Shreya after a certain time at a% rate of interest is Rs.2500

Which of the above statement is redundant to find the answer of the given question?

- a) Only statement I alone
- b) Only statement II alone
- c) Only statement III alone
- d) Only either statements I and II together or statements II and III together.
- e) Statements I, II and III together

17. What amount is received by Shreya after 'a/10' years?

Statement I: Value of 'a' can be determined by the equation: $3a^2 - 55a - 100 = 0$.

Statement II: Kavita invested Rs.1000 less than amount invested by Shreya.

Statement III: Total sum received Kavita and Shreya together after 'a/10' years is Rs.4280.

Which of the following statement is necessary to find the answer?

- a) Only statements I and II together are sufficient.
- b) Only statements I and III together are sufficient.
- c) Only statements II and III together are sufficient.
- d) Either statement I or III is sufficient alone.
- e) Statement I and either statement II or III together are sufficient.

18. This question consists of three statements numbered I, II and III given below it. You have to decide whether the data provided in the statements

are sufficient to answer the question. Read all the statements and Give answer:

Three persons P, Q and R are employed to do a work, then what is the time taken by person P alone to do the work?

I: Person P is 25% more efficient than person Q and $83\frac{1}{3}\%$ as efficient as person R. Time taken by persons P and Q together to do the work is $\frac{2}{3}$ days more than the time taken by persons Q and R together.

II: Time taken by person P alone to do the work is 2 days more than that by person R and together persons P and R can do the work in $\frac{60}{11}$ days.

III: Time taken by all the three persons together is 4 days and time taken by persons Q and R together to do the work is 6 days.

- a) I alone is sufficient.
- b) II alone is sufficient.
- c) Any one of them alone is sufficient.
- d) II and III together are sufficient.
- e) I and III together are sufficient.

19. This question consists of three statements numbered I, II and III given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read all the statements and Give answer:

Ratio of oil to water in containers A and B is 3: 2 and 4: 7 respectively. What is the difference between quantity of mixture in both the containers?

I: Mixture from container A and B are mixed to form mixture C and after selling the mixture C per cent profit and amount of profit earned is 20% and Rs.600 respectively.

II: Cost price of oil and water is Rs.30 per litre and Rs.10 per litre respectively and mixture C is sold at the rate of Rs.22.5 per litre.

III: Mixture from container A and B are mixed in the ratio 5: 11 to form a final mixture and quantity of oil in final mixture is 20 litres less than quantity of water in that mixture.

- a) I and II together are sufficient.
- b) Either III alone or I and II together are sufficient.
- c) III alone is sufficient.
- d) I and III together are sufficient.
- e) Any two of them together are sufficient.

20. Each of the questions below consists of a question and three statements numbered I, II and III given below it. You have to decide whether the data provided in the statements are sufficient to answer the question. Read all the statements and give answer.

Ashok, Manoj and Harsh entered into a partnership with investment in the ratio 5:9:13. After one year, Ashok doubled his investment. After one more year, Manoj invested Rs.5000 more. Ashok is the working partner and rest two are sleeping partner. Find the total share of Ashok in the profit at the end of three years.

Statement I: Ashok being the working partner, get 15% of the profit for his work.

Statement II: At the end of three years, they earned a total profit of Rs.274000.

Statement III: Respective ratio of the shares of Ashok and Harsh in the profit is 25:39.

- a) Only I and II
- b) Only I and either II or III
- c) Any two of the three

d) All I, II and III

e) Cannot be determined even after combining all the statements.

21. In each of the following questions, a question is followed by four statements numbered I, II, III and IV are given. You have to read all the four statements and give answer.

Find the cost price of the mixture of sugar formed from two different quality of sugar.

Statement I. The sugar of rate Rs. 2.1 per kg and Rs. 2.52 per kg is mixed

Statement II. The mixture is sold at 25% profit

Statement III. Two quantity of sugar are mixed in the ratio 2 : 5

Statement IV. Mixture is sold at Rs. 3 per kg

- a) Statement I and II together.
- b) Any two of the statements.
- c) Statement I and Statement III.
- d) Either statement I or statement III & IV.
- e) None of the statements.

22. In each of the following questions, a question is followed by four statements numbered I, II, III and IV are given. You have to read all the four statements and give answer.

Shikhar bought a phone from an electronic shop and sold after some time. Find the profit/loss percentage occurred to Shikhar.

Statement I. Shikhar paid Rs. 12000 for the phone and sold it to Rohan at some price.

Statement II. Vikas paid Rs. 11000 for the phone to Rohan.

Statement III . Vikas sold it to Pavan at 10% loss.

Statement IV. Amount of profit gained by Rohan is equal to $10/11^{\text{th}}$ of the loss occurred to Vikas.

- a) Statement I, II and IV together.
- b) Statement I, II and III together.
- c) All the statements together.
- d) Any two of the statements.
- e) None of the statement.

Directions (23 – 27): Each of the question below consists of a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements are sufficient to answer the question?

23. What is the age of Radha?

(I) Radha is 5 years younger than Radhe. The product of the age of Radhe 8 years ago (In years) and his age 10 years ago (In years) is 120.

(II) The present age of Radha is the average of the present ages of Riya and Rima. The ratio of the present ages of Riya and Rima is 8:7 and the product of Riya's age 4 years ago (In years) and Rima's age 9 years ago (In years) is 60.

- a) The data in Statement I alone is sufficient to answer the question, while the data in Statement II alone is not sufficient to answer the question.
- b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
- c) The data either in Statement I alone or in Statement II alone is sufficient to answer the question.

d) The data in both the Statements I and II together are not sufficient to answer the question.

e) The data in both the Statements I and II together are necessary to answer the question.

24. What is the length of the train?

(I) The ratio of the time taken by the train to cross a pole to the time taken by the train to cross a bridge of length 30 m with the same speed is 9:10.

(II) Train A having length 140 m less than the length of the given train travels with the speed of 10 m/s less than the speed of the given train. The ratio of time taken by the given train to cross train A by moving in the same direction of train A to the time taken by the given train to cross train A by moving in the opposite direction of train A is 2:1.

- a) The data in Statement I alone is sufficient to answer the question, while the data in Statement II alone is not sufficient to answer the question.
- b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
- c) The data either in Statement I alone or in Statement II alone is sufficient to answer the question.
- d) The data in both the Statements I and II together are not sufficient to answer the question.
- e) The data in both the Statements I and II together are necessary to answer the question.

25. In how many days will Umesh, Shiva, Kamlesh and Nagesh completes a task working together? (1 day = 12 hours).

(I) Shiva and Kamlesh together complete the task in 6 days 8 hours. Efficiency of Umesh is 50% more than the efficiency of Kamlesh and efficiency of Nagesh is 25% less than the efficiency of Shiva.

(II) Efficiency of Shiva is 25% more than the efficiency of Kamlesh. Number of hours taken by Nagesh alone to complete the task is 72 more than the number of hours taken by Umesh alone to complete the task.

- a) The data in Statement I alone is sufficient to answer the question, while the data in Statement II alone is not sufficient to answer the question.
- b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
- c) The data either in Statement I alone or in Statement II alone is sufficient to answer the question.
- d) The data in both the Statements I and II together are not sufficient to answer the question.
- e) The data in both the Statements I and II together are necessary to answer the question.

26. What is the initial quantity of pure milk in a 40 litres solution of milk and water?

(I) If 4 litres of solution is removed and 9 litres of milk is added followed by 5 litres of the solution removed and 10 litres of milk is added, then volume of the milk becomes 84% of the volume of the solution.

(II) If 4 litres of the solution is replaced by water, then quantity of the milk left in the solution was 750 ml more than the quantity of milk left in the solution after replacing 5 litres of solution by water.

- a) The data in Statement I alone is sufficient to answer the question, while the data in Statement II alone is not sufficient to answer the question.
- b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
- c) The data either in Statement I alone or in Statement II alone is sufficient to answer the question.

d) The data in both the Statements I and II together are not sufficient to answer the question.

e) The data in both the Statements I and II together are necessary to answer the question.

27. What is the total amount with Nikita?

(I) Nikita invested 60% of the total amount with her at the rate of 12% per annum simple interest and remaining at the rate of 20% per annum compound interest compounded annually for 2 years each. Total interested earned by Nikita was equal to the total interest earned in 2 years on Rs.10000 at the rate of 16% per annum.

(II) Nikita invested some of her amount at the rate of 14% per annum simple interest and remaining at the rate of 18% per annum simple interest. The effective rate of interest of Nikita on total amount is 16.8% per annum.

- a) The data in Statement I alone is sufficient to answer the question, while the data in Statement II alone is not sufficient to answer the question.
- b) The data in Statement II alone is sufficient to answer the question, while the data in Statement I alone is not sufficient to answer the question.
- c) The data either in Statement I alone or in Statement II alone is sufficient to answer the question.
- d) The data in both the Statements I and II together are not sufficient to answer the question.
- e) The data in both the Statements I and II together are necessary to answer the question.

Directions (28 – 30): Each of the questions below consists of a question and two or more statements numbered I, II and III given below it. You have to decide whether the data provided in the statements are sufficient to answer the question:

28. What is the speed of train Q?

I. Train P crosses a bridge of length 450 meter and train Q running in opposite direction in 33.75 sec and 12.5 sec respectively.

II. Train Q crosses a platform of length equal to $\frac{3}{5}$ th of train Q and pole in 18 sec and 11.25 sec respectively.

III. Train Q crosses a platform of length 240 meter and train P having length 360 meter running in same direction in 16.25 and 37.5 sec respectively considering speed of train Q is more than train P.

- a) All I, II and III together are sufficient
- b) Only II alone is sufficient
- c) Only I and III together are sufficient
- d) Either I and III together or II alone is sufficient
- e) only I alone is sufficient

29. What is the present age of Mohan?

I. Radha who is the younger sister of Mohan is 12 years younger to Suresh who is the elder brother of Mohan.

II. Arpita who is the mother of Suresh was 32 years old when Mohan was born, and sum of ages of suresh and Radha is 24 years.

III. Mohan is 8 years elder than Radha.

- a) Only II and III together are sufficient.
- b) Only I and II together are sufficient.
- c) Statement I and either II or III is sufficient.
- d) All the three statements together are required.
- e) Even all the three statements together are not sufficient.

30. What is the ratio of profits of Aman, Bhanu and Chandra at the end of the year (investment ratio is not necessarily constant for all the months)?

I. Aman, Bhanu and Chandra started a business with their investment in the ratio 1:3:5.

II. After 4 months, Aman invested the same amount as before and Bhanu as well as Chandra withdrew half of their investments.

III. Total profit at the end of the year is Rs.10500.

- a) Only II is sufficient.
- b) Only II and III together are sufficient.
- c) Only I and II together are sufficient.
- d) All I, II and III together are sufficient.
- e) None of the above

31. Mayank lent a sum on CI for two years in three different schemes A, B and C. what Sum invested by Mayank in scheme A?

I. Sum invested in scheme B is $37\frac{1}{2}\%$ more than Sum invested in scheme A, and sum invested in scheme C is 25% less than sum invested in scheme A.

II. Rate of interests offered by scheme A, B and C is 10%, 12% and 15% respectively. Interest got from scheme C is Rs. 7.14 more than interest got from scheme A.

III. Rate of interest offered by scheme A, B and C is 10%, 12% and 15% respectively. Mayank got a total interest of Rs. 179.5752.

- a) I and III statements are required
- b) I and II statements are required
- c) I statement and either II or III statement are required
- d) All statements are required
- e) Data is not sufficient and it requires more information to answer the given question.

32. A flower seller had, sell 24 roses, in which some are pink roses, some are red roses and some are yellow roses. Find how many yellow roses flower seller had.

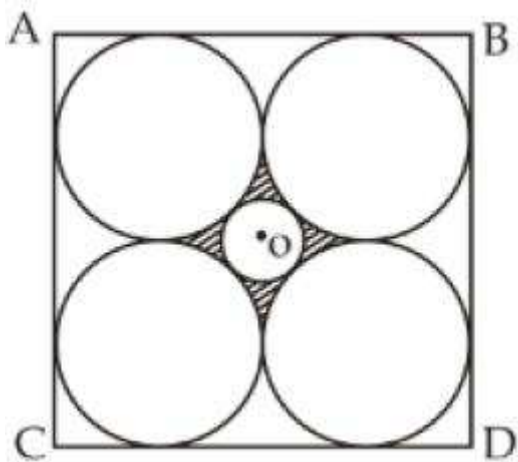
I. If seller sold two roses, probability of both are red is $\frac{7}{69}$

II. If seller sold two roses, probability of both are pink $\frac{15}{92}$

III. if seller sold three roses, probability of one them is red is greater than the probability of one of them is pink and one is yellow.

- a) I and III statements are required
- b) I and II statements are required
- c) I statement and either II or III statement are required
- d) All statements are required
- e) Data is not sufficient and it requires more information to answer the given question.

33. Find the area of the shaded region?



- A. Radius of bigger circle is given.
- B. Diagonal of square ABCD is given.

C. Difference between area of bigger circle and area of smaller circle is given.

- a) Either A or B alone is sufficient to answer the question
- b) Either B or C alone is sufficient to answer the question
- c) Either A or C alone is sufficient to answer the question
- d) Any of A, B or C alone is sufficient to answer the question
- e) Either only A or B and C together is sufficient to answer the question

34. Find the surface area of cone?

A. Ratio between height and radius of cone is $8 : 7$.

B. Radius of cone is half of the radius of hemisphere, which volume is 19404 cm^3

C. Radius of cone is 75% of radius of cylinder, which total surface area of 2640 cm^2 and ratio between height and radius of cylinder is $8 : 7$.

- a) Either A and B or B and C are sufficient to answer the question
- b) Either A and B or A and C are sufficient to answer the question
- c) Either A and C or B and C are sufficient to answer the question
- d) A, B and C together are sufficient to answer the question
- e) Either only A or B and C together are sufficient to answer the question

35. Find the height of an equilateral triangle.

A. Perimeter of the triangle is equal to the perimeter of the rectangle whose length and breadth are in the ratio of $5 : 3$.

B. Perimeter of the square is 48 m, which is twice the perimeter of the triangle.

C. Area of the triangle is $16\sqrt{3} \text{ m}^2$

a) Any two of them

b) Any of them

c) Only C

d) Either B or C alone

e) A and either B or C

36. The question consists of three statements numbered “I, II and III” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

What is the sum of the age of Rahul and Mitul?

Statement I: The age of Rahul is 6 years more than the age of Mitul.

Statement II: 40% of the age of Mitul is equal to 30% of the age of Rahul.

Statement III: The ratio of the half of the age of Rahul to one third of the age of Mitul is 2:1.

a) The data in statements I and II together are necessary to answer the question while the data in statement III alone is not sufficient to answer the question.

b) The data in statements II and III together are necessary to answer the question while the data in statement I alone is not sufficient to answer the question.

c) The data in statements I and III together are necessary to answer the question while the data in statement II alone is not sufficient to answer the question.

d) The data either in statement I and statement II together or in statements I and III together are necessary to answer the question.

e) The data in any two statements together are necessary to answer the question.

37. The question consists of four statements: I, II, III and IV given below it. You have to decide whether the data given in which of the following statements alone is sufficient to answer the question.

Find the two digit number.

I. The product of the digits of the two digit number is 21.

II. The difference between the digits of the two digit numbers is 4.

III. The sum of the digits of the two digit numbers is 10.

IV. The difference between two digit number and 30 is 7.

a) The data either in statement I alone or in statement IV alone are sufficient to answer the question.

b) The data either in statement I alone or in statement III alone are sufficient to answer the question.

c) The data either in statement III alone or in statement IV alone are sufficient to answer the question.

d) The data either in statement II alone or in statement III alone are sufficient to answer the question.

e) The data in any of the four statements I, II, III or IV alone are not sufficient to answer the question.

38. A cylindrical vessel contains 80% of water in it which is filled by a pipe. Find the total capacity of the cylindrical vessel. [Use $\pi = 3$]

I. The difference between the curved surface area and the total surface area of the cylindrical vessel is 384 m^2 .

II. The pipe took 72 minutes to fill the given quantity of water at the rate of 32 m^3 per minute.

III. The curved surface area and total surface area of the vessel is 720 m^2 and 1104 m^2 , respectively.

IV. The cost of painting the curved surface area of the vessel at the rate of Rs. 5 per m^2 is Rs. 3600.

- a) The data either in statement I alone or in statement IV alone are sufficient to answer the question.
- b) The data either in statement I alone or in statement III alone are sufficient to answer the question.
- c) The data either in statement III alone or in statement IV alone are sufficient to answer the question.
- d) The data either in statement II alone or in statement III alone are sufficient to answer the question.
- e) The data in any of the four statements I, II, III or IV alone are sufficient to answer the question.

39. The question consists of three statements numbered “I II and III” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

A boat starts from point A at 7:00 a.m. for point B. Find the distance between points A and B.

Statement I: The ratio of the downstream speed to upstream speed of the boat is 4:3 respectively. The difference between the time taken for going from point A to point B and that of the same while returning is 1 hour.

Statement II: The boat reached point B at 11:00 a.m.

Statement III: The speed of stream is 2 km/h.

- a) The data in statement I and statement II together are necessary to answer the question, while data in statement III alone is not sufficient to answer the question.
- b) The data in statement I and statement III together are necessary to answer the question, while data in statement II alone is not sufficient to answer the question.

c) The data in statement II and statement III together is necessary to answer the question, while data in statement I alone is not sufficient to answer the question.

d) Either option (a) or option (c)

e) All the statements together are necessary to answer the question.

40. The question consists of three statements numbered “I, II and III” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

Rahul and Vijay together started a business with initial investment of Rs. ‘x’ and Rs. 3600 respectively. After a year, Rahul increased his investment by 25% while Vijay reduced his investment by Rs. 1200. Find the total profit earned by the business after 2 years.

Statement I: The ratio of profit share of Rahul to Vijay after 2 years is 9:5.

Statement II: Rahul increased his investment by Rs. 1200 which is 33.33% of his profit share.

Statement III: Profit earned by Vijay after 2 years is Rs. 2000.

- a) Data in statements I and II together are necessary to answer the question while the data in statement III alone are not sufficient to answer the question.
- b) Data in statements I and III together are necessary to answer the question while the data in statement II alone are not sufficient to answer the question.
- c) Data either in statement II alone or in statements I and III together are necessary to answer the question.
- d) Data either in statement III alone or in statements I and II together are necessary to answer the question.
- e) Data in any two statements together are sufficient to answer the question.

41. Find the cost price of article P.

1. Article P is marked up by 60% above the cost price.
2. Selling price of article P is more than Rs. 1580.
3. Profit percentage earned on selling article P is $X\%$ where X is integer and $X > 30$.
4. Article P is sold at 17.5% discount.

Which of the given statement is redundant to find the answer of the question?

- a) Only statement 1
- b) Only statement 2
- c) Only statement 3
- d) Only statement 4
- e) Answer cannot be determined even after using all the statements.

42. The question consists of four statements: I, II, III and IV given below it. You have to decide whether the data given in which of the following statements alone is sufficient to answer the question.

In a river, two boats A and B are travelling towards each other from point P and point Q, respectively. Find the time taken by both boats to meet each other if both start travelling at the same time and distance between point P and point Q is 2520 km.

- I. Speed of boat A and boat B in still water is 30 km/h and 40 km/h, respectively.
- II. Ratio of upstream speed of boat A to that of boat B is 5:7 and speed of stream is 5 km/h.
- III. Difference between speeds of both boats in still water is 10 km/h and downstream speed of boat A is less than that of boat B.

IV. Upstream speed of boat A and downstream speed of boat B is 25 km/h and 45 km/h, respectively.

- a) The data either in statement I alone or in statement IV alone are sufficient to answer the question.
- b) The data either in statement I alone or in statement III alone are sufficient to answer the question.
- c) The data either in statement III alone or in statement IV alone are sufficient to answer the question.
- d) The data either in statement II alone or in statement III alone are sufficient to answer the question.
- e) The data in any of the four statements I, II, III or IV alone are sufficient to answer the question.

43. The question consists of three statements numbered "I, II and III" given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

Three persons 'A', 'B' and 'C' each cover a certain distance 'p' km. B takes 0.8 hours less than 'A' to cover the given distance. Find the speed of 'B'.

Statement I: If the speed of 'B' had been 20% less and the speed of 'A' had been 20% more then, both of them would have taken equal time to cover the given distance.

Statement II: 'C' running with a speed of 20 m/s covers the given distance in 1.5 hours.

Statement III: If the speed of 'A' had been 20% less he would have taken 0.6 hours more than the normal time to cover the given distance.

- a) The data in statements I and II together are sufficient to answer the question, while the data in statement III alone are not sufficient to answer the question.
- b) The data in statements I and III together are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.

c) The data in statements II and III together are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.

d) The data either in statements I and II together or in statements II and III together are sufficient to answer the question.

e) The data in all three statements I, II and III together are necessary to answer the question.

44. The question consists of three statements numbered “I, II and III” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

Present ages of A, B, C and D are in the ratio 6:9:7:5, respectively. Find the present age of C.

Statement I: Present average age of A, B and C is 14 years more than the present age of D.

Statement II: After seven years, sum of the ages of A and C will be equal to the sum of the ages of B and D after 4 years.

Statement III: Ratio of the average age of A and B after 30 years to the average age of C and D after 24 years will be 5:4.

a) The data in both statements I and II together are necessary to answer the question, while statement III alone is not sufficient to answer the question.

b) The data in both statements I and III together are necessary to answer the question, while statement II alone is not sufficient to answer the question.

c) The data in both statements II and III together are necessary to answer the question, while statement I alone is not sufficient to answer the question.

d) The data either in statement I alone or in statement II alone are sufficient to answer the question, while data in

statement III alone is not sufficient to answer the question.

e) None of the above

45. The question consists of two statements numbered “I and II” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

A, B and C started a business with certain initial investments. After one-year, A, B and C made certain additional investments. Find the profit share of B out of the total profit of Rs. 10,080 after two years.

Statement I: Initial investments of A, B and C are Rs. 1,260, Rs. 1,620 and Rs. 900, respectively. Additional investments of A, B and C are in the 2:3:2 respectively.

Statement II: Initial investments of A, B and C are in the ratio 7:9:5 respectively. Additional investments of A, B and C are ‘ $x + 100$ ’, ‘ $2x - 100$ ’ and Rs. ‘ $x + 100$ ’ respectively.

a) The data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.

b) The data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.

c) The data either in statement I alone or in statement II alone are sufficient to answer the question.

d) The data given in both statements I and II together are not sufficient to answer the question.

e) The data in both statements I and II together are necessary to answer the question.

46. The question consists of two statements numbered “I and II” given below it. You have to decide whether the data provided in the statements are sufficient to answer the question.

Lengths of trains A and B are 450 meters and 750 meters, respectively. Find the speed of train B.

Statement I: Train A crosses a pole in 18 seconds while the two trains A and B can cross each other in 30 seconds.

Statement II: Train A travelling with a speed of 25 m/s crosses train B which is travelling in same direction with respect to train A in 2 minutes.

- a) The data in statement I alone are sufficient to answer the question, while the data in statement II alone are not sufficient to answer the question.
- b) The data in statement II alone are sufficient to answer the question, while the data in statement I alone are not sufficient to answer the question.
- c) The data either in statement I alone or in statement II alone are sufficient to answer the question.
- d) The data given in both statements I and II together are not sufficient to answer the question.
- e) The data in both statements I and II together are necessary to answer the question.

47. If a person borrows money at a compound interest for 3 years, then calculate the amount to be returned in 3 years.

- I. After 5 years, Rs. 800 has to be paid as simple interest.
- II. The interest is rated at 5% per annum.
- III. The amount to be paid after 3 years as simple interest is equal to 6 times the amount when it was borrowed.

Which statement(s) is/are required to answer the question?

- a) Only statement III or both statement I and statement II are sufficient to answer the question.
- b) Only statement I is sufficient to answer the question.

c) Either statement I or statement II is sufficient to answer the question.

d) Only statement II is sufficient to answer the question.

e) Statement I and either statement II or statement III together are sufficient to answer the question.

48. If sum of the two numbers A and B is 68 and their HCF is 4, then what is the value of 'A'?

I: Difference between both the numbers is 52.

II: $(A/4) - (B/4) < 15$ and is a two digits positive prime number.

III: LCM of both the numbers is 120.

IV: Difference between the square of both the numbers is 3536.

- a) III and IV together are redundant.
- b) Combination of any two of the statements I, III and IV together are redundant.
- c) Combination of any two of the statements I, II and III together are redundant.
- d) I and IV together are redundant.
- e) Any two of them together are redundant.

49. What is the total capacity of a tank which is filled by using two men A and B and 3 women together? Assume efficiency of each woman is same while the efficiency of man A is double of the efficiency of man B.

I. Man A alone can fill the tank completely in 6 hours while one woman alone can fill that same tank completely in 12 hours.

II. Man B alone can fill half of the tank in 6 hours and one woman alone can fill one-fourth of that tank in 3

hours. Water filling efficiency of man A is 1.5 litres per minutes.

III. Total amount of water filled in the tank in 1 hour when all the five persons are working together is 180 litres.

- a) II alone is sufficient.
- b) Either II alone or I and III together are sufficient.
- c) I and III together are sufficient.
- d) Either I and III together or I and II together are sufficient.
- e) Any two of them together are sufficient.

50. There are 5 artists, 8 dancers, some players and some singers in a locality. Find the probability of selecting 2 artists and 2 singers from the locality.

Statement I: Probability of selecting one player from the locality is 1/5.

Statement II: A committee of four members is to be formed such that the committee contains 1 artist, 1 dancer, 1 player and 1 singer. The number of ways in which this can be possible is 480.

Statement III: Probability of selecting one artist from the locality is 1/4.

- a) Only I and either II or III
- b) All I, II and III
- c) Any two of the three
- d) Only I and II
- e) Cannot be answered even after combining all the statements.

Solutions And Detailed Explanantion :

1. Answer: C)

From I and II:

1/P + 1/R = 1/48 ----- (i)

1/P + 1/R + 1/Q = 3/80 ----- (ii)

From (i) and (ii)

=> 1/48 + 1/Q = 3/80

=> 1/Q = 3/80 - 1/48

=> 1/Q = (9 - 5)/240

=> 1/Q = 4/240

=> 1/Q = 1/60

Now,

2 x (1/Q + 1/R) = 7/120

=> 1/Q + 1/R = 7/240

=> 1/60 + 1/R = 7/240

=> 1/R = 7/240 - 1/60

=> 1/R = (7 - 4)/240

=> 1/R = 3/240

=> 1/R = 1/80

From (i)

1/P + 1/80 = 1/48

=> 1/P = 1/48 - 1/80

=> 1/P = (5 - 3)/240

$$\Rightarrow 1/P = 2/240$$

$$\Rightarrow 1/P = 1/120$$

$$\text{Required ratio} = 1/120 : 1/60 = 1:2$$

From I and III:

$$1/P + 1/R = 1/48 \text{ ----- (i)}$$

$$1/P + 1/R + 1/Q = 3/80 \text{ ----- (ii)}$$

From (i) and (ii)

$$\Rightarrow 1/48 + 1/Q = 3/80$$

$$\Rightarrow 1/Q = 3/80 - 1/48$$

$$\Rightarrow 1/Q = (9 - 5)/240$$

$$\Rightarrow 1/Q = 4/240$$

$$\Rightarrow 1/Q = 1/60$$

Now,

$$1/P + 1/Q = 1/40$$

$$\Rightarrow 1/P + 1/60 = 1/40$$

$$\Rightarrow 1/P = 1/40 - 1/60$$

$$\Rightarrow 1/P = (3 - 2)/120$$

$$\Rightarrow 1/P = 1/120$$

$$\text{Required ratio} = 1/120 : 1/60 = 1:2$$

From II and III:

$$2 \times (1/Q + 1/R) = 7/120$$

$$\Rightarrow 1/Q + 1/R = 7/240 \text{ ----- (iii)}$$

$$1/P + 1/Q = 1/40 \text{ ----- (iv)}$$

Now,

$$(1/P)/(1/R) = 2/3$$

$$\Rightarrow 1/P = 2/3R$$

From (iv)

$$2/3R + 1/Q = 1/40 \text{ ----- (v)}$$

Equation (iii) - equation (v)

$$1/Q + 1/R - 2/3R - 1/Q = 7/240 - 1/40$$

$$\Rightarrow (3 - 2)/3 \times 1/R = (7 - 6)/240$$

$$\Rightarrow 1/R = 3/240$$

$$\Rightarrow 1/R = 1/80$$

$$\Rightarrow 1/P = 2/3 \times 1/80$$

$$\Rightarrow 1/P = 1/120$$

From (iv)

$$1/120 + 1/Q = 1/40$$

$$\Rightarrow 1/Q = 1/40 - 1/20$$

$$\Rightarrow 1/Q = (3 - 1)/120$$

$$\Rightarrow 1/Q = 2/120$$

$$\Rightarrow 1/Q = 1/60$$

$$\text{Required ratio} = 1/120 : 1/60 = 1:2$$

Hence, any two of the three statements are sufficient.

2. Answer: B)

Let distance covered by car B = d km

Let speed of car A and B is 4a km/hr and 5a km/hr respectively.

Distance covered by car C = 378 km

Then, distance covered by car A = 858 - 378 = 480 - d

Time taken by car C = 8.4 hours

Speed of car C = $378/8.4 = 45$ km/hr

From option 1: Speed of car C is 90% of the speed of car B.

Speed of car B = $45 * 100/90 = 50$ km/hr

Then, speed of car A = $50 * 4/5 = 40$ km/hr

$19.5 - 8.4 = (480 - d)/40 + d/50$

$d = 180$ km

Hence, this option alone is sufficient.

From option 2: Speed of car C is 45 km/hr.

From the above data, we cannot determine the distance covered by car B.

Hence, this option alone is not sufficient.

From option 3: Time taken by car B is 3.9 hours less than time taken by car A.

Time taken by car A and B = $19.5 - 8.4 = 11.1$ hours

Time taken by car A = $(11.1 + 3.9)/2 = 7.5$ hours

Time taken by car B = $11.1 - 7.5 = 3.6$ hours

Then, $7.5 * 4a = 480 - d$..(i)

And, $3.6 * 5a = d$...(ii)

By dividing (i) by (ii), we get

$d = 180$ km

Hence, this option alone is sufficient.

From option 4: Speed of car A is 40 km/hr.

Then, speed of car B = $40 * 5/4 = 50$ km/hr

$19.5 - 8.4 = (480 - d)/40 + d/50$

$d = 180$ km

Hence, this option alone is sufficient.

3. Answer: B)

Let per unit cost of pure milk = 1

From I and III:

Let quantity of milk and water in mixture A is 'x + 10' and 'x' respectively while quantity of milk and water in mixture B is 'y + 10' and 'y' respectively.

Total quantity of milk in mixture C = $(x + 10) + (y + 10)$
 $= (x + y + 20)$

Total quantity of water in mixture C = $(x + y)$

Cost price of mixture C = $(x + y + 20) * 1 + (x + y) * 0 = (x + y + 20)$

Selling price of mixture C = 75% of $[(x + y + 20) + (x + y)] = (1.5x + 1.5y + 15)$

Profit amount = $(1.5x + 1.5y + 15) - (x + y + 20) = (0.5x + 0.5y - 5) = 31.25\%$ of $(x + y + 20)$

$(0.5x + 0.5y - 5) = 0.3125x + 0.3125y + 6.25$

$0.1875(x + y) = 11.25$

$(x + y) = 60$ (1)

Statements I and III together are not sufficient.

From I and II:

Let quantity of milk and water in mixture A is 'x + 10' and 'x' respectively while quantity of milk and water in mixture B is 'y + 10' and 'y' respectively.

Profit percent earned after selling mixture B = $[y/(y + 10)] * 100 = 700/9$

$9y = 7y + 70$

$y = 35$

Statements I and II together are not sufficient.

From II and III:

Let amount of milk and water in mixture B is 'm' and 'n' respectively.

According to the question:

$$(n/m) * 100 = 700/9$$

$$(n/m) = 7/9$$

$$m: n = 9: 7$$

Ratio of milk to water in mixture B = 9: 7

Let amount of milk and water in mixture C is 'p' and 'q' respectively.

Cost price of mixture C = p

Selling price of mixture C = 75% of (p + q)

$$\text{Profit amount} = (0.75p + 0.75q - p) = (0.75q - 0.25p)$$

According to the question:

$$[(0.75q - 0.25p)/p] * 100 = 31.25$$

$$[(0.75q - 0.25p)/p] = 5/16$$

$$12q - 4p = 5p$$

$$12q = 9p$$

$$p: q = 4: 3$$

Ratio of milk to water in mixture C = 4: 3

Statements II and III together are not sufficient.

From I, II and III:

From statements II and III together we get:

Ratio of milk to water in mixture B = 9: 7

Ratio of milk to water in mixture C = 4: 3

Now,

$$(y + 10): y = 9: 7$$

$$7y + 70 = 9y$$

$$y = 35$$

From equation (1):

$$x + y = 60$$

$$x = 25$$

Ratio of milk to water in mixture A = (x + 10): x = 35:
25 = 7: 5

By the rule of alligation:

$$\begin{array}{cc} (7/12) & (9/16) \\ & (4/7) \end{array}$$

Ratio in which mixtures A and B are mixed to form mixture C = [(9/16) - (4/7)]: [(4/7) - (7/12)]

$$= (1/112): (1/84)$$

$$= 84: 112$$

$$= 3: 4$$

Statements I, II and III together are sufficient.

4. Answer: D)

Stream is flowing with speed 12 km/hr. Boat A covers 4 km more downstream distance in one hour than boat C in same time period. Distance between two points X and Y is 380 km which is double the distance between X and Z.

Stream speed = 12 km/hr

Let speed of boat A, B and C in still water are 'a', 'b' and 'c' km/hr respectively.

$$\text{Then, } (a + 12) - (c + 12) = 4$$

$$a = c + 4$$

Distance between point X and Y = 380 km

Distance between point X and Z = $380/2 = 190$ km

From statement I: Difference between upstream speed of boat A and downstream speed of boat B is 2 km/hr less than the difference between downstream speed of boat A and upstream speed of boat C.

$$(b + 12) - (a - 12) = (a + 12) - (c - 12) - 2$$

$$2a = b + c + 2$$

$$2a = b + a - 4 + 2$$

$$b = a + 2$$

From statement II: Boat A covers covered the distance between point X to Z in 5 hours while moving downstream. Upstream speed of boat B and C are in the ratio 8: 5 respectively.

$$5 = 190/(a+12)$$

$$a = 26 \text{ km/hr}$$

$$\text{Then, } c = 26 - 4 = 22 \text{ km/hr}$$

$$\text{And, } (b - 12): (c - 12) = 8: 5$$

$$(b - 12): (22 - 12) = 8: 5$$

$$b = 28 \text{ km/hr}$$

From statement III: Sum of time taken by boat B to cover the distance between point X and Z while travelling upstream and the time taken by boat A to cover the distance between point X and Y while travelling downstream is 21.875 hours.

$$21.875 = (190/(b - 12)) + (380/(a + 12))$$

From statement I and III:

$$21.875 = (190/((a + 2) - 12)) + (380/(a + 12))$$

$$a = 26 \text{ km/hr}$$

$$b = 26 + 2 = 28 \text{ km/hr}$$

Hence, either statement I and III together are sufficient or statement II alone is sufficient to find the answer.

5. Answer: C)

A metallic cylinder and a metallic cone are melted to form a sold sphere. Radius of cylinder and cone are in the ratio 3: 2 respectively.

Let radius of cylinder and cone are 3a cm and 2a cm respectively.

Volume of cylinder + volume of cone = volume of sphere

From statement I: Height of cylinder and cone are in the ratio 4: 5 respectively and sum of volume of cylinder and cone is 39424 cm^3 .

Let height of cylinder and cone are 4k cm and 5k cm respectively.

Volume of sphere = $39424 = (4/3) \times (22/7) \times (\text{radius of sphere})^3$

$$\text{Radius of sphere} = 21.11 \text{ cm}$$

From statement II: Volume of cone is 27104 cm^3 less than the volume of cylinder and sum of their heights is 54 cm.

$$\text{Volume of cone} = (1/3) \times (22/7) \times (2a)^2 \times \text{height of cone}$$

$$\text{Volume of cylinder} = (22/7) \times (3a)^2 \times \text{height of cylinder}$$

$$27104 = (22/7) \times (3a)^2 \times \text{height of cylinder} - (1/3) \times (22/7) \times (2a)^2 \times \text{height of cone}$$

From statement III: Curved surface area of cylinder is 3168 cm^2 and its radius and height are in the ratio 7: 8 respectively.

$$3168 = 2 \times (22/7) \times 3a \times \text{height of cylinder}$$

$$\text{Height of cylinder} = 3a \times \frac{8}{7} = \frac{24a}{7}$$

$$\text{Then, } 3168 = 2 \times \left(\frac{22}{7}\right) \times 3a \times \left(\frac{24a}{7}\right)$$

$$a = 7$$

$$\text{Then, radius of cylinder} = 3 \times 7 = 21 \text{ cm}$$

$$\text{Radius of cone} = 2 \times 7 = 14 \text{ cm}$$

$$\text{Height of cylinder} = 24 \times \frac{7}{7} = 24 \text{ cm}$$

From statement II and III:

$$27104 = \left(\frac{22}{7}\right) \times (21)^2 \times 24 - \left(\frac{1}{3}\right) \times \left(\frac{22}{7}\right) \times (14)^2 \times \text{height of cone}$$

$$\text{Height of cone} = 30 \text{ cm}$$

Then, volume of sphere = volume of cylinder + volume of cone

$$\left(\frac{4}{3}\right) \times \left(\frac{22}{7}\right) \times (\text{radius of sphere})^3 = \left(\frac{22}{7}\right) \times (21)^2 \times 24 + \left(\frac{1}{3}\right) \times \left(\frac{22}{7}\right) \times (14)^2 \times 30$$

$$\text{Radius of sphere} = 21.11 \text{ cm}$$

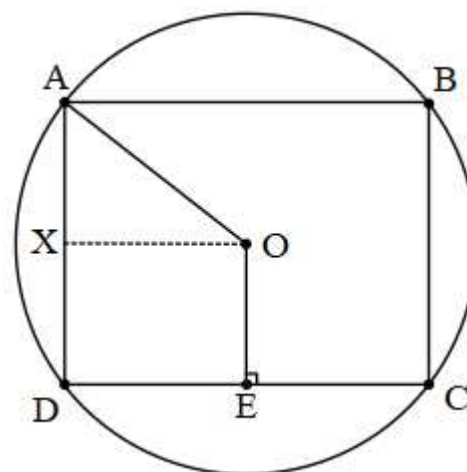
Hence, either statement I alone is sufficient or statement II and III together are sufficient.

6. Answer: D)

From I alone:

Since, OE is perpendicular to CD.

$$\text{So, } DE = \frac{1}{2} \times DC$$



$$\text{Similarly, } AX = \frac{1}{2} \times AD$$

$$\text{Given, } DC < 15 \text{ cm}$$

$$\text{So, } DE < 7.5 \text{ cm}$$

$$\text{So, } XO < 7.5 \text{ cm}$$

In the right-angled triangle AXO, AO will be integer when AX, OX and AO represent the Pythagorean triplets.

Since, XO is less than 7.5 cm, only 1 such triplet is possible where,

$$AX = 3 \text{ cm, } OX = 4 \text{ cm and } AO = 5 \text{ cm}$$

$$\text{So, area of triangle AXO} = \frac{1}{2} \times AX \times OX = \frac{(3 \times 4)}{2} = 6 \text{ cm}^2$$

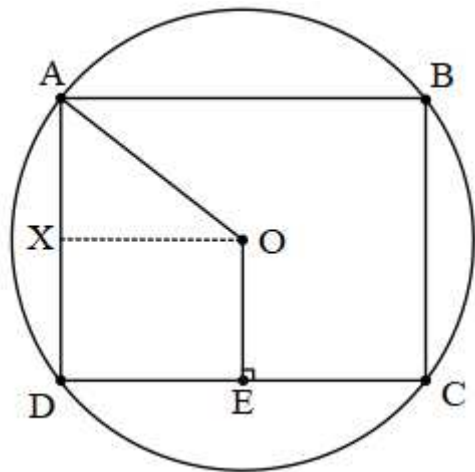
$$\text{Area of EDXO} = 3 \times 4 = 12 \text{ cm}^2$$

$$\text{Area of AOED} = 18 \text{ cm}^2$$

From II alone:

$$\text{The area of the circle is } 25\pi \text{ cm}^2.$$

$$\text{So, the radius of the circle} = 5 \text{ cm}$$



now,

$$AO^2 = XO^2 + AX^2$$

on multiplying both side with 4,

$$(2AO)^2 = (2XO)^2 + (2AX)^2$$

$$\text{so, } CA^2 = DC^2 + AD^2$$

or we can say that,

$$(\text{length})^2 + (\text{breadth})^2 \text{ of the rectangle} = 4 \times (\text{radius of the circle})^2.$$

But, diagonal of the rectangle = 2 x radius of the circle

So,

$$(\text{length})^2 + (\text{breadth})^2 \text{ of the rectangle} = (2 \times \text{radius of the circle})^2$$

$$= \text{Diagonal of rectangle}$$

But we don't have any additional data towards solving the example.

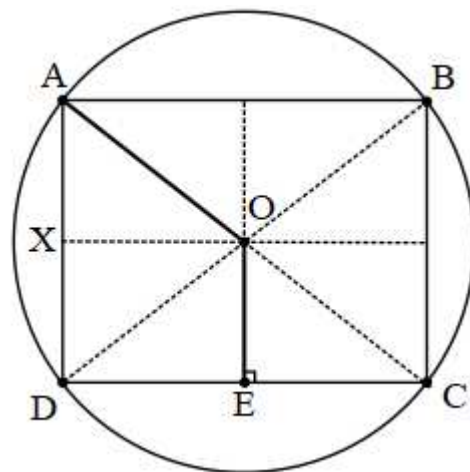
So, the length and the breadth of the rectangle can take different values.

So, statement II alone is **not** sufficient to answer the question.

From III alone:

The area of the pentagon ABCEO is 12 cm^2 more than the area of AOED.

Let us divide the rectangle in 8 equal parts as shown below.



3 parts together represents AOED while other 5 parts represents the pentagon ABCEO.

$$\text{Required difference between the area} = 12 \text{ cm}^2 = 5 \text{ parts} - 3 \text{ parts} = 2 \text{ parts}$$

So, one part represents the area of 6 cm^2

$$\text{Area of AOED} = 18 \text{ cm}^2$$

So, statement III alone is sufficient to answer the question.

7. Answer: B)

Three workers A, B and C complete a work together in 4 days. Then,

$$1/4 = (1/A) + (1/B) + (1/C)$$

$$(1/A) + (1/B) = (1/4) - (1/C) \dots (i)$$

The time taken by A and B together to complete the 25% of the whole work is equal to the time taken by D and C

together to complete the 150% more than the whole work. Then,

$$25\% \text{ of } (1/((1/A) + (1/B))) = 250\% \text{ of } (1/10)(1/((1/C) + (1/D)))$$

$$(1/A) + (1/B) = (1/C) + (1/D) \dots (ii)$$

From (i) and (ii), we have

$$(1/4) - (1/C) = (1/C) + (1/D)$$

$$D = 4C/(C - 8)$$

From statement I: Efficiencies of A and D are in the ratio 5: 3 respectively.

Efficiency ratio, A: D = 5: 3

Time ratio, A: D = 3: 5

$$\text{Then, } A = 3D/5$$

From statement II: Efficiencies of B and C are in the ratio 2: 3 respectively.

Efficiency ratio, B: C = 2: 3

Time ratio, B: C = 3: 2

$$\text{Then, } B = 3C/2$$

From statement III: Efficiency of D and C are in the ratio 1: 2 respectively.

Efficiency ratio, D: C = 1: 2

Time ratio, D: C = 2: 1

$$D = 2C$$

$$\text{Then, } 2C = 4C/(C - 8)$$

$$C = 10 \text{ days}$$

$$\text{And, } D = 2C = 2 \times 10 = 20 \text{ days}$$

From statement I and II:

$$(1/A) + (1/B) = (1/4) - (1/C)$$

$$(5/3D) + (2/3C) = (1/4) - (1/C)$$

$$D = 20C/(3C - 20)$$

$$\text{Then, } D = 4C/(C - 8) = 20C/(3C - 20)$$

$$C = 10 \text{ days}$$

$$\text{And, } D = 4C/(C - 8) = 4 \times 10/(10 - 8) = 20 \text{ days}$$

Hence, either statement III alone is sufficient or statement I and II together are sufficient.

8. Answer: D)

Let CP of watch = Rs. c

$$\text{Then, CP of radio} = 164\% \text{ of } c = 1.64c$$

$$\text{Total selling price} = 14760 = \text{SP of watch} + \text{SP of radio}$$

$$\text{SP of watch} = 14760 - \text{SP of radio}$$

Let marked price of radio and watch are M_r and M_w respectively.

From statement I: After giving a discount of 12% on marked price of radio, shopkeeper sold the radio at Rs.2020 more than the marked price of watch.

$$\text{Then, SP of radio} = 88\% \text{ of } M_r = M_w + 2020$$

From statement II: Shopkeeper marked radio at 40% above its cost price and allowed a discount of Rs.1260 on its marked price.

$$M_r = 140\% \text{ of } 1.64c = 2.296c$$

$$\text{Discount} = 1260$$

$$\text{Then, SP of radio} = 2.296c - 1260$$

From statement III: Rashmi bought watch at Rs.3280 less than radio and shopkeeper received a profit of 14.8% on watch.

SP of watch = SP of radio - 3280

And, SP of watch = 14760 - SP of radio

Then, SP of radio - 3280 = 14760 - SP of radio

SP of radio = 9020

Then, SP of watch = 9020 - 3280 = 5740

Profit% on watch = 14.8%

Then, CP of watch = $c = 5740 \times (100/114.8) = 5000$

Then, CP of radio = $1.64c = 1.64 \times 5000 = \text{Rs.}8200$

From statements I and II:

SP of radio = 88% of $M_r = M_w + 2020$

SP of radio = $2.296c - 1260$

$88\% \text{ of } M_r = M_w + 2020 = 2.296c - 1260$

since we don't know the profit %, we cannot determine the CP of the article.

Given data in statements I and II together are not sufficient.

Hence, only statement III alone is sufficient to find the answer.

9. Answer: A)

Let ages of Priya, Vishnu and Malti are A, B and C years.

LCM of ages of Priya and Vishnu is 45 and HCF of ages of Vishnu and Malti is 5. Then,

$\text{LCM of A and B} = AB/\text{HCF (A,B)} = 45$

Then, $\text{HCF (A,B)} = AB/45$

$\text{HCF (B,C)} = 5$

From statement I: Average of ages of Priya, Malti and Vishnu is $11(1/3)$.

$A + B + C = 3 \times 34/3 = 34$

From statement II: LCM of ages of Priya, Malti and Vishnu is 90.

$\text{LCM of A, B and C} = (ABC * \text{HCF (A,B,C)})/(\text{HCF (A,B)} * \text{HCF (B,C)} * \text{HCF (A,C)}) = 90$

$(ABC * \text{HCF (A,B,C)})/(AB/45) * 5 * \text{HCF (A,C)} = 90$

$\text{HCF (A,B,C)} = 10 * \text{HCF (A,C)}/C$

From statement III: Product of ages of Priya and Malti is 90 and age of Priya after 3 years will be 12.

Then, $AC = 90$

$A = 12 - 3 = 9$

Then, $C = 90/9 = 10$

From statement I and II:

$A + B + C = 34$

$\text{HCF (A,B,C)} = 10 * \text{HCF (A,C)}/C$

From statement I and III:

$A = 9, C = 10$

Then, $B = 34 - 9 - 10 = 15$

So, $\text{HCF of A, B and C} = 1$

From statement II and III:

$\text{HCF (A,B,C)} = 10 * \text{HCF (A,C)}/C$

$A = 9$

$C = 10$

Then, $\text{HCF (A,C)} = 1$

$\text{HCF (A,B,C)} = 10 * 1/10 = 1$