CAT 2017 Question Paper with Solution
Slot 1 DILR

1.

|||Common|||

Direction: Read the information given below and answer the question that follows.

Healthy Bites is a fast food joint serving three items: burgers, fries, and ice cream. It has two employees Anish and Bani who prepare the items ordered by the clients. Preparation time is 10 minutes for a burger and 2 minutes for an order of ice cream. An employee can prepare only one of these items at a time. The fries are prepared in an automatic fryer which can prepare up to 3 portions of fries at a time, and takes 5 minutes irrespective of the number of portions. The fryer does not need an employee to constantly attend to it, and we can ignore the time taken by an employee to start and stop the fryer. Thus, an employee can be engaged in preparing other items while the frying is on. However, fries cannot be prepared in anticipation of future orders.

Healthy Bites wishes to serve the orders as early as possible. The individual items in any order are served as and when ready. However, the order is considered to be completely served only when all the items of that order are served.

The table below gives the orders of three clients and the times at which they placed their orders:

Client No.	Time	Order
1	10:00	1 burger, 3 portions of fries, 1 order of ice cream
2	10:05	2 portions of fries, 1 order of ice cream
3	10:07	1 burger, 1 portion of fires

|||End|||
Assume that only one client's order can be processed at any given point of time. So, Anish or Bani cannot start preparing a new order while a previous order is being prepared.

At what time is the order placed by Client 1 completely served?
A. 10:17
B. 10:10
C. 10:15
D. 10:20

Answer: B

Solution:

As the item which takes the maximum time is burger, i.e., 10 minutes, Client 1 will be served their entire order by 10:10.

2. Assume that only one client's order can be processed at any given point of time. So, Anish or Bani cannot start preparing a new order while a previous order is being prepared.

At what time is the order placed by Client 3 completely served?

A. 10:35
B. 10:22
C. 10:25
D. 10:17

Answer: C

Solution:

The time taken to prepare the orders for the different clients are

Client no: 1 – 10.00 – 10.10 (burger- 10 mins)

Client no: 2 – 10.10 – 10.15 (fries – 5 mins)

Client no: 3 – 10.15 – 10.25 (burger – 10 mins)

3. Suppose the employees are allowed to process multiple orders at a time, but the preference would be to finish orders of clients who placed their orders earlier.

At what time is the order placed by Client 2 completely served?

A. 10:10
B. 10:12
C. 10:15
D. 10:17

Answer: A

Solution:

When they are allowed to process multiple orders, the time taken would be

Client no: 1 – 10.00 – 10.10 (Assume Anish prepared burger)

Client no: 2 – 10.05 – 10.10 (Bani prepared fries)

Client 2 will be served their entire order by 10:10.

4. Suppose the employees are allowed to process multiple orders at a time, but the preference would be to finish orders of clients who placed their orders earlier.

Also assume that the fourth client came in only at 10:35. Between 10:00 and 10:30, for how many minutes is exactly one of the employees idle?

A. 7
B. 10
C. 15
D. 23

Answer: B

Solution:

Anish prepares a burger for the first client which will be ready by 10:10.
Bani will serve ice-cream by 10:02.
She will be idle upto 10:05 (as the second order comes at 10:05).
Bani will be idle for 3 minutes.
Bani will prepare ice-cream (10:05 to 10:07) and after that from 10:07 to 10:17, she will prepare a burger for client 3.
From 10:10 to 10:17, Anish will be idle for 7 minutes.
After 10:17, both Anish and Bani will be idle upto 10:35 (till next order comes).
Hence, from 10:00 to 10:30, exactly one employee will be idle for 3 + 7, i.e., 10 minutes.

###TOPIC###Logical Reasoning||Logical Sequence||Logical Sequence###

5.

|||Common|||

Direction: Study the table/s given below and answer the question that follows.

A study to look at the early teaming of rural kids was carried out in a number of villages spanning three states, chosen from the North East (NE), the West (W) and the South (S). 50 four-year old kids from each of the 150 villages from NE, 250 villages from W and 200 villages from S were included in the study. It was found

that of the 30000 kids surveyed, 55% studied in primary schools run by the government (G), 37% in private schools (P) while the remaining 8% did not go to school (O).

The kids surveyed were further divided into two groups based on whether their mothers dropped out of school before completing primary education. The table below gives the number of kids in different types of schools for mothers who dropped out of school before completing primary education:

	G	P	O	Total
NE	4200	500	300	5000
W	4200	1900	1200	7300
S	5100	300	300	5700
Total	13500	2700	1800	18000

It is also known that:

1) In S, 60% of the surveyed kids were in G. Moreover, in S, all surveyed kids whose mothers had completed primary education were in school.

2) In NE, among the O kids, 50% had mothers who had dropped out before completing primary education.

3) The number of kids in G in NE was the same as the number of kids in G in W.

|||End|||
What percentage of kids from S were studying in P?
A. 37%
B. 6%
C. 79%
D. 56%

Answer: A

Solution:

From the given data, we get the following table:

	G		P		O		Total
	Dropped out	Completed	Dropped out	Completed	Dropped out	Completed	
NE	4200	1050	500	1150	300	300	7500
W	4200	1050	1900	3850	1200	300	12500
S	5100	900	300	3400	300	0	10000
Total	13,500	3000	2700	8400	1800	600	30000

300 + 3400 = 3700 students from S were studying in P
Required percentage = $\frac{3700}{10000}$ = 37%

6. Among the kids in W whose mothers had completed primary education, how many were not in school?

A. 300

B. 1200

C. 1050

D. 1500

Answer: A

Solution:

From the given data, we get the following table.

	G		P		O		Total
	Dropped out	Completed	Dropped out	Completed	Dropped out	Completed	
NE	4200	1050	500	1150	300	300	7500
W	4200	1050	1900	3850	1200	300	12500
S	5100	900	300	3400	300	0	10000
Total	13,500	3000	2700	8400	1800	600	30000

In W, 300 kids whose mothers had completed primary education were not in school.

7. In a follow-up survey of the same kids two years later, it was found that all the kids were now in school. Of the kids who were not in school earlier, in one region,

25% were in G now, whereas the rest were enrolled in P; in the second region, all such kids were in G now; while in the third region, 50% of such kids had now joined G while the rest had joined P. As a result, in all three regions put together, 50% of the kids who were earlier out of school had joined G. It was also seen that no surveyed kid had changed schools.

What number of the surveyed kids now were in G in W?

A. 6000

B. 5250

C. 6750

D. 6300

Answer: A

Solution:

From the given data, we get the following table:

	G		P		O		Total
	Dropped out	Completed	Dropped out	Completed	Dropped out	Completed	
NE	4200	1050	500	1150	300	300	7500
W	4200	1050	1900	3850	1200	300	12500
S	5100	900	300	3400	300	0	10000
Total	13,500	3000	2700	8400	1800	600	30000

2400 students who were not in school and now 1200 of them are in G.

Therefore, 50% of W = 50% of 1500 = 750

25% of NE = 25% of 600 = 150

100% of S = 100% of 300 = 300
Total = 750 + 150 + 300 = 1200

Therefore, 4200 + 1050 + 750 = 6000 students were in G in W.

8. In a follow-up survey of the same kids two years later, it was found that all the kids were now in school. Of the kids who were not in school earlier, in one region, 25% were in G now, whereas the rest were enrolled in P; in the second region, all

such kids were in G now; while in the third region, 50% of such kids had now joined G while the rest had joined P. As a result, in all three regions put together, 50% of the kids who were earlier out of school had joined G. It was also seen that no surveyed kid had changed schools.

What percentage of the surveyed kids in S, whose mothers had dropped out before completing primary education, were in G now?

A. 94.7%

B. 89.5%

C. 93.4%

D. Cannot be determined from the given information

Answer: A

Solution:

From the given data, we get the following table.

	G		P		O		Total
	Dropped out	Completed	Dropped out	Completed	Dropped out	Completed	
NE	4200	1050	500	1150	300	300	7500
W	4200	1050	1900	3850	1200	300	12500
S	5100	900	300	3400	300	0	10000
Total	13,500	3000	2700	8400	1800	600	30000

All 300 in S who were not going to school, now shifted to G (from the previous question).
5700 students' mothers had dropped out in S regions.

Hence, 5400 are in G.

###TOPIC###Data Interpretation||Tables||Tables###

9.

|||Common|||

Direction: Read the information given below and answer the question that follows.

Applicants for the doctoral programmes of Ambi Institute of Engineering (AIE) and Bambi Institute of Engineering (BIE) have to appear for a Common Entrance Test (CET). The test has three sections: Physics (P), Chemistry (C), and Maths (M). Among those appearing for CET, those at or above the 80th percentile in at least two sections, and at or above the 90th percentile overall, are selected for the Advanced Entrance Test (AET) conducted by AIE. AET is used by AIE for final selection.

For the 200 candidates who are at or above the 90th percentile overall based on CET, the following are known about their performance in CET:

1) No one is below the 80th percentile in all 3 sections.

2) 150 are at or above the 80th percentile in exactly two sections.

3) The number of candidates at or above the 80th percentile only in P is the same as the number of candidates at or above the 80th percentile only in C. The same is the number of candidates at or above the 80th percentile only in M.

4) Number of candidates below 80th percentile in P : Number of candidates below 80th percentile in C : Number of candidates below 80th percentile in M = 4 : 2 : 1

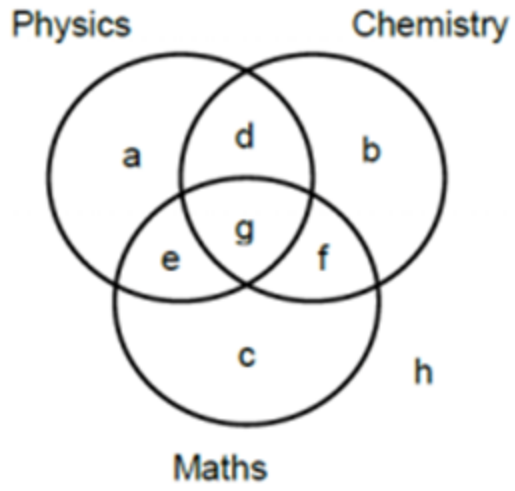
BIE uses a different process for selection. If any candidate is appearing in the AET by AIE, BIE considers their AET score for final selection provided the candidate has scored 80 percentile or more in P. Any other candidate at or above the 80 percentile in P in CET, but who is not eligible for the AET, is required to appear in a separate test to be conducted by BIE to be considered for final selection. Altogether, there are 400 candidates this year who have scored 80 percentile or more in P.

|||End|||
What best can be concluded about the number of candidates sitting for the separate test for BIE who were at or above the 90th percentile overall in CET?
A. 3 or 10
B. 10
C. 5
D. 7 or 10

Answer: A

Solution:

The Venn diagram shows the number of persons who scored above 80 percentile in CET in each of the three sections:



From 1, h = 0.

From 2, d + e + f = 150.

From 3, a = b = c.

We know that 3a + g = 200 – 150 = 50

From 4, (2a + f) : (2a + e) : (2a + d) = 4 : 2 : 1

Hence, 6a + (d + e + f) is a multiple of 7.

d + e + f = 150, 6a + 150 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7.

i.e., 6a + 3 is a multiple of 7 (as 147 is a multiple of 7).

Hence, a = 3, 10, 17, . . .

3a + g = 50
a = 3 or 10

We can calculate the values of the other variables for the two cases.

a = 3, d = 18, e = 42, f = 90, g = 41

a = 10, d = 10, e = 40, f = 100, g = 20

The candidates represented by d, e, f and g are selected for AET. Because, from the candidates who are at or above 90th percentile, the candidates who are at or above 80th percentile in at least two sections are selected for AET.

BIE will consider the candidates represented by d, e and g, which can be either 80 or 104.

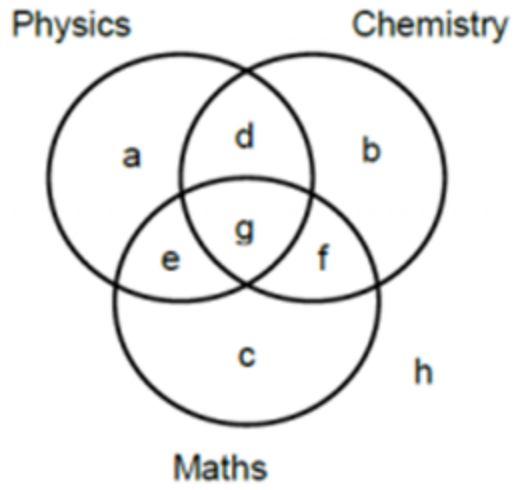
BIE will conduct a separate test for the other students who are at or above 80th percentile in P.
Out of them some have an overall percentile of >90 which is represented by a, i.e., 3 or 10.

10. If the number of candidates who are at or above the 90th percentile overall and also at or above the 80th percentile in all three sections in CET is actually a multiple of 5, what is the number of candidates who are at or above 90 percentile overall and at or above the 80 percentile in both P and M in CET?

Answer: 60

Solution:

The Venn diagram shows the number of persons who scored above 80 percentile in CET in each of the three sections:



From 1, h = 0

From 2, d + e + f = 150

From 3, a = b = c

we know that, 3a + g = 200 – 150 = 50

From 4, (2a + f) : (2a + e) : (2a + d) = 4 : 2 : 1

Hence, 6a + (d + e + f) is a multiple of 7.

d + e + f = 150, 6a + 150 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7 (as 147 is a multiple of 7).

Hence, a = 3, 10, 17, . . .

3a + g = 50
a = 3 or 10

We can calculate the values of the other variables for the two cases.

a = 3, d = 18, e = 42, f = 90, g = 41

a = 10, d = 10, e = 40, f = 100, g = 20

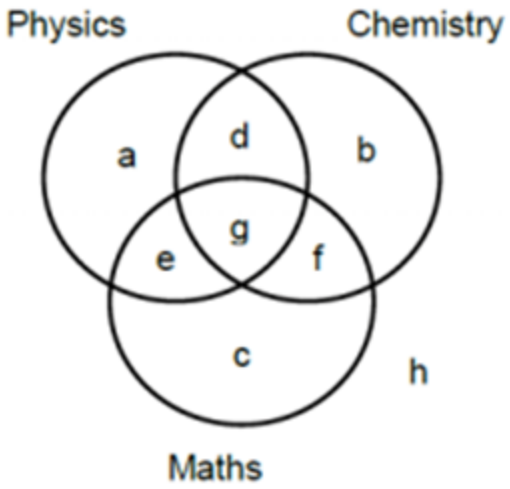
We know that g is a multiple of 5, i.e., g = 20.
The number of candidates who scored 90 percentile or more overall and those who scored 80 percentile or more in both P and M = g + e = 60.

11. If the number of candidates who have scored90 percentile or more overall and also those who have scored 80 percentile or more in all three sections in CET is actually a multiple of 5, then how many candidates were shortlisted for the AET for AIE?

Answer: 170

Solution:

The Venn diagram shows the number of persons who scored above 80 percentile in CET in each of the three sections:



From 1, h = 0.

From 2, d + e + f = 150

From 3, a = b = c

We know that, 3a + g = 200 – 150 = 50

From 4, (2a + f) : (2a + e) : (2a + d) = 4 : 2 : 1

Hence, 6a + (d + e + f) is a multiple of 7

d + e + f = 150, 6a + 150 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7.

i.e., 6a + 3 is a multiple of 7 (as 147 is a multiple of 7).

Hence, a = 3, 10, 17, . . .

3a + g = 50.
a = 3 or 10.

We can calculate the values of the other variables for the two cases.

a = 3, d = 18, e = 42, f = 90, g = 41

a = 10, d = 10, e = 40, f = 100, g = 20

The candidates represented by d, e, f, and g are selected for AET. Because, from the candidates who have scored 90 percentile or more, the candidates who have scored 80 percentile or more in at least two sections are selected for AET.

Here, g = 20.

Number of candidates shortlisted for AET = d + e + f + g = 10 + 40 + 100 + 20 = 170

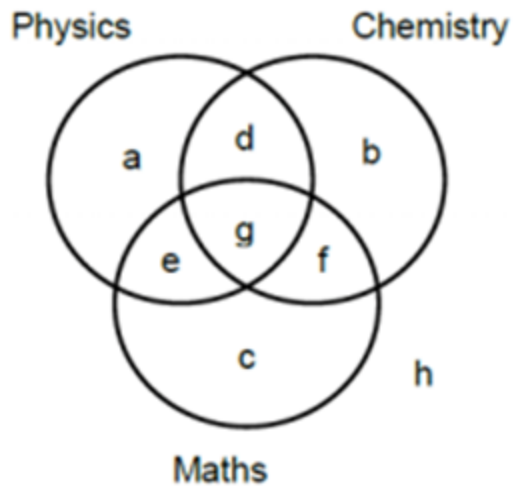
12. If the number of candidates who score 90 percentile or more overall and also those who score 80 percentile or more in P in CET is more than 100, then how many candidates had to sit for the separate test for BIE?

A. 299
B. 310
C. 321
D. 330

Answer: A

Solution:

The Venn diagram shows the number of persons who scored above 80 percentile in CET in each of the three sections:



From 1, h = 0

From 2, d + e + f = 150

From 3, a = b = c

we know that, 3a + g = 200 – 150 = 50

From 4, (2a + f):(2a + e):(2a + d) = 4:2:1

Hence, 6a + (d + e + f) is a multiple of 7.

d + e + f = 150, 6a + 150 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7,

i.e., 6a + 3 is a multiple of 7 (as 147 is a multiple of 7).

Hence, a = 3, 10, 17, . . .

3a + g = 50
a = 3 or 10

We can calculate the values of the other variables for the two cases.

a = 3, d = 18, e = 42, f = 90, g = 41

a = 10, d = 10, e = 40, f = 100, g = 20

So,the total number of students who got 80 percentile or more in P and also 90 percentile or more overall in CET= a + d + e + g = 80 or 104. Since the value is > 100, it has to be 104.
a = 3, d = 18, e = 42, f = 90, g = 41

Number of students in separate test = Total students who got 80 percentile or more in P – the number of students who got 80 percentile or more in P and also qualified for AET
= 400 - (d + e + g)
= 400 -(18 +42 + 41)
= 299

###TOPIC###Logical Reasoning||Venn Diagrams||Venn Diagrams###

13.

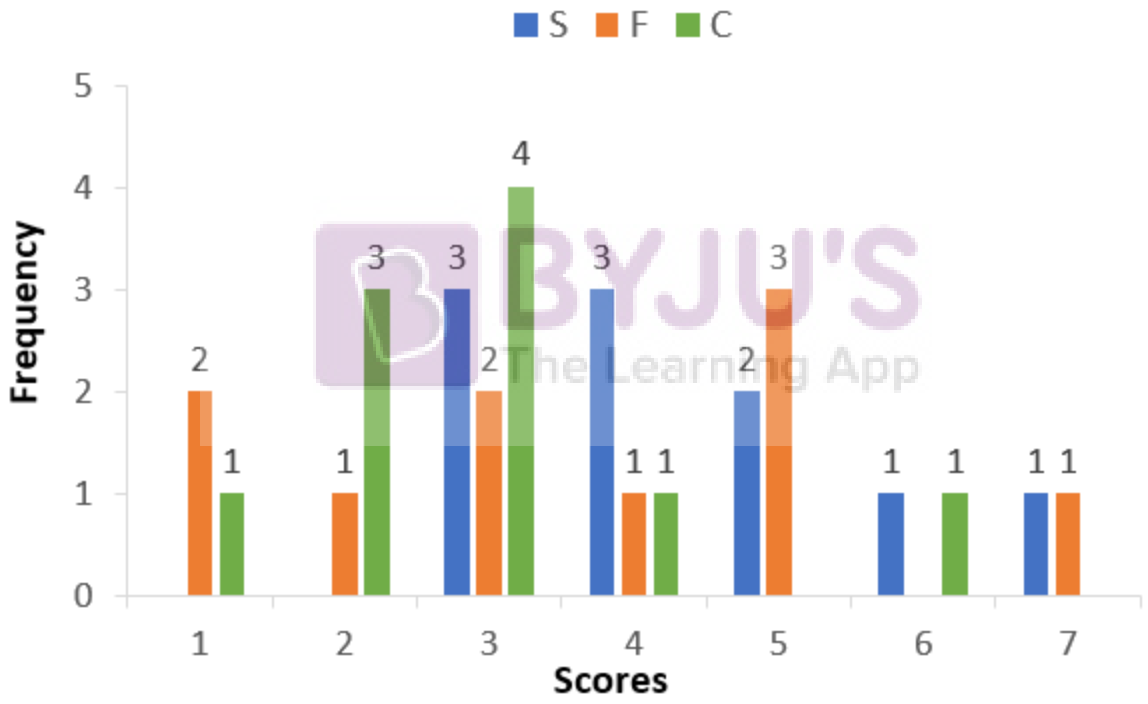
|||Common|||

Direction: Analyse the graphs given below and answer the question that follows.

Simple Happiness Index (SHI) of a country is computed on the basis of three parameters: social support (S), freedom to life choices (F), and corruption perception (C). Each of these three parameters is measured on a scale of 0 to 8 (integers only). A country is then categorized based on the total score obtained by summing the scores of all the three parameters, as shown in the following table:

Total Score	0-4	5-8	9-13	14-19	20-24
Category	Very Unhappy	Unhappy	Neutral	Happy	Very Happy

The following diagram depicts the frequency distribution of the scores in S, F, and C of 10 countries: Amda, Benga, Calla, Delma, Eppa, Varsa, Wanna, Xanda, Yanga and Zoorna.



Further, the following are known:

1) Amda and Calls jointly have the lowest total score, 7, with identical scores in all the three parameters.

2) Zooma has a total score of 17.

3) All the 3 countries, which are categorised as happy, have the highest score in exactly one parameter.

|||End|||
What is Amda's score in F?

Answer: 1

Solution:

The given data can be represented in a table as follows.

Scores	S	F	C
1		2	1
2		1	3
3	3	2	4
4	3	1	1
5	2	3	
6	1		1
7	1	1	
Total	10	10	10

Amda and Calla had a total score of 7, with identical scores in all these parameters.

The possibilities are 1, 2, and 4 or 3, 3, and 1.
Zooma's score = 17
All three countries in the happy category had the highest score in exactly one parameter.
Zooma can only have a 7 in F, 6 in S, and 4 in C as a score of 7 in S and 6 in C would be the scores of the other two countries.
Zooma cannot have a 7, 7, and 5 as there is no country which scored a 5 in C.
Amda can have a distribution of 3, 3, 1 or 4, 2, 1.
In either case, the only possible score of F is 1.

14.What is Zooma's score in S?

Answer: 6

Solution:

The given data can be represented in a table as follows.

Scores	S	F	C
1		2	1
2		1	3
3	3	2	4
4	3	1	1
5	2	3	
6	1		1
7	1	1	
Total	10	10	10

Amda and Calla had a total score of 7, with identical scores in all these parameters.

The possibilities are 1, 2, and 4 or 3, 3, and 1.
Zooma's score = 17
All three countries in the happy category had the highest score in exactly one parameter.
Zooma can only have a 7 in F, 6 in S, and 4 in C as a score of 7 in S and 6 in C would be the scores of the other two countries.
Zooma cannot have a 7, 7, and 5 as there is no country which scored a 5 in C.
Hence, Zooma's score in S has to be 6.

15. Benga and Delma, two countries categorized as happy, are tied with the same total score. What is the maximum score they can have?

A. 14
B. 15
C. 16
D. 17

Answer: B

Solution:

The given data can be represented in a table as follows.

Scores	S	F	C
1		2	1
2		1	3
3	3	2	4
4	3	1	1
5	2	3	
6	1		1
7	1	1	
Total	10	10	10

Amda and Calla had a total score of 7, with identical scores in all these parameters.

The possibilities are 1, 2, and 4 or 3, 3, and 1.
Zooma's score = 17
All three countries in the happy category had the highest score in exactly one parameter.
Zooma can only have a 7 in F, 6 in S, and 4 in C as a score of 7 in S and 6 in C would be the scores of the other two countries.
Zooma cannot have a 7, 7 and 5 as there is no country which scored a 5 in C.

In the table given, among the highest scores, a score of 7 in F, 6 in S, and 4 in S were the scores of Zooma.
The best possible scores remaining for Benga and Dalma would be

Benga	Dalma
S – 5	S – 7
C – 6	C – 3
F – 5	F – 5
16	15

As it is given that both had the same total score, it can only be 15. Hence, Benga's score in S or F was one less than the maximum possible score.

16. If Benga scores 16 and Delma scores 15, then what is the maximum number of countries with a score of 13?

A. 0
B. 1
C. 2
D. 3

Answer: B

Solution:

The given data can be represented in a table as follows.

Scores	S	F	C
1		2	1
2		1	3
3	3	2	4
4	3	1	1
5	2	3	
6	1		1
7	1	1	
Total	10	10	10

Amda and Calla had a total score of 7, with identical scores in all these parameters.

The possibilities are 1, 2 and 4 or 3, 3 and 1.
Zooma's score = 17.
All three countries in the happy category had the highest score in exactly one parameter.
Zooma can only have a 7 in F, 6 in S, and 4 in C as a score of 7 in S and 6 in C would be the scores of the other two countries.
Zooma cannot have a 7, 7, and 5 as there is no country which scored a 5 in C.

Considering the score of Zooma, Benga and Delma as 17, 16 and 15, we get

	S	F	C	Total
Zoom	6	7	4	17
Benga	5	5	6	16
Delma	7	5	3	15

In the table given, among the highest scores, a score of 7 in F, 6 in S, and 4 in S were the scores of Zooma.

The best possible scores remaining for Benga and Dalma would be

Benga	Dalma
S – 5	S – 7
C – 6	C – 3
F – 5	F – 5
16	15

If Benga's score is 16 and Dalma's score is 15, the maximum possible values remaining are

Score	S	F	C
3	3	2	3
4	3	1	0
5	1	1	0

From the above table, the score of 13 can be for only one city.

###TOPIC###Data Interpretation||Bar Charts||Bar Charts###

17.

|||Common|||

Direction: Read the information given below and answer the question that follows.

There are 21 employees working in a division, out of whom 10 are special-skilled employees (SE) and the remaining are regular-skilled employees (RE). During the next five months, the division has to complete five projects every month. Out of the 25 projects, 5 projects are "challenging", while the remaining ones are "standard". Each of the challenging projects has to be completed in different months. Every month, five teams - T1, T2, T3, T4 and T5, work on one project each. T1, T2, T3, T4 and T5 are allotted the challenging project in the first, second, third, fourth and fifth month, respectively. The team assigned the challenging project has one more employee than the rest.

In the first month, T1 has one more SE than T2, T2 has one more SE than T3, T3 has one more SE than T4, and T4 has one more SE than T5. Between two successive months, the composition of the teams changes as follows:

a. The team allotted the challenging project gets two SEs from the team which was allotted the challenging project in the previous month. In exchange, one RE is shifted from the former team to the latter team.

b. After the above exchange, if T1 has any SE and T5 has any RE, then one SE is shifted from T1 to T5, and one RE is shifted from T 5 to T1. Also, if T2 has any SE and T4 has any RE, then one SE is shifted from T2 to T4, and one RE is shifted from T 4 to T2.

Each standard project has a total of 100 credit points, while each challenging project has 200 credit points. The credit points are equally shared between the employees included in that team.

|||End|||
The number of times in which the composition of team T2 and the number of times in which composition of team T4 remained unchanged in two successive months are:
A. (2, 1)
B. (1, 0)

C. (0, 0)
D. (1, 1)

Answer: B

Solution:

Given that there are 10 SEs and 11 REs.

The number of SEs in T1, T2, T3, T4, and T5 must be 4, 3, 2, 1, and 0, respectively.

The team that is assigned the challenging project will have 5 employees while the other teams will have 4 employees.

T1 is assigned the challenging project in the first month. Hence, T1 will have 5 employees, and the other teams will have 4 employees each.

The following table provides the composition of the teams in the first month:

Team	SE	RE	Total
T1	4	1	5
T2	3	1	4
T3	2	2	4
T4	1	3	4
T5	0	4	4

In the second month, T2 will be allotted the challenging project.

From a, two SEs will be shifted from T1 to T2. One RE is shifted from T2 to T1.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1. Similar transfers will happen between T2 and T4.

The following table provides the number of employees in each team in the second month:

Team	SE	RE	Total
T1	1	3	4
T2	4	1	5
T3	2	2	4
T4	2	2	4
T5	1	3	4

In the third month, T3 will be allotted the challenging project.

From a, two SEs will be shifted from T2 to T3. One RE is shifted from T3 to T2.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1.

And one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the third month:

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	4	1	5
T4	3	1	4
T5	2	2	4

In the fourth month, T4 will be allotted the challenging project.

From a, two SEs will be shifted from T3 to T4. One RE is shifted from T4 to T3.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

One SE must be shifted from T2 to T4 and one RE must be shifted from T4 to T2. There are no REs in T4. Hence, this shifting will also not happen.

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	2	2	4
T4	5	0	5
T5	2	2	4

In the fifth month, T5 will be allotted the challenging project.

From a, two SEs will be shifted from T4 to T5. One RE is shifted from T5 to T4.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

Also, one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the fifth month:

Team	SE	RE	Total
T1	0	4	4
T2	0	4	4
T3	2	2	4
T4	4	0	4
T5	4	1	5

The composition of T2 did not change once between the third and the fourth months and the composition of T4 changed between any two successive months.

Hence, the number of times in which the composition of team T2 and the number of times in which composition of team T4 remained unchanged in two successive months are (1, 0).

18.The number of SE in T1 and T5 for the projects in the third month are, respectively,:

A. (0, 2).

B. (0, 3).

C. (1, 2).

D. (1, 3).

Answer: A

Solution:

Given that there are 10 SEs and 11 REs.

The number of SEs in T1, T2, T3, T4, and T5 must be 4, 3, 2, 1, and 0.

The team that is assigned the challenging project will have 5 employees while the other teams will have 4 employees.

T1 is assigned the challenging project in the first month. Hence, T1 will have 5 employees and the other teams will have 4 employees each.

The following table provides the composition of the teams in the first month:

Team	SE	RE	Total
T1	4	1	5
T2	3	1	4
T3	2	2	4
T4	1	3	4
T5	0	4	4

In the second month, T2 will be allotted the challenging project.

From a, two SEs will be shifted from T1 to T2. One RE is shifted from T2 to T1.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1. Similar transfers will happen between T2 and T4.

The following table provides the number of employees in each team in the second month:

Team	SE	RE	Total
T1	1	3	4
T2	4	1	5
T3	2	2	4
T4	2	2	4
T5	1	3	4

In the third month, T3 will be allotted the challenging project.

From a, two SEs will be shifted from T2 to T3. One RE is shifted from T3 to T2.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1.

And one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the third month:

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	4	1	5
T4	3	1	4
T5	2	2	4

In the fourth month, T4 will be allotted the challenging project.

From a, two SEs will be shifted from T3 to T4. One RE is shifted from T4 to T3.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

One SE must be shifted from T2 to T4 and one RE must be shifted from T4 to T2. There are no REs in T4. Hence, this transfer will also not happen.

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	2	2	4
T4	5	0	5
T5	2	2	4

In the fifth month, T5 will be allotted the challenging project.

From a, two SEs will be shifted from T4 to T5. One RE is shifted from T5 to T4.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1, hence, this will not happen.

Also, one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the fifth month:

Team	SE	RE	Total
T1	0	4	4
T2	0	4	4
T3	2	2	4
T4	4	0	4
T5	4	1	5

Hence, the number of SE in T1 and T5 for the projects in the third month are 0, 2, respectively.

19. Which of the following CANNOT be the total credit points earned by any employee from the projects?

A. 140

B. 150

C. 170

D. 200

Answer: B

Solution:

Given that there are 10 SEs and 11 REs.

The number of SEs in T1, T2, T3, T4, and T5 must be 4, 3, 2, 1, and 0.

The team that is assigned the challenging project will have 5 employees, while the other teams will have 4 employees.

T1 is assigned the challenging project in the first month. Hence, T1 will have 5 employees, and the other teams will have 4 employees each.

The following table provides the composition of the teams in the first month:

Team	SE	RE	Total
T1	4	1	5
T2	3	1	4
T3	2	2	4
T4	1	3	4
T5	0	4	4

In the second month, T2 will be allotted the challenging project.

From a, two SEs will be shifted from T1 to T2. One RE is shifted from T2 to T1.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1. Similar transfers will happen between T2 and T4.

The following table provides the number of employees in each team in the second month:

Team	SE	RE	Total
T1	1	3	4
T2	4	1	5
T3	2	2	4
T4	2	2	4
T5	1	3	4

In the third month, T3 will be allotted the challenging project.

From a, two SEs will be shifted from T2 to T3. One RE is shifted from T3 to T2.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1.

And one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the third month:

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	4	1	5
T4	3	1	4
T5	2	2	4

In the fourth month, T4 will be allotted the challenging project.

From a, two SEs will be shifted from T3 to T4. One RE is shifted from T4 to T3.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

One SE must be shifted from T2 to T4 and one RE must be shifted from T4 to T2. There are no REs in T4. Hence, this transfer will also not happen.

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	2	2	4
T4	5	0	5
T5	2	2	4

In the fifth month, T5 will be allotted the challenging project.

From a, two SEs will be shifted from T4 to T5. One RE is shifted from T5 to T4.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

Also, one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the fifth month:

Team	SE	RE	Total
T1	0	4	4
T2	0	4	4
T3	2	2	4
T4	4	0	4
T5	4	1	5

Credits for the challenging projects = 200 credits and for the standard projects = 100 credits.
In each type of project, the credits are equally shared by the employees in the team. Hence, for a challenging project, an employee earns 200/5 = 40 credits.

For a standard project, an employee earns 100/4 = 25 credits.

The number of challenging and standard projects an employee can work on are (5,0) or (4,1) or (3,2) or (2,3) or (1,4) or (0,5).

In each case, an employee will earn 200 or 185 or 170 or 155 or 140 or 125 credits.
Hence, it is impossible for an employee to earn 150 credits.

20. One of the employees named Aneek scored 185 points. Which of the following CANNOT be true?

A. Aneek worked only in Teams T1, T2, T3, T4

B. Aneek worked only in Teams T1, T2, T4, T5

C. Aneek worked only in Teams T2, T3, T4, T5

D. Aneek worked only in Teams T1, T3, T4, T5

Answer: D

Solution:

Given that there are 10 SEs and 11 REs.

The number of SEs in T1, T2, T3, T4, and T5 must be 4, 3, 2, 1, and 0.

The team that is assigned the challenging project will have 5 employees, while the other teams will have 4 employees.

T1 is assigned the challenging project in the first month. Hence, T1 will have 5 employees, and the other teams will have 4 employees each.

The following table provides the composition of the teams in the first month:

Team	SE	RE	Total
T1	4	1	5
T2	3	1	4
T3	2	2	4
T4	1	3	4
T5	0	4	4

In the second month, T2 will be allotted the challenging project.

From a, two SEs will be shifted from T1 to T2. One RE is shifted from T2 to T1.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1. Similar transfers will happen between T2 and T4.

The following table provides the number of employees in each team in the second month:

Team	SE	RE	Total
T1	1	3	4
T2	4	1	5
T3	2	2	4
T4	2	2	4
T5	1	3	4

In the third month, T3 will be allotted the challenging project.

From a, two SEs will be shifted from T2 to T3. One RE is shifted from T3 to T2.

From b, one SE will be shifted from T1 to T5, one RE will be shifted from T5 to T1.

And one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the third month:

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	4	1	5
T4	3	1	4
T5	2	2	4

In the fourth month, T4 will be allotted the challenging project.

From a, two SEs will be shifted from T3 to T4. One RE is shifted from T4 to T3.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1. Hence, this will not happen.

One SE must be shifted from T2 to T4 and one RE must be shifted from T4 to T2. There are no REs in T4. Hence, this transfer will also not happen.

Team	SE	RE	Total
T1	0	4	4
T2	1	3	4
T3	2	2	4
T4	5	0	5
T5	2	2	4

In the fifth month, T5 will be allotted the challenging project.

From a, two SEs will be shifted from T4 to T5. One RE is shifted from T5 to T4.

From b, one SE must be shifted from T1 to T5. There are no SEs in T1, hence, this will not happen.

Also, one SE will be shifted from T2 to T4 and one RE will be shifted from T4 to T2.

The following table provides the number of employees in each team in the fifth month:

Team	SE	RE	Total
T1	0	4	4
T2	0	4	4
T3	2	2	4
T4	4	0	4
T5	4	1	5

Since Aneek secured 185 credits, he worked in four challenging projects and one standard project.

Option A is possible:

	Month	Project
T1	1st	Challenging
T2	2nd	Challenging
T3	3rd	Challenging
T4	4th	Challenging
T4	5th	Standard

Option B is possible:

	Month	Project
T1	1st	Challenging
T2	2nd	Challenging
T3	3rd	Standard
T4	4th	Challenging
T5	5th	Challenging

Option C is possible:

	Month	Project
T2	1st	Standard
T2	2nd	Challenging
T3	3rd	Challenging
T4	4th	Challenging
T5	5th	Challenging

Option D is not possible:

T1	1st	Challenging
T1/T5	2nd	Challenging

In this, he cannot work in T3 without working in T2 first. If we assume that he worked in T3 in the first month, he could not have worked in four teams in the five months.

21.

|||Common|||

Direction: Read the information given below and answer the question that follows.

In a square layout of size 5m × 5m, 25 equal-sized square platforms of different heights are built. The heights (in metres) of individual platforms are as shown below:

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

Individuals (all of the same height) are seated on these platforms. We say an individual A can reach an individual B if all the three following conditions are met:

(i) A and B are in the same row or column.

(ii) A is at a lower height than B.

(iii) If there is/are any individual(s) between A and B, such individual(s) must be at a height lower than that of A.

Thus, in the table given above, consider the individual seated at height 8 on the 3rd row and 2nd column. He can be reached by four individuals. He can be reached by the individual on his left at height 7, by the two individuals on his right at heights of 4 and 6 and by the individual above at height 5.

Rows in the layout are numbered from top to bottom and columns are numbered from left to right.

|||End|||
How many individuals in this layout can be reached by just one individual?
A. 3
B. 5
C. 7

D. 8

Answer: C

Solution:

The heights of the platforms given are as below.

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

The number of persons who can be reached by just one individual is highlighted.

6	1	**2**	4	3
9	5	3	2	8
7	8	**4**	6	**5**
3	9	5	1	**2**
1	7	6	**3**	9

A total of 7 persons can be reached by just one individual.

22. Which of the following is true for any individual at a platform of height 1 m in this layout?

A. They can be reached by all the individuals in their own row and column.

B. They can be reached by at least 4 individuals.

C. They can be reached by at least one individual.
D. They cannot be reached by anyone.

Answer: D

Solution:

The heights of the platforms given is as below.

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

For any individual at a platform of height 1 m in this layout, they cannot be reached by anyone.

23. We can find two individuals who cannot be reached by anyone in

A. the last row.
B. the fourth row.
C. the fourth column.
D. the middle column.

Answer: C

Solution:

The heights of the platforms given are as below.

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

In the fourth column, we can find the two individuals (height 2 and height 1) who cannot be reached by anyone.

24. Which of the following statements is true about this layout?

A. Each row has an individual who can be reached by 5 or more individuals.
B. Each row has an individual who cannot be reached by anyone.
C. Each row has at least two individuals who can be reached by an equal number of individuals.

D. All individuals at the height of 9 m can be reached by at least 5 individuals.

Answer: C

Solution:

The heights of the platforms given are as below.

6	1	2	4	3
9	5	3	2	8
7	8	4	6	5
3	9	5	1	2
1	7	6	3	9

No individual in row 1 can be reached by 5 or more individuals. Hence, I is wrong.
Row 3 has no individual who cannot be reached by anyone. Hence, II is wrong.
The individual at height 9 in column 1 can be reached by only 4 individuals. Hence, IV is wrong.
Each row has at least two individuals who can be reached by an equal number of individuals – This is correct.

∴ Only Statement - 3 is correct.

25.

|||Common|||

Direction: Read the information given below and answer the question that follows.

A new airlines company is planning to start operations in the country. The company has identified ten different cities which they plan to connect through their network to start with. The flight duration between any pair of cities will be less than one hour. To start operations, the company has to decide on a daily schedule.

The underlying principle that they are working on is the following:

Any person staying in any of these 10 cities should be able to make a trip to any other city in the morning and should be able to return by the evening of the same day.

|||End|||
If the underlying principle is to be satisfied in such a way that the journey between

any two cities can be performed using only direct (non-stop) flights, then the minimum number of direct flights to be scheduled is:
A. 45.

B. 90.

C. 180.

D. 135.

Answer: C

Solution:

For any pair of cities, say P and Q, there must be a morning flight from P to Q, an evening flight from Q to P and a morning flight from Q to P and an evening flight from P to Q. Only then can a person from P or Q travel to Q or P and return the same day. Hence, there must be four flights between any pair of cities. Number of ways of selecting two cities from ten cities

$= {}^{10}C_2 = (10 \times 9)/2 = 45$

Hence, the minimum number of flights that must be scheduled $= 4 \times 45 = 180$.

26. Suppose three of the ten cities are to be developed as hubs. A hub is a city which is connected with every other city by direct flights each way, both in the morning as well as in the evening. The only direct flights which will be scheduled are originating and/or terminating in one of the hubs. Then the minimum number of direct flights that need to be scheduled so that the underlying principle of the airline to serve all the ten cities is met without visiting more than one hub during one trip is:

A. 54.
B. 120.
C. 96.
D. 60.

Answer: C

Solution:

Let the ten cities be represented by 1 through 10. Among these ten cities, consider 1, 2 and 3 to be hubs and the other seven cities to be non-hub cities. It is given that any direct flight should originate and/or terminate at a hub.

Consider city 4, which is not a hub. 4 should be connected to each of 1, 2 and 3.
Between 4 and each of 1, 2 and 3, there must be four flights .
Hence, from 4, there must be 4 × 3 = 12 flights to the three hubs, 1, 2 and 3.
Similarly, for each of the other six non-hub cities, there must be 12 flights connecting each non-hub city with the three hubs.
Hence, a total of 12 ×7 = 84 flights will connect a non-hub city with a hub.
The three hubs must be connected amongst themselves.
Since there must be four flights between any pair of cities, there must be a total of 3 × 4 = 12 flights connecting any pair of hubs.
Hence, the total minimum number of flights that should be scheduled = 84 + 12 = 96

27. Suppose the 10 cities are divided into 4 distinct groups G1,G2,G3,G4 having 3, 3, 2 and 2 cities respectively and that G1 consists of cities named A, B and C. Further, suppose that direct flights are allowed only between two cities satisfying one of the following:

a. Both cities are in G1

b. Between A and any city in G2

c. Between B and any city in G3

d. Between C and any city in G4

Then the minimum number of direct flights that satisfies the underlying principle of the airlines is

Answer: 40

Solution:

G2 cannot be connected by a direct flight to a city in G3 or G4.

For a person to travel from a city in G2 to a city in G3 or G4, all the cities in G2 must be connected to A and from A, he can travel to B or C to travel to a city G3 or G4, respectively.

Hence, A must be connected to the 3 cities in G2.
Hence, there must be 4 × 3 = 12 flights between cities in A and G2.

There are 2 cities in G3 and G4 each. There must be 2 × 4 = 8 flights between cities in G3 and B and between cities in G4 and C. A, B and C must be connected to each other. Hence, there are an additional 12 flights between these three cities.

The total minimum number of direct flights that must be scheduled = 12 + 8 + 8 + 12 = 40.

28. Suppose the 10 cities are divided into 4 distinct groups G1, G2, G3, G4 having 3, 3, 2 and 2 cities respectively and that G1 consists of cities named A, B and C. Further, suppose that direct flights are allowed only between two cities satisfying one of the following:

a. Both cities are in G1

b. Between A and any city in G2

c. Between B and any city in G3

d. Between C and any city in G4

However, due to operational difficulties at A, it was later decided that the only flights that would operate at A would be those to and from B. Cities in G2 would have to be assigned to G3 or to G

What would be the maximum reduction in the number of direct flights as compared to the situation before the operational difficulties arose?

Answer: 4

Solution:

G2 will be assigned to G3 or G4. The cities in G2 will still have to be connected to either B or C.
There are no flights between A and C. Hence, 4 flights that would have been scheduled in the previous case, will now not be scheduled.

Hence, the maximum reduction in the number of direct flights as compared to the situation before the operational difficulties arose is 4.

###TOPIC###Data Interpretation||Caselets||Caselets###

29.

|||Common|||

Direction: Read the information given below and answer the question that follows.

Four cars need to travel from Akala (A) to Bakala (B). Two routes are available, one via Mamur (M) and the other via Nanur (N). The roads from A to M, and from N to B, are both short and narrow. In each case, one car takes 6 minutes to cover the distance, and each additional car increases the travel time per car by 3 minutes because of congestion. (For example, if only two cars drive from A to M, each car takes 9 minutes.) On the road from A to N, one car takes 20 minutes, and each additional car increases the travel time per car by 1 minute. On the road from M to B, one car takes 20 minutes, and each additional car increases the travel time per car by 0.9 minute.

The police department orders each car to take a particular route in such a manner that it is not possible for any car to reduce its travel time by not following the order, while the other cars are following the order.

|||End|||
How many cars would be asked to take the route A-N-B, that is Akala-Nanur-Bakala route, by the police department?

Answer: 2

Solution:

There are four cars and two routes. Two cars should go through A-N-B and the other two through A-M-B. If one of them broke the rule, the travel time would increase. If 3 cars are allowed on the A-M-B route, one car can break the rule and reduce the travel time. Hence, 2 cars would be asked to take the route A-N-B.

30. If all the cars follow the police order, what is the difference in travel time (in minutes) between a car which takes the route A-N- B and a car that takes the route A-M-B?

A. 1

B. 0.1

C. 0.2

D. 0.9

Answer: B

Solution:

2 cars are allowed through A – N – B and A – M – B.
Time taken through A – M – B = 29.9 minutes and through A – N – B = 30 minutes.
The required difference = 0.1 minutes

31. A new one-way road is built from M to N. Each car now has three possible routes to travel from A to B: A-M-B, A-N-B and A-M-N-B. On the road from M to N, one car takes 7 minutes and each additional car increases the travel time per car by 1 minute. Assume that any car taking the A-M-N-B route travels the A-M portion at the same time as other cars taking the A-M-B route, and the N-B portion at the same time as other cars taking the A-N-B route.

How many cars would the police department order to take the A-M-N-B route so that it is not possible for any car to reduce its travel time by not following the order while the other cars follow the order? (Assume that the police department would never order all the cars to take the same route.)

Answer: 2

Solution:

Either two or three cars should go through A-M.
Case 1: 2 cars go through the M-B route.
One car can break the police order and go through M-N and reach B.
Time taken = 9 + 7 + 12 = 28 minutes
Case 2: Both went through the A-M-B route, time taken = 29.9 minutes.

Case 3: 2 cars go through A-M and one of them goes through M-N,
One of the cars that went through A-N can break the police order and had gone through A-M-B

Original time = 21 + 12 = 33 minutes.
Time saved = 33 – new time, i.e., 33 – (12 + 20.9) = 33 - 32.9 = 0.1 minute

Case 4: If both cars are directed to go through M-N, all four cars would go through N-B, which is not possible.

Case 5: If 3 cars are directed to go through A-M
either one or two cars can be directed through M-N.

Case 5a: If one car is directed through M-N
The car that was directed through M-B can break the police order and go through the M-N route.

Time saved = (12 + 20.9) – (12 + 8 + 12) = 0.9 minutes

Hence, the police department ordered 2 cars to take the A-M-N-B route so that it is not possible for any car to reduce its travel time by not following the order while the other cars follow the order, two cars must be directed through M-N such that any car breaking the police order cannot reduce the travel time.

32. A new one-way road is built from M to N. Each car now has three possible routes to travel from A to B: A-M-B, A-N-B and A-M-N-B. On the road from M to N, one car takes 7 minutes and each additional car increases the travel time per car by 1 minute. Assume that any car taking the A-M-N-B route travels the A-M portion at the same time as other cars taking the A-M-B route, and the N-B portion at the same time as other cars taking the A-N-B route.

If all the cars follow the police order, what is the minimum travel time (in minutes) from A to B? (Assume that the police department would never order all the cars to take the same route.)

A. 26
B. 32
C. 29.9
D. 30

Answer: B

Solution:

When all cars follow the police order the time taken would be
One car - A-M-B = $(6 + 3 \times 2) + 20$ = 32 minutes.
Two cars - A-M-N-B = $(6 + 3 \times 2) + (7 + 1) + (6 + 3 \times 2)$ = 32 minutes.
One car - A-N-B = $20 + (6 + 3 \times 2)$=32 minutes.

The minimum travel time from A to B is 32 minutes.

###TOPIC###Data Interpretation||Caselets||Caselets###