

DILR_CAT_2019_Slot 2

SET 1: Rifle Shooting

Ten players, as listed in the table below, participated in a rifle shooting competition comprising of 10 rounds. Each round had 6 participants.

Players numbered 1 through 6 participated in Round 1, players 2 through 7 in Round 2,..., players 5 through 10 in Round 5, players 6 through 10 and 1 in Round 6, players 7 through 10, 1 and 2 in Round 7 and so on.

Player No.	Player Name	Points after Round 6	Points after Round 10
1	Amita	8	18
2	Bala	2	5
3	Chen	3	6
4	David	6	6
5	Eric	3	10
6	Fatima	10	10
7	Gordon	17	17
8	Hansa	1	4
9	Ikea	2	17
10	Joshin	14	17

The top three performances in each round were awarded 7, 3 and 1 points respectively. There were no ties in any of the 10 rounds. The table below gives the total number of points obtained by the 10 players after Round 6 and Round 10.

The following information is known about Rounds 1 through 6:

- Gordon did not score consecutively in any two rounds.
- Eric and Fatima both scored in a round.

The following information is known about Rounds 7 through 10:

- Only two players scored in three consecutive rounds. One of them was Chen. No other player scored in any two consecutive rounds.
- Joshin scored in Round 7, while Amita scored in Round 10.
- No player scored in all the four rounds.

1. What were the scores of Chen, David, and Eric respectively after Round 3?

- A) 3, 0, 3 B) 3, 3, 0 C) 3, 3, 3 D) 3, 6, 3

2. Which three players were in the last three positions after Round 4?

- A) Hansa, Ikea, Joshin B) Bala, Chen, Gordon
 C) Bala, Ikea, Joshin D) Bala, Hansa, Ikea

3. Which player scored points in maximum number of rounds?

- A) Joshin B) Chen
 C) Ikea D) Amita

4. Which players scored points in the last round?

- A) Amita, Bala, Chen B) Amita, Chen, David
 C) Amita, Eric, Joshin D) Amita, Chen, Eric

SET 2: Languages spoken

In the table below, the check marks indicate all languages spoken by five people: Paula, Quentin, Robert, Sally and Terence. For example, Paula speaks only Chinese and English.

	Arabic	Basque	Chinese	Dutch	English	French
Paula			✓		✓	
Quentin				✓	✓	
Robert	✓					✓
Sally		✓			✓	
Terence			✓			✓

These five people form three teams, Team 1, Team 2 and Team 3. Each team has either 2 or 3 members. A team is said to speak a particular language if at least one of its members speak that language.

The following facts are known.

- (1) Each team speaks exactly four languages and has the same number of members.
- (2) English and Chinese are spoken by all three teams, Basque and French by exactly two teams and the other languages by exactly one team.
- (3) None of the teams include both Quentin and Robert.
- (4) Paula and Sally are together in exactly two teams.
- (5) Robert is in Team 1 and Quentin is in Team 3.

1. Who among the following four is not a member of Team 2?

- A) Sally B) Paula C) Quentin D) Terence

2. Who among the following four people is a part of exactly two teams?

- A) Sally B) Quentin C) Robert D) Paula

3. Who among the five people is a member of all teams?

- A) No one B) Terence C) Sally D) Paula

4. Apart from Chinese and English, which languages are spoken by Team 1?

- A) Basque and French B) Arabic and French
 C) Basque and Dutch D) Arabic and Basque

SET 3: Students & Proposals

Students in a college are discussing two proposals --

A: a proposal by the authorities to introduce dress code on campus, and

B: a proposal by the students to allow multinational food franchises to set up outlets on college campus.

A student does not necessarily support either of the two proposals.

In an upcoming election for student union president, there are two candidates in fray: Sunita and Ragini. Every student prefers one of the two candidates.

A survey was conducted among the students by picking a sample of 500 students. The following information was noted from this survey.

- 1) 250 students supported proposal A and 250 students supported proposal B.
- 2) Among the 200 students who preferred Sunita as student union president, 80% supported proposal A.
- 3) Among those who preferred Ragini, 30% supported proposal A.
- 4) 20% of those who supported proposal B preferred Sunita.
- 5) 40% of those who did not support proposal B preferred Ragini.
- 6) Every student who preferred Sunita and supported proposal B also supported proposal A.
- 7) Among those who preferred Ragini, 20% did not support any of the proposals.

1. Among the students surveyed who supported proposal A, what percentage preferred Sunita for student union president?

[TITA]

2. What percentage of the students surveyed who did not support proposal A Preferred Ragini as student union president?

[TITA]

3. What percentage of the students surveyed who supported both proposals A and B preferred Sunita as student union president?

- A) 25 B) 50 C) 40 D) 20

4. How many of the students surveyed supported proposal B, did not support proposal A and preferred Ragini as student union president?

- A) 40 B) 210 C) 200 D) 150

SET 4: MT & ET

The first year students in a business school are split into six sections. In 2019 the Business Statistics course was taught in these six sections by Annie, Beti, Chetan, Dave, Esha, and Fakir. All six sections had a common midterm (MT) and a common endterm (ET) worth 100 marks each. ET contained more questions than MT. Questions for MT and ET were prepared collectively by the six faculty members. Considering MT and ET together, each faculty member prepared the same number of questions.

Each of MT and ET had at least four questions that were worth 5 marks, at least three questions that were worth 10 marks, and at least two questions that were worth 15 marks. In both MT and ET, all the 5-mark questions preceded the 10-mark questions, and all the 15-mark questions followed the 10-mark questions.

The following additional facts are known.

- ii. Annie prepared the fifth question for both MT and ET. For MT, this question carried 5 marks.
- iii. Annie prepared one question for MT. Every other faculty member prepared more than one questions for MT.
- iv. All questions prepared by a faculty member appeared consecutively in MT as well as ET.
- v. Chetan prepared the third question in both MT and ET; and Esha prepared the eighth question in both.
- vi. Fakir prepared the first question of MT and the last one in ET. Dave prepared the last question of MT and the first one in ET.

1. The second question in ET was prepared by:

- A) Esha B) Chetan C) Dave D) Beti

2. How many 5-mark questions were there in MT and ET combined?

- A) Cannot be determined B) 12
C) 10 D) 13

3. Who prepared 15-mark questions for MT and ET?

- A) Only Dave, Esha and Fakir B) Only Beti, Dave, Esha and Fakir
C) Only Esha and Fakir D) Only Dave and Fakir

4. Which of the following questions did Beti prepare in ET?

- A) Ninth question B) Tenth question
C) Fourth question D) Seventh question

SET 5: Three doctors

Three doctors, Dr. Ben, Dr. Kane and Dr. Wayne visit a particular clinic Monday to Saturday to see patients. Dr. Ben sees each patient for 10 minutes and charges Rs. 100/-. Dr. Kane sees each patient for 15 minutes and charges Rs. 200/-, while Dr. Wayne sees each patient for 25 minutes and charges Rs. 300/-.

The clinic has three rooms numbered 1, 2 and 3 which are assigned to the three doctors as per the following table.

Room no.	Monday & Tuesday	Wednesday & Thursday	Friday & Saturday
1	Ben	Wayne	Kane
2	Kane	Ben	Wayne
3	Wayne	Kane	Ben

The clinic is open from 9 a.m. to 11.30 a.m. every Monday to Saturday.

On arrival each patient is handed a numbered token indicating their position in the queue, starting with token number 1 every day. As soon as any doctor becomes free, the next patient in the queue enters that emptied room for consultation. If at any time, more than one room is free then the waiting patient enters the room with the smallest number. For example, if the next two patients in the queue have token numbers 7 and 8 and if rooms numbered 1 and 3 are free, then patient with token number 7 enters room number 1 and patient with token number 8 enters room number 3.

1. What is the maximum number of patients that the clinic can cater to on any single day?

- A) 15 B) 30 C) 31 D) 12

2. The queue is never empty on one particular Saturday. Which of the three doctors would earn the maximum amount in consultation charges on that day?

- A) Dr. Kane B) Dr. Wayne C) Dr. Ben D) Both Dr. Wayne and Dr. Kane

3. Mr. Singh visited the clinic on Monday, Wednesday, and Friday of a particular week, arriving at 8:50 a.m. on each of the three days. His token number was 13 on all three days. On which day was he at the clinic for the maximum duration?

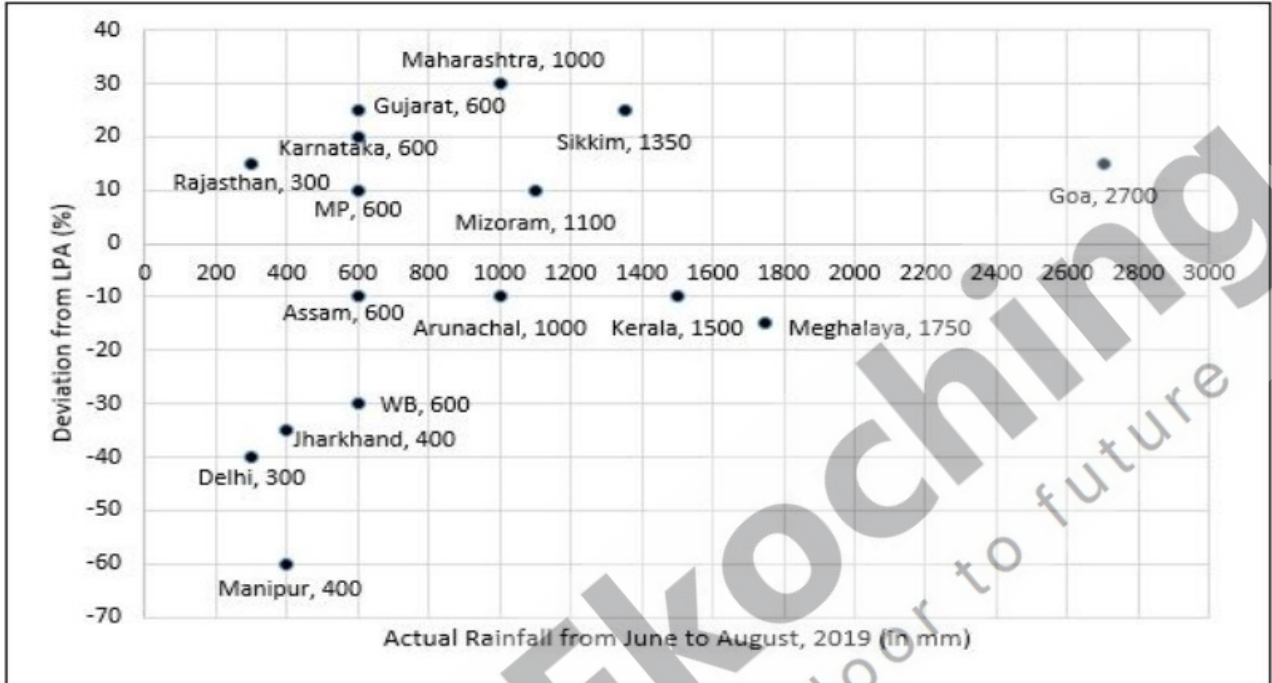
- A) Friday B) Wednesday C) Same duration on all three days D) Monday

4. On a slow Thursday, only two patients are waiting at 9 a.m. After that two patients keep arriving at exact 15 minute intervals starting at 9:15 a.m. -- i.e. at 9:15 a.m., 9:30 a.m., 9:45 a.m. etc. Then the total duration in minutes when all three doctors are simultaneously free is

- A) 30 B) 10 C) 15 D) 0

SET 6: Rainfall

To compare the rainfall data, India Meteorological Department (IMD) calculated the Long Period Average (LPA) of rainfall during period June-August for each of the 16 states. The figure given below shows the actual rainfall (measured in mm) during June-August, 2019 and the percentage deviations from LPA of respective states in 2018. Each state along with its actual rainfall is presented in the figure.



1. If a 'Heavy Monsoon State' is defined as a state with actual rainfall from June-August, 2019 of 900 mm or more, then approximately what percentage of 'Heavy Monsoon States' have a negative deviation from respective LPAs in 2019?

- A) 75.00 B) 57.14 C) 42.86 D) 14.29

2. If a 'Low Monsoon State' is defined as a state with actual rainfall from June-August, 2019 of 750 mm or less, then what is the median 'deviation from LPA' (as defined in the Y-axis of the figure) of 'Low Monsoon States'?

- A) -30% B) 10% C) -20% D) -10%

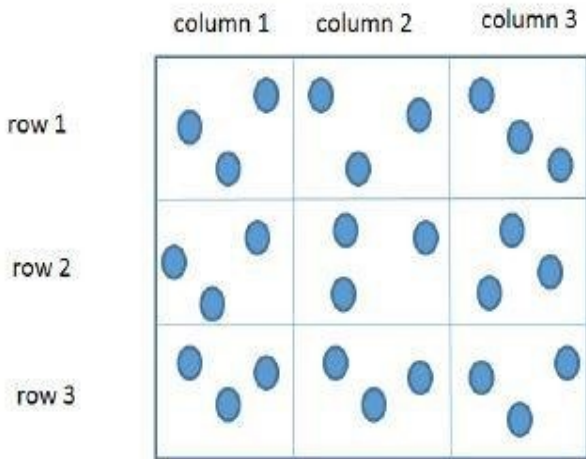
3. What is the average rainfall of all states that have actual rainfall of 600 mm or less in 2019 and have a negative deviation from LPA?

- A) 450 mm B) 367 mm C) 460 mm D) 500 mm

4. The LPA of a state for a year is defined as the average rainfall in the preceding 10 years considering the period of June-August. For example, LPA in 2018 is the average rainfall during 2009-2018 and LPA in 2019 is the average rainfall during 2010-2019. It is also observed that the actual rainfall in Gujarat in 2019 is 20% more than the rainfall in 2009. The LPA of Gujarat in 2019 is closest to

- A) 475 mm B) 490 mm C) 505 mm D) 525 mm

SET 7: Three pouches



	Column 1	Column 2	Column 3
Row 1	(2,4)	(6, 8)	(1, 3)
Row 2	(3,5)	(1,1)	(6, 20)
Row 3	(1,2)	(1,2)	(2,5)

Three pouches (each represented by a filled circle) are kept in each of the nine slots in a 3×3 grid, as shown in the figure. Every pouch has a certain number of one-rupee coins. The minimum and maximum amounts of money (in rupees) among the three pouches in each of the nine slots are given in the table. For example, we know that among the three pouches kept in the second column of the first row, the minimum amount in a pouch is Rs. 6 and the maximum amount is Rs. 8. There are nine pouches in any of the three columns, as well as in any of the three rows. It is known that the average amount of money (in rupees) kept in the nine pouches in any column or in any row is an integer. It is also known that the total amount of money kept in the three pouches in the first column of the third row is Rs. 4

1. What is the total amount of money (in rupees) in the three pouches kept in the first column of the second row?

[TITA]

2. How many pouches contain exactly one coin?

[TITA]

4. What is the number of slots for which the average amount (in rupees) of its three pouches is an integer?

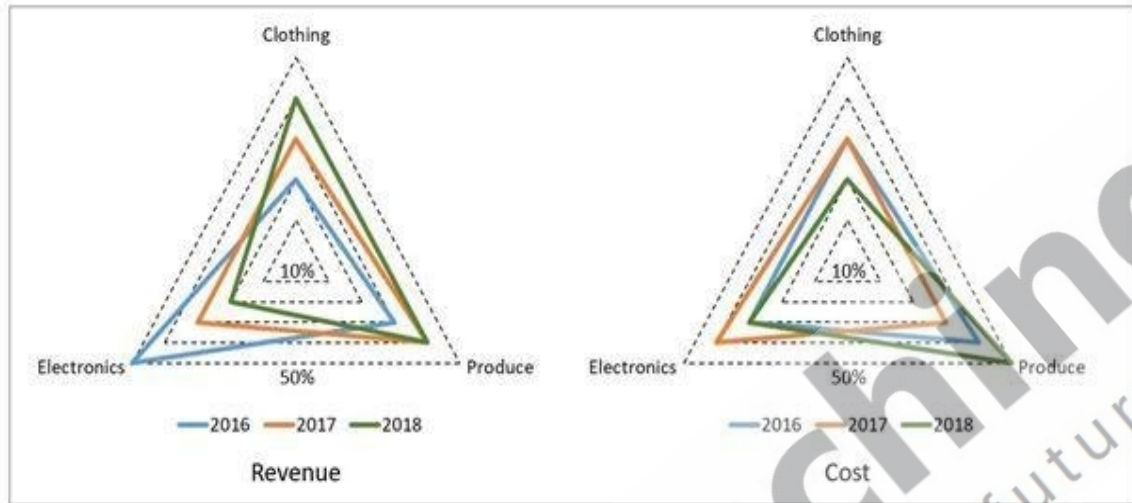
[TITA]

5. The number of slots for which the total amount in its three pouches strictly exceeds Rs. 10 is

[TITA]

SET 8: Revenue & Cost

A large store has only three departments, Clothing, Produce, and Electronics. The following figure shows the percentages of revenue and cost from the three departments for the years 2016, 2017 and 2018. The dotted lines depict percentage levels. So for example, in 2016, 50% of store's revenue came from its Electronics department while 40% of its costs were incurred in the Produce department.



In this setup, Profit is computed as (Revenue – Cost) and Percentage Profit as Profit/Cost × 100%.

It is known that

1. The percentage profit for the store in 2016 was 100%.
2. The store's revenue doubled from 2016 to 2017, and its cost doubled from 2016 to 2018.
3. There was no profit from the Electronics department in 2017.
4. In 2018, the revenue from the Clothing department was the same as the cost incurred in the Produce department.

1. What was the percentage profit of the store in 2018?

[TITA]

2. What was the ratio of revenue generated from the Produce department In 2017 to that in 2018?

- A) 8 : 5 B) 16 : 9 C) 4 : 3 D) 9 : 16

3. What percentage of the total profits for the store in 2016 was from the Electronics department?

[TITA]

4. What was the approximate difference in profit percentages of the store in 2017 and 2018?

- A) 8.3 B) 33.3 C) 25.0 D) 15.5

Solution 35:

After Round 3, the scored of Chen, David and Eric were 3, 3 and 3 points respectively.
Answer: (3, 3, 3)

Solution 36:

The three players who were in the last position after Round 4 were Joshin (0 points), Ikea (1 point) and Hansa (1 point).
Answer: (Hansa, Ikea, Joshin)

Solution 37:

Ikea scored in the maximum number of rounds (5 rounds).
Answer: (Ikea)

Solution 38:

The players who scored in the last round are Amita, Chen and Eric.
Answer: (Amita, Chen, Eric)

Solution for Question 39 to 42

From (1) and (5), the persons in Team 1 speak English, Chinese, Arabic and French. (Robert speaks both Arabic and French).

From (1) and (5), the persons in Team 3 speak, English, Chinese and Dutch. (Quentin speaks Dutch and English). Since each person speaks two languages and each team speaks exactly four languages, we need to find one person for Team 3, who speaks one language among English, Chinese and Dutch and a different language apart from these three. Since, Paula and Sally together speak Basque, Chinese and English and they are together in exactly two teams, they cannot be in Team 1. They must be in Teams 2 and 3.

Hence, from (5) and the above, Paula, Quentin and Sally, (Basque, Chinese, Dutch and English) are in Team 3. Since there are three persons in Team 3. Teams 1 and 2 should also have three persons each. Team 1 speaks, English, Chinese, Arabic and French. Robert (Arabic and French) is one of the team members. Now, two more persons, who speak languages among the above four are to be selected. It is possible only with Paula and Terence.

From (2) Basque and French are spoken by two teams. Hence, Team 2 speaks these two languages. Paula and Sally are there in Team 2 (Basque, Chinese and English). We need to find one more person, who speaks one of these three languages and French. It is possible with only Terence.

Team	1	2	3
Persons	Robert, Paula, Terence	Paula, Sally, Terence	Quentin, Paula, Sally
Languages	Arabic, Chinese, English, French	Basque, Chinese, English, French	Basque, Chinese, Dutch, English

Solution 39:

Quentin is not a member of Team 2.

Answer: (Quentin)

Solution 40:

Sally is part of exactly two teams.

Answer: (Sally)

Solution 41:

Paula is a member of all the teams.

Answer: (Paula)

Solution 42:

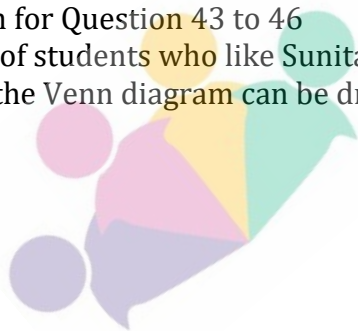
Apart from Chinese and English, Team 1 speaks Arabic and French.

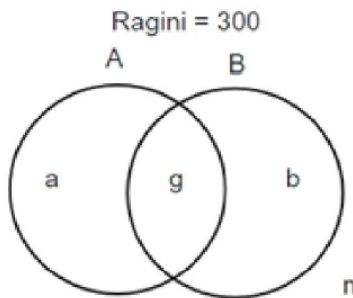
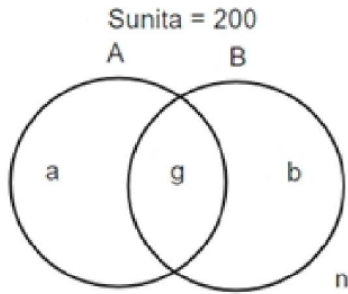
Answer: (Arabic and French)

Solution for Question 43 to 46

The set of students who like Sunita and Ragini are disjoint sets.

Hence, the Venn diagram can be drawn as follows





There are 500 students in all.

From statement (2)

Sunita = 200. Hence, Ragini = 300.

From statement (1) $A(\text{Sunita}) + A(\text{Ragini}) = 250$ and $B(\text{Sunita}) + B(\text{Ragini}) = 250$.

From (2), $A(\text{Sunita}) = 160$. Hence, $A(\text{Ragini}) = 90$.

From (4), $B(\text{Sunita}) = 20\% \text{ of } 250 = 50$. Hence, $B(\text{Ragini}) = 200$.

From (6), $g(\text{Sunita}) = 50$ and hence, $b(\text{Sunita}) = 0$ and $a(\text{Sunita}) = 110$. Hence, $n(\text{Sunita}) = 40$.

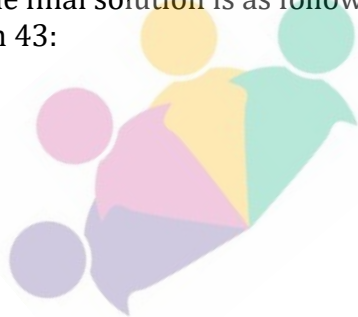
From (7), $n(\text{Ragini}) = 60$

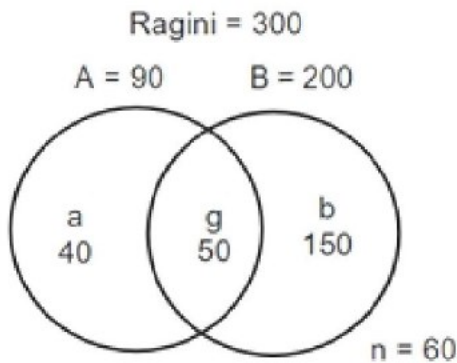
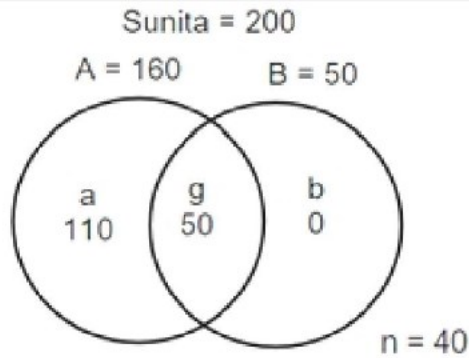
It is given that 250 support B, hence the other 250 do not support B.

From (5), $(a + n)$ of Ragini = $40\% \text{ of } 250 = 100$. Hence, $a(\text{Ragini}) = 40$.

Thus, the final solution is as follows.

Solution 43:





Solution 43:

The required value is $\frac{160}{250} \times 100 = 64$

Solution 44:

The required answer is $\frac{210}{250} \times 100 = 84$.

Solution 45:

The required answer is $\frac{50}{250} \times 100 = 50$.

Solution 46:

The students who supported proposal *B* but not *A* are *b* (Sunita) and *b* (Ragini). Among them those supported Ragini are *b* (Ragini) 150. Ans: (150)

Solution for Question 47 to 50

Solution 46:

The students who supported proposal *B* but not *A* are *b* (Sunita) and *b* (Ragini). Among them those supported Ragini are *b* (Ragini) 150. Ans: (150)

Solution for Question 47 to 50

In the following the names of the faculties are referred by first letter of their names. Given that each of MT and ET carries 100 marks. Each of MT and ET has at least four

questions of 5 marks ($4 \times 5 = 20$), at least three questions of 10 marks ($3 \times 10 = 30$) and atleast two questions of 15 marks ($2 \times 15 = 30$). These together add up to 80 marks. Theremaining 20 marks can be of the following possible combinations. (Four questions of 5marks) or (two questions of 10 marks) or (one question of 5 marks and 1question of 15marks)or (two questions of five marks and one question of ten marks). Hence, the total number of questions in MT or ET can be 11 or 12 or 13. It is given that ET has morenumberof questions than in MT. Hence, MT has 11 or 12 questions.

It is given that the number of questions given by any faculty in both MT and ET together is the same. If MT has 12 questions and ET has 13 questions, or if MT has 11 questions and ET has 12 questions, this condition cannot be satisfied. Hence, MT has 11 (Five 5 marks, three 10 marks and three 15 marks) questions and ET has 13 questions (eight 5 marks, three ten marks and two 15 marks). This implies, each faculty has given four questions in MT and ET together. Since it is given that faculty A has given only one question in MT and each of the other faculties has given more than one question, each of the faculties B, C, D, E and F has given two questions in MT. This implies faculty A has given three questions in ET and all other faculties have given two questions each in ET. From the given data we get the following.

Q No.	MT (Faculty name/Marks)	ET (Faculty name/Marks)
1	F	D
2		
3	C	C
4		
5	A / 5	A
6		
7		
8	E	E
9		
10		
11	D	
12	No 12 th question in MT	
13	No 13 th question in MT	F

Except A, every other faculty gave at least two questions for MT and all the questions of a faculty appeared consecutively. Hence, 2nd question in MT is given by F, 4th by C, 10th by D. B also has given two questions and both appeared consecutively. Hence, 6th and 7th questions

are given by B and the 9th question is given by E. In each test first all 5 marks questions appeared followed by 10 marks questions and then 15 marks questions. It can be understood that MT has five 5 marks, three 10 marks and three 15 marks. Hence, in MT questions 1 to 5 carry 5 marks each, 6 to 8 carry 10 marks each and 9 to 11 carry 15 marks each.

It can be understood that A has given three questions for ET and each of the others has

given two questions. Hence, the 2nd question of ET is given by D, the 4th question by C, 6th and 7th questions by A, 9th by E, 10th and 11th by B and 12th by F. Since ET has eight 5marks questions, three ten marks questions and two 15 marks questions, questions 1 to 8 of ET carry 8 marks each, 9 to 11 carry ten marks each, 12 and 13 carry 15 marks each. Thus, we get the following:

Q No.	MT (Faculty name/Marks)	ET (Faculty name/Marks)
1	F/5	D/5
2	F/5	D/5
3	C/5	C/5
4	C/5	C/5
5	A / 5	A/5
6	B/10	A/5
7	B/10	A/5
8	E/10	E/5
9	E/15	E/10
10	D/15	B/10
11	D/15	B/10
12	No 12 th question in MT	F/15
13	No 13 th question in MT	F/15

Solution 47:

The second question in ET was prepared by Dave.

Ans: (Dave)

Solution 48:

In MT and ET together, there are 13 questions

Ans: (13)

Solution 49:

The 15 marks question in MT and ET are prepared by Esha, Dave and Fakir only.

Ans: (Only Dave, Esha and Fakir)

Solution 50:

Beti prepared 10th question in ET.

Ans: (Tenth question)

Solution 51:

From 9-11: 30, we have 150 minutes. Doctors Ben, Kane and Wayne take 10,15 and 20 minutes respectively for each patient. Therefore Ben, Kane and Wayne can see $150/10=15$, $150/15=10$ and $150/25=6$ respectively. Therefore Ben, Kane and Wayne can see a maximum of 15,10 and 6 patients respectively every day. Sum =31

Solution 52:

Given, on Saturday, the queue is not empty.

=> Each doctor sees the maximum number of patients on a day.

Given Ben, Kane and Wayne charge Rs.100, 200 and 300 respectively.

=> Ben earns 15 (100)= Rs.1500, Kane earns 10(200)

= Rs .2000, Wayne earns 6(300)= Rs .1800

Therefore, Kane earns the maximum amount.

Ans: (Dr. Kane)

Solution 53:

Mr. Singh takes maximum duration when he enters Dr. Wayne's room, who sees each patient for 25 minutes.

Monday – timings / token numbers					
Ben	9:10 (4)	9:20 (6)	9:30 (8)	9:40 (10)	9:50 (12)
Kane	9:15 (5)		9:30 (9)	9:45 (11)	
Wayne	9:25 (7)				9:50 (13)

He was at the clinic for 85 minutes.

Similarly On Wednesday, he would meet Ben and he would be at the clinic for 70 minutes.

On Friday, he would meet Ben and he would be at the clinic for 70 minutes.

Therefore, Singh stays at the clinic for the maximum duration on Monday

Ans: (Monday)

Solution 54:

Thursday					
Wayne – Room no 1	9-9:25 – Token 1	(Free 9:25-9:30)	9:30-9:55-Token 5	(Free 9:55-10:00)	10-10:25 – Token 9
Ben – Room no 2	9-9:10 – Token 2 (Free 9:10-9:15)	9:15-9:25- Token 3 (Free 9:25-9:30)	9:30-9:40-Token 6 (Free 9:40-9:45)	9:45-9:55-Token 7 (Free 9:55 to 10:00)	10-10:10 – Token 10
Kane – Room no 3	(Free 9-9:15)	9:15-9:30- Token 4	(Free 9:30-9:45)	9:45-10:00-Token 8	(Free 10:00- 10:15)

The above pattern continues.

Hence, there is no time where all the doctors are simultaneously free.

Ans: (0)

Solution for Question 55 to 58

The actual rainfall in 2019 and the Long Period

Average (LPA) for the different states are as follows.

SI No.	State	Actual	LPA
1.	Maharashtra	1000	770
2.	Gujarat	600	480
3.	Sikkim	1350	1080
4.	Karnataka	600	500
5.	Rajasthan	300	260
6.	MP	600	545
7.	Mizoram	1100	1000
8.	Goa	2700	2350
9.	Assam	600	665
10.	Arunachal	1000	1110
11.	Kerala	1500	1665
12.	Meghalaya	1750	2060
13.	WB	600	855
14.	Jharkhand	400	615
15.	Delhi	300	500
16.	Manipur	400	1000

Solution 55:

The heavy monsoon states are Maharashtra, Sikkim, Mizoram, Goa, Arunachal, Kerala and Meghalaya. Among these, Arunachal, Kerala and Meghalaya have a negative deviation from respective LPAs in 2019 . The required percentage = $\frac{3}{7} \times 100 = 42.86\%$

Solution 56:

The Low monsoon states are Gujarat, Karnataka, Rajasthan, MP, Assam, WB, Jharkhand, Delhi and Manipur. The deviation from LPA for these states are 25,20,15 , 10,-10,-30,-35,-40 and -60. The median value is -10

Solution 57:

The states which have a negative deviation from LPA and have an actual rainfall of 600 mm or less are Assam, WB, Jharkhand, Delhi and Manipur. The average rainfall in these states is $\frac{2300}{5} = 460 \text{ mm}$

Solution 58:

The actual rainfall in Gujarat in 2019 is 600 mm. The rainfall in Gujarat in 2009 was 500 mm. As the value of 500 is replaced by 600 in calculating the LPA, the LPA would increase by 10 as it is the average of 10 years.

Ans: (490 mm)

Solution for Question 59 to 62

The minimum and maximum and possible number of coins (overall) in each slot would be as follows.

(2, 4) 8/9/10	(6, 8) 20/21/22	(1, 3) 5/6/7
(3, 5) 11/12/13	(1, 1) 3	(6, 20) 32 – 46
(1, 2) 4 (given)	(1, 2) 4/5	2, 5 9/10/11/12

It is given that the average amount of money kept in the nine pouches in any column or any row is an integer (a multiple of nine).

The total amount of money in the first column must be either 18 or 27. The minimum value of the sum of money in the three slots is $8+11+4 = 23$ and the maximum value is $10+13+4 = 27$.

\therefore The number of coins in the first column of the three rows are $10(2+4+4)$, $13(3+5+5)$ and $4(1+2+1)$. Similarly in the third row, the sum must be 18 and in the second column, the sum must be 27.

\therefore The number of coins in the second column is $20(6+6+8) + 3(1+1+1)$ and $4(1+1+2)$

The third column in the first row would be $6(1+2+3)$ and the third column in the third row would be $10(2+3+5)$

In the last column, the value in the second row would be $54 - 16 - 38(6 - 12 - 20)$. We have the following figure for the number of coins in the pouches in each slot.

(2, 4, 4)	(6, 6, 8)	(1, 2, 3)
(3, 5, 5)	(1, 1, 1)	(6, 12, 20)
(1, 1, 2)	(1, 1, 2)	(2, 3, 5)

Solution 59:

The total amount of money in the three pouches in the first column of the second row is 13.

Ans: (13)

Solution 60:

Eight pouches contain exactly one coin.

Ans: (8)

Solution 61:

Only in two slots (row 2, column 2) and (row 1, column 3) is the average amount in the three pouches an integer.

Ans: (2)

In three slots (row 2, column 1), (row 1, column 2) and (row 2, column 3), the amount in the three pouches strictly exceeds 10.

Solution 62:

The percentage share in Revenue and cost in the different years are as follows.

	Year					
	2016		2017		2018	
	Revenue	Cost	Revenue	Cost	Revenue	Cost
Clothing	20	30	30	30	40	20
Produce	30	40	40	30	40	50
Electronics	50	30	30	40	20	30

Solution for Question 63 to 66

Assume the cost of the store in 2016 to be 100.

As the profit percentage that year was 100, the revenue of the store in that year would be 200 .

∴ Revenue in 2017 would be 400 and cost of the store in 2018 would be 200 . Given that in 2017, 30% of 400 = 40% of cost



Passage 1 : Bureaucracy Decentralisation

Around the world, capital cities are disgorging bureaucrats. In the post-colonial fervour of the 20th century, coastal capitals picked by trade-focused empires were spurned for “regionally neutral” new ones.... But decamping wholesale is costly and unpopular; governments these days prefer piecemeal dispersal. The trend reflects how the world has changed. In past eras, when information travelled at a snail’s pace, civil servants had to cluster together. But now desk-workers can ping emails and video-chat around the world. Travel for face-to-face meetings may be unavoidable, but transport links, too, have improved....

Proponents of moving civil servants around promise countless benefits. It disperses the risk that a terrorist attack or natural disaster will cripple an entire government. Workers in the sticks will be inspired by new ideas that walled off capitals cannot conjure up. Autonomous regulators perform best far from the pressure and lobbying of the big city. Some even hail a cure for ascendant cynicism and populism. The unloved bureaucrats of faraway capitals will become as popular as firefighters once they mix with regular folk. Beyond these sunny visions, dispersing central-government functions usually has three specific aims : to improve the lives of both civil servants and those living in clogged capitals; to save money; and to redress regional imbalances. The trouble is that these goals are not always realised.

The first aim—improving living conditions—has a long pedigree. After the second world war Britain moved thousands of civil servants to “agreeable English country towns” as London was rebuilt. But swapping the capital for some where smaller is not always agreeable. Attrition rates can exceed 80%.... The second reason to pack bureaucrats off is to save money. Office space costs far more in capitals.... Agencies that are moved elsewhere can often recruit better workers on lower salaries than in capitals, where well-paying multinationals mop up talent.

The third reason to shift is to rebalance regional inequality. Norway treats federal jobs as a resource every region deserves to enjoy, like profits from oil. Where government jobs go, private ones follow. . . . Sometimes the aim is to fulfil the potential of a country’s second-tier cities. Unlike poor, remote places, bigger cities can make the most of relocated government agencies, linking them to local universities and businesses and supplying a better-educated workforce. The decision in 1946 to set up America’s Centres for Disease Control in Atlanta rather than Washington, D.C., has transformed the city into a hub for health-sector research and business. The dilemma is obvious. Pick small, poor towns, and areas of high unemployment get new jobs, but it is hard to attract the most qualified workers; opt for larger cities with infrastructure and better-qualified residents, and the country’s most deprived areas see little benefit. . . . Others contend that decentralisation begets corruption by making government agencies less accountable. . . . A study in America found that state-government corruption is worse when the state capital is isolated—journalists, who tend to live in the bigger cities, become less watchful of those in power.

Passage 1: Questions

- Q.1** According to the passage, colonial powers located their capitals :
- A. to showcase their power and prestige.
 - B. where they had the densest populations.
 - C. based on political expediency.
 - D. to promote their trading interests.
- Q.2** The “dilemma” mentioned in the passage refers to :
- A. keeping government agencies in the largest city with good infrastructure or moving them to a remote area with few amenities.
 - B. concentrating on decongesting large cities or focusing on boosting employment in relatively larger cities.
 - C. encouraging private enterprises to relocate to smaller towns or not incentivising them in order to keep government costs in those towns low.
 - D. relocating government agencies to boost growth in remote areas with poor amenities or to relatively larger cities with good amenities.
- Q.3** People who support decentralising central government functions are LEAST likely to cite which of the following reasons for their view ?
- A. More independence could be enjoyed by regulatory bodies located away from political centres.
 - B. Policy makers may benefit from fresh thinking in a new environment.
 - C. It reduces expenses as infrastructure costs and salaries are lower in smaller cities.
 - D. It could weaken the nexus between bureaucrats and media in the capital.
- Q.4** The “long pedigree” of the aim to shift civil servants to improve their living standards implies that this move :
- A. is not a new idea and has been tried in the past.
 - B. has become common practice in several countries worldwide.
 - C. is supported by politicians and the ruling elites.
 - D. takes a long time to achieve its intended outcomes.
- Q.5** According to the author, relocating government agencies has not always been a success for all of the following reasons EXCEPT :
- A. a rise in pollution levels and congestion in the new locations.
 - B. the difficulty of attracting talented, well-skilled people in more remote areas.
 - C. increased avenues of corruption away from the capital city.
 - D. high staff losses, as people may not be prepared to move to smaller towns.

Passage 2: Tech and Archeological Preservation

War, natural disasters and climate change are destroying some of the world's most precious cultural sites. Google is trying to help preserve these archaeological wonders by allowing users access to 3D images of these treasures through its site.

But the project is raising questions about Google's motivations and about who should own the digital copyrights. Some critics call it a form of "digital colonialism."

When it comes to archaeological treasures, the losses have been mounting. ISIS blew up parts of the ancient city of Palmyra in Syria and an earthquake hit Bagan, an ancient city in Myanmar, damaging dozens of temples, in 2016. In the past, all archaeologists and historians had for restoration and research were photos, drawings, remnants and intuition.

But that's changing. Before the earthquake at Bagan, many of the temples on the site were scanned. . . . [These] scans . . . are on Google's Arts & Culture site. The digital renditions allow viewers to virtually wander the halls of the temple, look up-close at paintings and turn the building over, to look up at its chambers. . . . [Google Arts & Culture] works with museums and other nonprofits . . . to put high-quality images online.

The images of the temples in Bagan are part of a collaboration with CyArk, a nonprofit that creates the 3D scanning of historic sites. . . . Google . . . says [it] doesn't make money off this website, but it fits in with Google's mission to make the world's information available and useful.

Critics say the collaboration could be an attempt by a large corporation to wrap itself in the sheen of culture. Ethan Watrall, an archaeologist, professor at Michigan State University and a member of the Society for American Archaeology, says he's not comfortable with the arrangement between CyArk and Google. . . . Watrall says this project is just a way for Google to promote Google. "They want to make this material accessible so people will browse it and be filled with wonder by it," he says. "But at its core, it's all about advertisements and driving traffic." Watrall says these images belong on the site of a museum or educational institution, where there is serious scholarship and a very different mission. . . .

[There's] another issue for some archaeologists and art historians. CyArk owns the copyrights of the scans — not the countries where these sites are located. That means the countries need CyArk's permission to use these images for commercial purposes.

Erin Thompson, a professor of art crime at John Jay College of Criminal Justice in New York City, says it's the latest example of a Western nation appropriating a foreign culture, a centuries-long battle. . . . CyArk says it copyrights the scans so no one can use them in an inappropriate way. The company says it works closely with authorities during the process, even training local people to help. But critics like Thompson are not persuaded. . . . She would prefer the scans to be owned by the countries and people where these sites are located.

Passage 2: Questions

- Q.1** Based on his views mentioned in the passage, one could best characterise Dr. Watrall as being:
- A. opposed to the use of digital technology in archaeological and cultural sites in developing countries.
 - B. dismissive of laypeople's access to specialist images of archaeological and cultural sites.
 - C. uneasy about the marketing of archaeological images for commercial use by firms such as Google and CyArk.
 - D. critical about the links between a non-profit and a commercial tech platform for distributing archaeological images.
- Q.2** By "digital colonialism", critics of the CyArk–Google project are referring to the fact that:
- A. CyArk and Google have been scanning images without copyright permission from host developing countries.
 - B. dismissive of laypeople's access to specialist images of archaeological and cultural sites.
 - C. uneasy about the marketing of archaeological images for commercial use by firms such as Google and CyArk.
 - D. critical about the links between a non-profit and a commercial tech platform for distributing archaeological images.
- Q.3** Which of the following, if true, would most strongly invalidate Dr. Watrall's objections? A. Google takes down advertisements on its website hosting CyArk's scanned images.
- B. There is a ban on CyArk scanning archeological sites located in other countries.
 - C. CyArk does not own the copyright on scanned images of archaeological sites.
 - D. CyArk uploads its scanned images of archaeological sites onto museum websites only.
- Q.4** In Dr. Thompson's view, CyArk owning the copyright of its digital scans of archaeological sites is akin to :
- A. tourists uploading photos of monuments onto social media.
 - B. the seizing of ancient Egyptian artefacts by a Western museum.
 - C. the illegal downloading of content from the internet.
 - D. digital platforms capturing users' data for market research.
- Q.5** Of the following arguments, which one is LEAST likely to be used by the companies that digitally scan cultural sites?
- A. It enables people who cannot physically visit these sites to experience them.
 - B. It helps preserve precious images in case the sites are damaged or destroyed.
 - C. It allows a large corporation to project itself as a protector of culture.
 - D. It provides images free of cost to all users.

Passage 3 : Urban Settlements

The magic of squatter cities is that they are improved steadily and gradually by their residents. To a planner's eye, these cities look chaotic. I trained as a biologist and to my eye, they look organic. Squatter cities are also unexpectedly green. They have maximum density—1 million people per square mile in some areas of Mumbai—and have minimum energy and material use. People get around by foot, bicycle, rickshaw, or the universal shared taxi.

Not everything is efficient in the slums, though. In the Brazilian favelas where electricity is stolen and therefore free, people leave their lights on all day. But in most slums recycling is literally a way of life. The Dharavi slum in Mumbai has 400 recycling units and 30,000 ragpickers. Six thousand tons of rubbish are sorted every day. In 2007, the Economist reported that in Vietnam and Mozambique, "Waves of gleaners sift the sweepings of Hanoi's streets, just as Mozambiquan children pick over the rubbish of Maputo's main tip. Every city in Asia and Latin America has an industry based on gathering up old cardboard boxes." . . .

In his 1985 article, Calthorpe made a statement that still jars with most people: "The city is the most environmentally benign form of human settlement. Each city dweller consumes less land, less energy, less water, and produces less pollution than his counterpart in settlements of lower densities." "Green Manhattan" was the inflammatory title of a 2004 New Yorker article by David Owen. "By the most significant measures," he wrote, "New York is the greenest community in the United States, and one of the greenest cities in the world . . . The key to New York's relative environmental benignity is its extreme compactness. . . . Placing one and a half million people on a twenty-three-square-mile island sharply reduces their opportunities to be wasteful." He went on to note that this very compactness forces people to live in the world's most energy-efficient apartment buildings. . . .

Urban density allows half of humanity to live on 2.8 per cent of the land. . . . Consider just the infrastructure efficiencies. According to a 2004 UN report: "The concentration of population and enterprises in urban areas greatly reduces the unit cost of piped water, sewers, drains, roads, electricity, garbage collection, transport, health care, and schools." . . .

[T]he nationally subsidised city of Manaus in northern Brazil "answers the question" of how to stop deforestation: give people decent jobs. Then they can afford houses, and gain security. One hundred thousand people who would otherwise be deforesting the jungle around Manaus are now prospering in town making such things as mobile phones and televisions. . . .

Of course, fast-growing cities are far from an unmitigated good. They concentrate crime, pollution, disease and injustice as much as business, innovation, education and entertainment. . . . But if they are overall a net good for those who move there, it is because cities offer more than just jobs. They are transformative: in the slums, as well as the office towers and leafy suburbs, the progress is from hick to metropolitan to cosmopolitan . . .

Passage 3: Questions

- Q.1** Which one of the following statements would undermine the author's stand regarding the greenness of cities?
- A. The compactness of big cities in the West increases the incidence of violent crime.
 - B. Sorting through rubbish contributes to the rapid spread of diseases in the slums.
 - C. The high density of cities leads to an increase in carbon dioxide and global warming.
 - D. Over the last decade the cost of utilities has been increasing for city dwellers.
- Q.2** According to the passage, squatter cities are environment-friendly for all of the following reasons EXCEPT:
- A. their transportation is energy efficient.
 - B. they recycle material.
 - C. they sort out garbage.
 - D. their streets are kept clean.
- Q.3** We can infer that Calthorpe's statement "still jars" with most people because most people:
- A. regard cities as places of disease and crime.
 - B. do not consider cities to be eco-friendly places.
 - C. do not regard cities as good places to live in.
 - D. consider cities to be very crowded and polluted.
- Q.4** In the context of the passage, the author refers to Manaus in order to:
- A. explain how urban areas help the environment.
 - B. describe the infrastructure efficiencies of living in a city.
 - C. explain where cities source their labour for factories.
 - D. promote cities as employment hubs for people.
- Q.5** From the passage it can be inferred that cities are good places to live in for all of the following reasons EXCEPT that they:
- A. offer employment opportunities.
 - B. help prevent destruction of the environment.
 - C. contribute to the cultural transformation of residents.
 - D. have suburban areas as well as office areas.

Passage 4 : Linguistics and Culture

For two years, I tracked down dozens of . . . Chinese in Upper Egypt [who were] selling lingerie. In a deeply conservative region, where Egyptian families rarely allow women to work or own businesses, the Chinese flourished because of their status as outsiders. They didn't gossip, and they kept their opinions to themselves. In a New Yorker article entitled "Learning to Speak Lingerie," I described the Chinese use of Arabic as another non-threatening characteristic. I wrote, "Unlike Mandarin, Arabic is inflected for gender, and Chinese dealers, who learn the language strictly by ear, often pick up speech patterns from female customers. I've come to think of it as the lingerie dialect, and there's something disarming about these Chinese men speaking in the feminine voice." . . .

When I wrote about the Chinese in the New Yorker, most readers seemed to appreciate the unusual perspective. But as I often find with topics that involve the Middle East, some people had trouble getting past the black-and-white quality of a byline. "This piece is so orientalist I don't know what to do," Aisha Gani, a reporter who worked at The Guardian, tweeted. Another colleague at the British paper, Iman Amrani, agreed: "I wouldn't have minded an article on the subject written by an Egyptian woman—probably would have had better insight." . . .

As an MOL (man of language), I also take issue with this kind of essentialism. Empathy and understanding are not inherited traits, and they are not strictly tied to gender and race. An individual who wrestles with a difficult language can learn to be more sympathetic to outsiders and open to different experiences of the world. This learning process—the embarrassments, the frustrations, the gradual sense of understanding and connection—is invariably transformative. In Upper Egypt, the Chinese experience of struggling to learn Arabic and local culture had made them much more thoughtful. In the same way, I was interested in their lives not because of some kind of voyeurism, but because I had also experienced Egypt and Arabic as an outsider. And both the Chinese and the Egyptians welcomed me because I spoke their languages. My identity as a white male was far less important than my ability to communicate.

And that easily lobbed word—"Orientalist"—hardly captures the complexity of our interactions. What exactly is the dynamic when a man from Missouri observes a Zhejiang native selling lingerie to an Upper Egyptian woman? . . . If all of us now stand beside the same river, speaking in ways we all understand, who's looking east and who's looking west? Which way is Oriental?

For all of our current interest in identity politics, there's no corresponding sense of identity linguistics. You are what you speak—the words that run throughout your mind are at least as fundamental to your selfhood as is your ethnicity or your gender. And sometimes it's healthy to consider human characteristics that are not inborn, rigid, and outwardly defined. After all, you can always learn another language and change who you are.

Passage 4: Questions

- Q.1** Which of the following can be inferred from the author's claim, "Which way is Oriental?"
- A. Learning another language can mitigate cultural hierarchies and barriers.
 - B. Globalisation has mitigated cultural hierarchies and barriers.
 - C. Goodwill alone mitigates cultural hierarchies and barriers.
 - D. Orientalism is a discourse of the past, from colonial times, rarely visible today.
- Q.2** A French ethnographer decides to study the culture of a Nigerian tribe. Which of the following is most likely to be the view of the author of the passage?
- A. The author would encourage the ethnographer, but ask him/her to first learn the language of the Nigerian tribe s/he wishes to study.
 - B. The author would encourage the ethnographer, but ask him/her to be mindful of his/her racial and gender identity in the process.
 - C. The author would discourage the ethnographer from conducting the study as Nigerian ethnographers can better understand the tribe.
 - D. The author would encourage the ethnographer and recommend him/her to hire a good translator for the purpose of holding interviews.
- Q.3** The author's critics would argue that :
- A. Empathy can overcome identity politics.
 - B. Language is insufficient to bridge cultural barriers.
 - C. Linguistic politics can be erased.
 - D. Orientalism cannot be practiced by Egyptians.
- Q.4** According to the passage, which of the following is not responsible for language's ability to change us?
- A. The ups and downs involved in the course of learning a language.
 - B. Language's intrinsic connection to our notions of self and identity.
 - C. Language's ability to mediate the impact of identity markers one is born with.
 - D. The twists and turns in the evolution of language over time.

Passage 5 : British Colonialism

British colonial policy . . . went through two policy phases, or at least there were two strategies between which its policies actually oscillated, sometimes to its great advantage. At first, the new colonial apparatus exercised caution, and occupied India by a mix of military power and subtle diplomacy, the high ground in the middle of the circle of circles. This, however, pushed them into contradictions. For, whatever their sense of the strangeness of the country and the thinness of colonial presence, the British colonial state represented the great conquering discourse of Enlightenment rationalism, entering India precisely at the moment of its greatest unchecked arrogance. As inheritors and representatives of this discourse, which carried everything before it, this colonial state could hardly adopt for long such a self-denying attitude. It had restructured everything in Europe—the productive system, the political regimes, the moral and cognitive orders—and would do the same in India, particularly as some empirically inclined theorists of that generation considered the colonies a massive laboratory of utilitarian or other theoretical experiments. Consequently, the colonial state could not settle simply for eminence at the cost of its marginality; it began to take initiatives to introduce the logic of modernity into Indian society. But this modernity did not enter a passive society. Sometimes, its initiatives were resisted by pre-existing structural forms. At times, there was a more direct form of collective resistance. Therefore the map of continuity and discontinuity that this state left behind at the time of independence was rather complex and has to be traced with care.

Most significantly, of course, initiatives for . . . modernity came to assume an external character. The acceptance of modernity came to be connected, ineradicably, with subjection. This again points to two different problems, one theoretical, the other political. Theoretically, because modernity was externally introduced, it is explanatorily unhelpful to apply the logical format of the ‘transition process’ to this pattern of change. Such a logical format would be wrong on two counts. First, however subtly, it would imply that what was proposed to be built was something like European capitalism. (And, in any case, historians have forcefully argued that what it was to replace was not like feudalism, with or without modificatory adjectives.) But, more fundamentally, the logical structure of endogenous change does not apply here. Here transformation agendas attack as an external force. This externality is not something that can be casually mentioned and forgotten. It is inscribed on every move, every object, every proposal, every legislative act, each line of causality. It comes to be marked on the epoch itself. This repetitive emphasis on externality should not be seen as a nationalist initiative that is so well rehearsed in Indian social science. . . .

Quite apart from the externality of the entire historical proposal of modernity, some of its contents were remarkable. . . . Economic reforms, or rather alterations . . . did not foreshadow the construction of a classical capitalist economy, with its necessary emphasis on extractive and transport sectors. What happened was the creation of a degenerate version of capitalism—what early dependency theorists called the ‘development of underdevelopment’

Passage 5 : Questions

- Q.1** All of the following statements about British colonialism can be inferred from the first paragraph, EXCEPT that it:
- A. was at least partly an outcome of Enlightenment rationalism.
 - B. faced resistance from existing structural forms of Indian modernity.
 - C. was at least partly shaped by the project of European modernity.
 - D. allowed the treatment of colonies as experimental sites.
- Q.2** All of the following statements, if true, could be seen as supporting the arguments in the passage, EXCEPT:
- A. the introduction of capitalism in India was not through the transformation of feudalism, as happened in Europe.
 - B. modernity was imposed upon India by the British and, therefore, led to underdevelopment.
 - C. throughout the history of colonial conquest, natives have often been experimented on by the colonisers.
 - D. the change in British colonial policy was induced by resistance to modernity in Indian society.
- Q.3** “Consequently, the colonial state could not settle simply for eminence at the cost of its marginality; it began to take initiatives to introduce the logic of modernity into Indian society. ”Which of the following best captures the sense of this statement?
- A. The colonial state’s eminence was unsettled by its marginal position; therefore, it developed Indian society by modernising it.
 - B. The colonial enterprise was a costly one; so to justify the cost it began to take initiatives to introduce the logic of modernity into Indian society.
 - C. The colonial state felt marginalised from Indian society because of its own modernity; therefore, it sought to address that marginalisation by bringing its modernity to change Indian society.
 - D. The cost of the colonial state’s eminence was not settled; therefore, it took the initiative of introducing modernity into Indian society.
- Q.4** Which one of the following 5-word sequences best captures the flow of the arguments in the passage?
- A. Military power—arrogance—laboratory—modernity—capitalism.
 - B. Colonial policy—Enlightenment—external modernity—subjection—under development.
 - C. Colonial policy—arrogant rationality—resistance—independence—development.
 - D. Military power—colonialism—restructuring—feudalism—capitalism.
- Q.5** Which of the following observations is a valid conclusion to draw from the author’s statement that “the logical structure of endogenous change does not apply here. Here transformation agendas attack as an external force”?
- A. The endogenous logic of colonialism can only bring change if it attacks and transforms external forces.
 - B. Indian society is not endogamous; it is more accurately characterised as aggressively exogamous.
 - C. Colonised societies cannot be changed through logic; they need to be transformed with external force.
 - D. The transformation of Indian society did not happen organically, but was forced by colonial agendas.

Q25 : Gender and time

The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Conceptualisations of 'women's time' as contrary to clock- time and clock-time as synonymous with economic rationalism are two of the deleterious results of this representation.
2. While dichotomies of 'men's time', 'women's time', clock- time, and caring time can be analytically useful, this article argues that everyday caring practices incorporate a multiplicity of times; and both men and women can engage in these multiple-times.
3. When the everyday practices of working sole fathers and working sole mothers are carefully examined to explore conceptualisations of gendered time, it is found that caring time is often more focused on the clock than generally theorised.
4. Clock-time has been consistently represented in feminist literature as a masculine artefact representative of a 'time is money' perspective.

Q26 : Cognition and Structure

The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Living things—animals and plants—typically exhibit correlational structure.
2. Adaptive behaviour depends on cognitive economy, treating objects as equivalent.
3. The information we receive from our senses, from the world, typically has structure and order, and is not arbitrary.
4. To categorize an object means to consider it equivalent to other things in that category, and different—along some salient dimension—from things that are not.

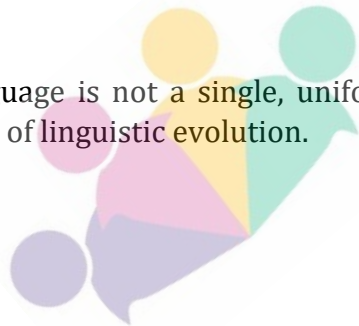


Q.27 : Impact of Language

The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Language is an autapomorphy found only in our lineage, and not shared with other branches of our group such as primates. We also have no definitive evidence that any species other than Homo sapiens ever had language. However, it must be noted straightaway that 'language' is not a monolithic entity, but rather a complex bundle of traits that must have evolved over a significant time frame.... Moreover, language crucially draws on aspects of cognition that are long established in the primate lineage, such as memory: the language faculty as a whole comprises more than just the uniquely linguistic features.

- A. Language, a derived trait found only in humans, has evolved over time and involves memory.
- B. Language is a distinctively human feature as there is no evidence of the existence of language in any other species.
- C. Language evolved with linguistic features building on features of cognition such as memory.
- D. Language is not a single, uniform entity but the end result of a long and complex process of linguistic evolution.

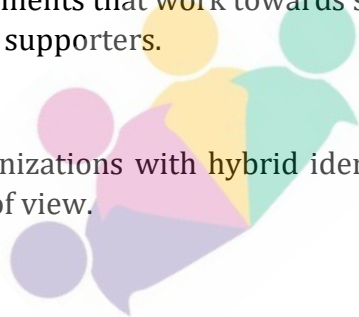


Q.28 : Movements and Organisations

The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Social movement organizations often struggle to mobilize supporters from allied movements in their efforts to achieve critical mass. Organizations with hybrid identities—those whose organizational identities span the boundaries of two or more social movements, issues, or identities—are vital to mobilizing these constituencies. Studies of the post-9/11 U.S. antiwar movement show that individuals with past involvement in non-anti-war movements are more likely to join hybrid organizations than are individuals without involvement in non-anti-war movements. In addition, they show that organizations with hybrid identities occupy relatively more central positions in inter-organizational contact networks within the antiwar movement and thus recruit significantly more participants in demonstrations than do nonhybrid organizations.

- A. Post 9/11 studies show that people who are involved in non anti-war movements are likely to join hybrid organizations.
- B. Hybrid organizations attract individuals that are deeply involved in anti-war movements.
- C. Movements that work towards social change often find it difficult to mobilize a critical mass of supporters.
- D. Organizations with hybrid identities are able to mobilize individuals with different points of view.



Q.29 : Atonality

The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

1. To the uninitiated listener, atonal music can sound like chaotic, random noise.
2. Atonality is a condition of music in which the constructs of the music do not 'live' within the confines of a particular key signature, scale, or mode.
3. After you realize the amount of knowledge, skill, and technical expertise required to compose or perform it, your tune may change, so to speak.
4. However, atonality is one of the most important movements in 20th century music.



Q.30 : Comics

Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. A particularly interesting example of inference occurs in many single panel comics.
2. It's the creator's participation and imagination that makes the single-panel comic so engaging and so rewarding.
3. Often, the humor requires you to imagine what happened in the instant immediately before or immediately after the panel you're being shown.
4. To get the joke, you actually have to figure out what some of these missing panels must be.
5. It is as though the cartoonist devised a series of panels to tell the story and has chosen to show you only one – and typically not even the funniest.



Q.31: Rumination

Five sentences related to a topic are given below in a jumbled order. Four of them form a coherent and unified paragraph. Identify the odd sentence that does not go with the four. Key in the number of the option that you choose.

1. Socrates told us that 'the unexamined life is not worth living' and that to 'know thyself' is the path to true wisdom.
2. It suggests that you should adopt an ancient rhetorical method favored by the likes of Julius Caesar and known as 'illeism' – or speaking about yourself in the third person.
3. Research has shown that people who are prone to rumination also often suffer from impaired decision making under pressure and are at a substantially increased risk of depression.
4. Simple rumination – the process of churning your concerns around in your head – is not the way to achieve self-realization.
5. The idea is that this small change in perspective can clear your emotional fog, allowing you to see past your biases.



Q.32 : Ocean Plastic

Five sentences related to a topic are given below. Four of them can be put together to form a meaningful and coherent short paragraph. Identify the odd one out. Choose its number as your answer and key it in.

1. Ocean plastic is problematic for a number of reasons, but primarily because marine animals eat it.
2. The largest numerical proportion of ocean plastic falls in small size fractions.
3. Aside from clogging up the digestive tracts of marine life, plastic also tends to adsorb pollutants from the water column.
4. Plastic in the oceans is arguably one of the most important and pervasive environmental problems today.
5. Eating plastic has a number of negative consequences such as the retention of plastic particles in the gut for longer periods than normal food particles.



Q.33 : Teleology

The four sentences (labelled 1, 2, 3, 4) given below, when properly sequenced would yield a coherent paragraph. Decide on the proper sequence of the order of the sentences and key in the sequence of the four numbers as your answer.

1. Such a belief in the harmony of nature requires a purpose presumably imposed by the goodness and wisdom of a deity.
2. These parts, all fit together into an integrated, well-ordered system that was created by design.
3. Historically, the notion of a balance of nature is part observational, part metaphysical, and not scientific in any way.
4. It is an example of an ancient belief system called teleology, the notion that what we call nature has a predetermined destiny associated with its component parts.



Q.34 : Office Spaces

The passage given below is followed by four alternate summaries. Choose the option that best captures the essence of the passage.

Privacy-challenged office workers may find it hard to believe, but open-plan offices and cubicles were invented by architects and designers who thought that to break down the social walls that divide people, you had to break down the real walls, too. Modernist architects saw walls and rooms as downright fascist. The spaciousness and flexibility of an open plan would liberate homeowners and office dwellers from the confines of boxes. But companies took up their idea less out of a democratic ideology than a desire to pack in as many workers as they could. The typical open-plan office of the first half of the 20th century was a white-collar assembly line. Cubicles were interior designers' attempt to put some soul back in.

- A. Wall-free office spaces did not quite work out as desired and therefore cubicles came into being.
- B. Wall-free office spaces did not quite work out the way their utopian inventors intended, as they became tools for exploitation of labor.
- C. Wall-free office spaces could have worked out the way their utopian inventors intended had companies cared for workers' satisfaction.
- D. Wall-free office spaces did not quite work out as companies don't believe in democratic ideology.



SOLUTIONS

Passage 1: Detailed Solution

Q.1

Option D

See paragraph 1, line 1 : 'coastal capitals picked by trade-focused empires....'. So, empires picked their capitals in order to promote their trading interests.

Q.2

Option D

Paragraph 6 explains the dilemma. Small, poor towns = new jobs in areas of high employment, but it is hard to attract the most qualified workers; Larger cities = infrastructure and better-qualified residents, but deprived areas do not benefit. Option D simply paraphrases this.

Q.3

Option D

The question asks us to pick the option that those who support decentralisation are least likely to cite, i.e. the option that does not support the argument for decentralisation. The last paragraph explains how decentralisation begets corruption: journalists in bigger cities are less likely to hold bureaucrats in smaller cities accountable. Those who support decentralisation are not likely to mention this while making their point. More independence, fresh thinking and lower costs in smaller cities are, on the other hand, arguments for decentralisation.

Q.4

Option A

'Pedigree' is used in the sense of 'history' here. That is, shifting civil servants in order to improve their living standards is something that is not new and has been tried in the past.

Q.5

Option A

Note the double negative in the question. It's easier to pick the answer to this question by completing the sentence with the answer option and checking if the statement is true or false. Relocating government agencies has not always been a success because of a rise in pollution levels and congestion in the new locations. The passage does not mention a rise in pollution levels in smaller cities. So, this option is not supported by the passage. Relocating government agencies has not always been a success because of the difficulty of attracting talented, well-skilled people in more remote areas. This is true. (see paragraph 4 : 'agencies that are moved elsewhere can often recruit better workers on lower salaries than in capitals, where well-paying multinationals mop up

talent.'). Relocating government agencies has not always been a success because of increased avenues of corruption away from the capital city. Again, this is true. (see last paragraph) Relocating government agencies has not always been a success because of high staff losses, as people may not be prepared to move to smaller towns. This is also true. (see paragraph 4: 'swapping the capital for somewhere smaller is not always agreeable. Attrition rates can exceed 80%.') So, options B, C and D are true, while A is not.

Passage 2 : Detailed Solution

Q.1

Option D

The passage states that Dr. Watrall is 'not comfortable' about the arrangement between CyArk and Google as he sees the project as 'a way for Google to promote Google', and, at its core, 'about advertisements and driving traffic.' Options A is easily ruled out, as Dr. Watrall is not opposed to the use digital technology in archaeological sites. Option B is also incorrect. The fact that Dr. Watrall would like the images to belong to a museum or educational institution 'where there is serious scholarship' does not automatically imply that he is dismissive of laypeople's access to specialist images. Option C is incorrect as well. From the passage we gather that CyArk is a non-profit organisation that creates the 3D scanning of historic sites and that Google does not make money off the website. Option C labels both Google and CyArk as firms interested in the marketing of archaeological images for commercial use. This is false. Option D—that Dr. Watrall is critical about the links between a non-profit and a commercial tech platform for distributing archaeological images—is the correct choice.

Q.2

Option C

Note the context in which 'digital colonialism' is mentioned in the passage: '...the project is raising questions about Google's motivations and about who should own the digital copyrights. Some critics call it a form of "digital colonialism."' The problem, according to the passage, is that the countries need CyArk's permission to use the images for commercial purposes.' So, 'digital colonialism' is about the appropriation of the scan copyrights by CyArk-Google.

Passage 2 : Detailed Solution

Q.3

Option D

In Dr. Watrall's view, the CyArk-Google project is about Google promoting itself and benefitting through advertisements and traffic. Dr. Watrall believes these images, instead,

belong on the site of a museum or educational institution, 'where there is serious scholarship and a very different mission'. His concern relates, primarily, to how the images are put to use. If CyArk uploads its scanned images of archaeological sites onto museum websites, Dr. Watrall's objections are invalidated. Option A talks about Google's advertisements on the website hosting CyArk's scanned images. This only addresses a very small part of the issue raised by Dr. Watrall. Option B too is incorrect. Dr. Watrall is not opposed to CyArk scanning archaeological sites but is concerned about how the images are used. Option C is tempting, but incorrect. Dr. Watrall does not raise the issue of copyrights—this is discussed later in the passage.

Q.4

Option B

Dr. Thompson describes CyArk owning the copyright of its digital scans of archaeological sites as 'the latest example of a Western nation appropriating a foreign culture'. Option B is the one that closely matches this.

Q.5

Option C

The question asks us to choose the argument that is least likely to be used by the companies that digitally scan cultural sites. Companies that digitally scan cultural sites will choose to argue that it enables people who cannot physically visit these sites to experience them, that it helps to preserve precious images in case the sites are damaged or destroyed and that it provides images free of cost to all users. These companies, however, would not like it to be generally known that this project is a good way for them to acquire a sheen of culture.

Passage 3 : Detailed Solutions

Q.1

Option C

According to the author, high urban density makes cities green. The argument that high density of cities results in an increase in carbon dioxide and global warming goes against this. Options A and B are unrelated to the idea of greenness of big cities. According to the author, high urban density forces 'minimum energy and material use', thereby making cities green. Option 4 only talks of increasing cost of utilities for city dwellers, ignoring the point about recycling and reduced opportunities to be wasteful in big cities mentioned in the passage. So, it does not really help undermine the author's stand.

Q.2

Option D

Energy efficient transportation, recycling of material and sorting of garbage all relate to environment friendliness. Keeping streets clean, on the other hand, does not relate to environment friendliness as such.

Q.3

Option B

The author says that Calthorpe calling the city ‘the *most environmentally benign* form of human settlement’ jars most people. Why? Because people believe the opposite: that cities are not eco- friendly.

Of the given options A and C are easily ruled out. Calthorpe argues that the very fact that cities are crowded *contributes to* their environmental benignity. The point here is not the crowding, but the fact that Calthorpe regards this extreme compactness to be environment friendly.

Q.4

Option A

Note the context in which the author mentions Manaus: ‘One hundred thousand people *who would otherwise be deforesting the jungle around Manaus* are now prospering in town making such things as mobile phones and televisions’. The idea the author wants to convey is that employment in the city helps stop deforestation.

Q.5

Option D

That cities have suburban as well as office areas does not meaningfully relate to the idea that cities are good places to live in. In the passage, the author mentions employment opportunities (‘give people decent jobs. Then they can afford houses, and gain security’), prevention of destruction of the environment (example of Manaus) and cultural transformation (‘the progress is from hick to metropolitan to cosmopolitan’) as reasons for cities being good places to live in.

Passage 4 : Detailed Solutions

Q.1

Option A

The main idea of the passage is summed up in the last paragraph: ‘You are what you speak—the words that run throughout your mind are at least as fundamental to your selfhood as is your ethnicity or your gender.’

The author asks, ‘Which way is Oriental?’ to help readers realise that cultural hierarchies and barriers are not fixed and that they can be mitigated by learning another language.

Q.2

Option A

The author firmly believes that learning another language can help transcend cultural barriers. See paragraph 3: 'An individual who wrestles with a difficult language can learn to be more sympathetic to outsiders and open to different experiences of the world.'

Q.3

Option B

The author observes 'both the Chinese and the Egyptians welcomed me because I spoke their languages. My identity as a white male was far less important than my ability to communicate.' That is, he believes language can help overcome identity politics. His critics' view would be the opposite: language is insufficient to bridge cultural barriers.

Q.4

Option D

Observe what the author says about how the language learning process changes one's identity: 'This learning process—the embarrassments, the frustrations, the gradual sense of understanding and connection—is invariably transformative.'

The embarrassments, the frustrations= the ups and downs of learning a new language
The gradual sense of understanding and connection = Language's ability to mediate the impact of identity markers one is born with
In the last paragraph, the author states 'the words that run throughout your mind are at least as fundamental to your selfhood as is your ethnicity or your gender.' This relates to language's intrinsic connection to our notions of self and identity.

Only language evolution is not related to language's ability to change us. The author does not talk about language evolution in the passage.



Passage 5 : Detailed Solution

Q.1

Option B

The question asks which of the given statements cannot be inferred. Let us check each one by one. Option A states British colonialism was at least partly *an outcome* of Enlightenment rationalism. The fact that the colonial state emerged at least partly as a result of Enlightenment rationalism can be inferred from paragraph 1: 'the British colonial state represented the great conquering discourse of Enlightenment rationalism... As inheritors and *representatives* of this discourse, which carried everything before it, this colonial state could hardly adopt for long such a self-denying attitude...'

Option B states British colonialism faced resistance from existing structural forms of Indian modernity. This does not sound correct, as the passage only talks about European modernity, *not Indian modernity*. Paragraph 1 does mention that initiatives to introduce its logic of modernity on the Indian society by the British 'were resisted by pre-existing structural forms'. Were these structural forms of *Indian modernity*? This is not mentioned in the passage.

Consider option C. British colonialism was *at least partly shaped* by the project of European modernity. This is clearly true. See paragraph 1 : 'the British colonial state represented the great conquering discourse of Enlightenment rationalism.... As *inheritors* and representatives of this discourse.... this colonial state could hardly adopt for long such a self-denying attitude. It had restructured everything in Europe...and would do the same in India'. The British colonial state *inherited the discourse of Enlightenment rationalism* which had restructured everything in Europe.

Option D states that British colonialism allowed the treatment of colonies as experimental sites. This can also be easily inferred from paragraph 1: '....some empirically inclined theorists of that generation considered the colonies a massive laboratory of utilitarian or other theoretical experiments'.

Passage 5 : Detailed Solution

Q.2

Option D

The question asks us to choose the statement which *cannot* be seen as supporting the arguments in the passage.

Option A states that the introduction of capitalism in India was not through the transformation of feudalism, as happened in Europe. This statement supports the arguments in the passage. See what paragraph 2 says about the introduction of modernity by the British: 'First, however subtly, it would imply that *what was proposed to be built was something like European capitalism*. (And, in any case, historians have forcefully argued that *what it was to replace was not like feudalism*, with or without modificatory adjectives.)' The passage argues here that what European modernity tried to introduce was not like European capitalism and that what it tried to replace was not like feudalism in Europe.

Option B states that modernity was imposed upon India by the British and, therefore, led to underdevelopment. This statement also supports the arguments in the passage. That modernity was imposed on India can be inferred from multiple references in the passage, to quote a few : 'initiatives for modernity came to assume an external character. The acceptance of modernity came to be connected, ineradicably, with subjection' and '...transformation agendas attack as an *external force*'. That modernity imposed by the British led to underdevelopment can be inferred from the last lines of the passage: 'Economic reforms, or rather alterations *did not foreshadow the construction of a classical capitalist economy*, with its necessary emphasis on extractive and transport sectors. What happened

was the creation of a degenerate version of capitalism—what early dependency theorists called the ‘*development of underdevelopment*’. That is, economic reforms imposed by the British in India only resulted in underdevelopment.

Option C states that throughout the history of colonial conquest, natives have often been experimented on by the colonisers. This statement, too, supports the arguments in the passage. See paragraph 1: ‘...empirically inclined theorists of that generation considered the colonies a massive laboratory of utilitarian or other theoretical experiments.’ That is, colonizers regarded colonies as laboratories of practical or theoretical experiments.

Option D states that the change in British colonial policy was induced by resistance to modernity in Indian society. This statement does not support the arguments in the passage. Did the resistance to modernity in India *result in a change in* British colonial policy? The passage does not say this. The passage only talks of resistance resulting in a ‘the map of continuity and discontinuity’ being left behind at the time of independence. So, option D is the correct answer.

Q3.

Option C

The British colonial state could not settle for eminence at the cost of its marginality. That is, the British colonial state believed its superior modernity set it apart from the Indian society. But it did not want to be marginalised because of its modernity. So, it began to take initiatives to introduce the logic of modernity into Indian society. Option 3 best captures this.

Q4.

Option B

The passage can be summed up as follows. British colonial policy was guided by the idea of Enlightenment rationalism/ European modernity. Because they believed colonies could be used as laboratories, the British resolved they would do the same in India. However, this imposed modernity came to assume an external character. External modernity was associated with subjugation and met with stiff resistance. What the economic reforms resulted in was only a degenerate version of capitalism and underdevelopment.

Option B captures key ideas like ‘external modernity’ and ‘underdevelopment’ that none of the other options mention.

Q5.

OPTION D

‘Endogenous change’ means change from within. The first line means that the transformation of the Indian society did not proceed due to changes within the system. ‘Transformation agendas attack as an external force’ means the agenda to transform the society was imposed upon by external forces. Here, the external force is the colonial agenda. Option D sums this up best.

Q.25 Solution

Answer: 4132

Tricky question,

Sentence 1 says that conceptualisations of 'women's time' as contrary to clock-time and clock-time as synonymous with economic rationalism are two results of "this representation". The representation referred to here can only be the representation of clock-time in feminist literature as a masculine 'time is money' artefact—mentioned in sentence 4. Feminist literature representing clock-time as masculine implies the conceptualisation of 'women's time' as contrary to clock-time. The idea that time is money relates to economic rationalism. So, sentence 1 follows sentence 4

Sentence 3 introduces the idea of 'caring time'. Sentence 2 mentions all 4 conceptualisations of time referred to in sentences 4, 1 and 3. It is best placed at the end of the paragraph as it lays down the main premise of 'this article' that everyday caring practices incorporate a multiplicity of times. So, 4132 is the right order.

Q.26 Detailed Solution :

Answer : 2431

2431

The sentences given relate to adaptive behaviour, so sentence 2 offers the best start to the paragraph. Sentence 2 states that adaptive behaviour depends on cognitive economy—that is, minimising thinking and information processing effort—by treating objects as equivalent. Sentence 4 elaborates what 'treating objects as equivalent' involves. So, 4 follows 2. Of the remaining sentences, 3 logically follows 2, as it explains that the information we receive from the world has both structure and order. This introduces the idea of 'structure' in the living world. Sentence 1 adds to 3. So, 2431 is the correct order

Q.27 Detailed Solution :

OPTION C

The key idea of the passage is that language, which is unique to humans, is more than just linguistic features. It is a complex bundle of traits evolved over time that crucially draws on important cognitive aspects such as memory.

Option 3 is the only option that mentions the idea of language drawing upon aspects of cognition, such as memory. This is mentioned as a crucial feature in the paragraph and must hence feature in the summary.

Q.28 Detailed Solution :

OPTION D

The main idea of the paragraph is that hybrid organizations are more powerful and have higher ability to achieve critical mass as individuals with past involvement in other movements are more likely to join hybrid organizations. Option 4 captures the key ideas of the paragraph best.

Note here that though the paragraph cites the example of studies of the post-9/11 U.S. anti-war movement, this is not the focus of the passage. The example simply illustrates the idea that individuals with different points of view are more likely to join hybrid organisations.

Q.29 Detailed Solution :

Answer: **2143**

2143

Sentence 2 introduces the idea of 'atonality' in music. So, it is the best sentence to start the paragraph. Sentence 1 adds to 2, explaining that atonal music may seem like noise to the uninitiated listener. 2 leads to 4, which states that atonality is one of the most important movements in 20th century music. 3 adds to 4, explaining that a lot of knowledge, skill, and technical expertise required to compose or perform atonal music. 2143 is the logical order.

Q.30 Detailed Solution :

Answer: **2**

While sentences 1, 3, 4 and 5 relate to the reader of the single panel comic and the importance of the reader's ability to infer what happened before and after, sentence 2 is about the creator of the comics. So, 2 is the odd one out.

Q.31 Detailed Solution :

Answer: 1

Option 1 is about the importance of self-examination and rumination. All other sentences argue against rumination. The sentence order 4325 makes a coherent paragraph about illeism or speaking about oneself in the third person.

Q.32 Detailed Solution :

Answer: 2

Option 2

Sentences 1, 3, 4 and 5 relate to plastic in oceans affecting marine life, producing pervasive environmental problems. On the other hand, option 2 talks of the 'largest numerical proportion' of ocean plastic 'falling in small size fractions' – an unrelated idea.

Q.33 Detailed Solution :

Answer: 3421

3421

Of the given sentences, sentence 3 is the best opening statement. 3 leads on to 4, which defines teleology and the idea of nature as having a predetermined destiny with component parts. 2, which starts off with "these parts" clearly follows 4. 1 sums up the paragraph. So, 3421 is the correct order.

Q.34 Detailed Solution :

OPTION B

The paragraph given explains that while open-plan offices were created with the idea of liberating workers, things did not work to plan, as companies used these spaces to cram in as many workers as they could, in a soul-less "white-collar assembly line".

Option C states that wall-free spaces 'could have worked out' had companies cared for workers' satisfaction. But the paragraph given merely talks of *why* the idea of wall-free office spaces failed: 3 is hence not a satisfactory summary of the paragraph.

Option D is incorrect as it goes too far. The paragraph says companies took up the idea of wall-free spaces *less* out of a democratic ideology than a desire to pack in workers. This does not imply that companies don't believe in democratic ideology.

Options A and B are close, but 2 is a better option than 1 as it brings in the points about the 'utopian' (idealistic) intentions of the inventors of wall-free offices and the way cramming of workers became a means of invading their privacy and exploiting them.



CAT_2019_Quants_Que_67 to 100 With Solutions

- Q. 67 The salaries of Ramesh, Ganesh and Rajesh were in the ratio 6:5:7 in 2010, and in the ratio 3:4:3 in 2015. If Ramesh's salary increased by 25% during 2010-2015, then the percentage increase in Rajesh's salary during this period is closest to
1. 8 2. 7 3. 9 4. 10
- Q. 68 If x is a real number, then $\sqrt{\log_e \frac{4x-x^2}{3}}$ is a real number if and only if
1. $1 \leq x \leq 2$ 2. $-3 \leq x \leq 3$ 3. $1 \leq x \leq 3$ 4. $-1 \leq x \leq 3$
- Q. 69 In an examination, Rama's score was one-twelfth of the sum of the scores of Mohan and Anjali. After a review, the score of each of them increased by 6. The revised scores of Anjali, Mohan, and Rama were in the ratio 11:10:3. Then Anjali's score exceeded Rama's score by
1. 24 2. 26 3. 32 4. 35
- Q. 70: How many pairs (m,n) of positive integers satisfy the equation $2^m - 105 = 2^n$?
- Q. 71: Anil alone can do a job in 20 days while Sunil alone can do it in 40 days. Anil starts the job, and after 3 days, Sunil joins him. Again, after a few more days, Bimal joins them and they together finish the job. If Bimal has done 10% of the job, then in how many days was the job done?
1. 14 2. 13 3. 15 4. 12
- Q. 72: Two circles, each of radius 4 cm, touch externally. Each of these two circles is touched externally by a third circle. If these three circles have a common tangent, then the radius of the third circle, in cm, is
1. 2 2. $\pi / 3$ 3. $1/2$ 4. 1
- Q. 73: In an examination, the score of A was 10% less than that of B, the score of B was 25% more than that of C, and the score of C was 20% less than that of D. If A scored 72, then the score of D was
- Q. 74: A cyclist leaves A at 10 am and reaches B at 11 am. Starting from 10:01 am, every minute a motor cycle leaves A and moves towards B. Forty-five such motor cycles reach B by 11 am. All motor cycles have the same speed. If the cyclist had doubled his speed, how many motor cycles would have reached B by the time the cyclist reached B?
1. 23 2. 20 3. 15 4. 22
- Q. 75: The average of 30 integers is 5. Among these 30 integers, there are exactly 20 which do not exceed 5. What is the highest possible value of the average of these 20 integers?
1. 4 2. 3.5 3. 4.5 4. 5

- Q. 84: The strength of a salt solution is $p\%$ if 100 ml of the solution contains p grams of salt. Each of three vessels A, B, C contains 500 ml of salt solution of strengths 10%, 22%, and 32%, respectively. Now, 100 ml of the solution in vessel A is transferred to vessel B. Then, 100 ml of the solution in vessel B is transferred to vessel C. Finally, 100 ml of the solution in vessel C is transferred to vessel A.
The strength, in percentage, of the resulting solution in vessel A is
1. 12 2. 17 3. 13 4. 15
- Q. 85: How many factors of $24 \cdot 35 \cdot 104$ are perfect squares which are greater than 1?
- Q. 86: What is the largest positive integer n such that $\frac{n^2 + 7n + 12}{n^2 - n - 12}$ is also positive integer?
1. 8 2. 12 3. 16 4. 6
- Q. 87: Let a, b, x, y be real numbers such that $a^2 + b^2 = 25, x^2 + y^2 = 169$, and $ax + by + 65$. If $k = ay - bx$, then
1. $k = 0$
2. $0 < k \leq \frac{5}{13}$
3. $k = \frac{5}{13}$
4. $k > \frac{5}{13}$
- Q. 88: Let A be a real number. Then the roots of the equation $x^2 - 4x - \log_2 A = 0$ are real and distinct if and only if
1. $A > 1/16$ 2. $A > 1/8$ 3. $A < 1/16$ 4. $A < 1/8$
- Q. 89: A shopkeeper sells two tables, each procured at cost price p , to Amal and Asim at a profit of 20% and at a loss of 20%, respectively. Amal sells his table to Bimal at a profit of 30%, while Asim sells his table to Barun at a loss of 30%. If the amounts paid by Bimal and Barun are x and y , respectively, then $(x - y) / p$ equals
1. 0.7 2. 1 3. 1.2 4. 0.50
- Q. 90: Mukesh purchased 10 bicycles in 2017, all at the same price. He sold six of these at a profit of 25% and the remaining four at a loss of 25%. If he made a total profit of Rs. 2000, then his purchase price of a bicycle, in Rupees, was
1. 8000 2. 6000 3. 4000 4. 2000
- Q. 91: John gets Rs 57 per hour of regular work and Rs 114 per hour of overtime work. He works altogether 172 hours and his income from overtime hours is 15% of his income from regular hours. Then, for how many hours did he work overtime?

- Q. 92: A man makes complete use of 405 cc of iron, 783 cc of aluminium, and 351 cc of copper to make a number of solid right circular cylinders of each type of metal. These cylinders have the same volume and each of these has radius 3 cm. If the total number of cylinders is to be kept at a minimum, then the total surface area of all these cylinders, in sq cm, is
 1. 8464π 2. 928π 3. $1044 (4 + \pi)$ 4. $1026 (1 + \pi)$
- Q. 93: Let ABC be a right-angled triangle with hypotenuse BC of length 20 cm. If AP is perpendicular on BC, then the maximum possible length of AP, in cm, is
 1. 10 2. $6\sqrt{2}$ 3. $8\sqrt{2}$ 4. 5
- Q. 94: The base of a regular pyramid is a square and each of the other four sides is an equilateral triangle, length of each side being 20 cm. The vertical height of the pyramid, in cm, is
 1. $8\sqrt{3}$ 2. 12 3. $5\sqrt{5}$ 4. $10\sqrt{2}$
- Q. 95: Let f be a function such that $f(mn) = f(m) f(n)$ for every positive integers m and n . If $f(1)$, $f(2)$ and $f(3)$ are positive integers, $f(1) < f(2)$, and $f(24) = 54$, then $f(18)$ equals
- Q. 96: If $(2n+1)+(2n+3)+(2n+5)+\dots+(2n+47) = 5280$, then what is the value of $1+2+3+\dots+n$?
- Q. 97: If $5^x - 3^y = 13438$ and $5^{x-1} - 3^{y+1} = 9686$ then $x+y$ equals
- Q. 98: Let A and B be two regular polygons having a and b sides, respectively. If $b = 2a$ and each interior angle of B is $\frac{3}{2}$ times each interior angle of A, then each interior angle, in degrees, of a regular polygon with $a + b$ sides is
- Q. 99: The number of common terms in the two sequences: 15, 19, 23, 27, ... 415 and 14, 19, 24, 29, ... , 464 is
 1. 18 2. 19 3. 21 4. 20
- Q. 100: Amal invests Rs 12000 at 8% interest, compounded annually, and Rs 10000 at 6% interest, compounded semi-annually, both investments being for one year. Bimal invests his money at 7.5% simple interest for one year. If Amal and Bimal get the same amount of interest, then the amount, in Rupees, invested by Bimal is

Solution 67 _ to _ 100

Solution 67:

Let their salaries in 2010 be $6x$, $5x$ and $7x$ respectively.
 Also, let their salaries in 2015 be $3y$, $4y$ and $3y$ respectively
 Given, $3y = 1.25 \times 6x$
 $Ory = 2.5 x$.
 Therefore, salary of Rajesh in 2015 = $3y = 3 \times 2.5x = 7.5 x$

$$\text{Percentage increase} = \left(\frac{7.5x - 7x}{7x} \right) \times 100 \approx 7\%$$

Solution 68:

The expression will be real only if

$$\log_e \frac{4x - x^2}{3} \geq 0$$

$$\text{Or } \frac{4x - x^2}{3} \geq e^0$$

$$\Rightarrow \frac{4x - x^2}{3} \geq 1$$

$$\Rightarrow 4x - x^2 \geq 3$$

$$\Rightarrow x^2 - 4x + 3 \leq 0$$

$$\Rightarrow (x-1)(x-3) \leq 0$$

$$1 \leq x \leq 3$$

Solution 69:

Let their scores after review be $11x$, $10x$, and $3x$ respectively.

Therefore, their scores before review was: $(11x-6)$, $10x-6$ and $(3x-6)$ respectively.

Given, Rama's score was one-twelfth of the sum of the scores of Mohan and Anjali.

$$\Rightarrow (3x - 6) = \frac{1}{12} [(11x - 6) + (10x - 6)]$$

$$\Rightarrow 12(3x - 6) = 21x - 12$$

$$\Rightarrow 36x - 72 = 21x - 12$$

$$\Rightarrow 36x - 21x = 72 - 12 = 60$$

$$\Rightarrow x = 4$$

$$\text{Now, Anjali's score} - \text{Rama's score} = (11x-6) - (3x-6) = 8x = 32.$$

Solution 70:

Shortcut:

$$\text{Number of pairs} = \frac{\text{number of factors } 105}{2}$$

$$105 = 3 \times 5 \times 7$$

$$\text{Number of factors} = 2 \times 2 \times 2 = 8$$

$$\text{Hence, required number of pairs} = 8/2 = 4$$

Detailed Explanation:

$$m^2 + 105 = n^2$$

$$\Rightarrow n^2 - m^2 = 105$$

$$\Rightarrow (n-m)(n+m) = 105$$

Since m and n are positive integers, $(n-m) < (n+m)$

Splitting 105 in two factors, we get

$$\Rightarrow (n-m)(n+m) = 1 \times 105$$

$$\text{For } (n-m) = 1 \text{ and } (n+m) = 105, (m, n) = (52, 53)$$

$$\Rightarrow (n-m)(n+m) = 3 \times 35$$

$$\text{For } (n-m) = 3 \text{ and } (n+m) = 35, (m, n) = (16, 19)$$

$$\Rightarrow (n-m)(n+m) = 5 \times 21$$

$$\text{For } (n-m) = 5 \text{ and } (n+m) = 21, (m, n) = (8, 13)$$

$$\Rightarrow (n-m)(n+m) = 7 \times 21$$

$$\text{For } (n-m) = 7 \text{ and } (n+m) = 21, (m, n) = (4, 11)$$

Hence there are four pairs.

Solution 71:

Let the work be of 40 units

Amount of work done by Anil in one day = $40/20 = 2$ units

Amount of work done by Sunil in one day = $20/20 = 1$ units

Bimal does 10% work i.e. 4 units.

Rest $40 - 4 = 36$ units is done by Anil and Sunil.

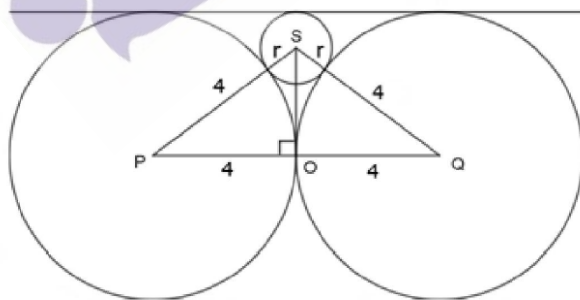
Let Anil took x days. Therefore, Sunil took $(x-3)$ days. Therefore,

$$2 \times x + 1 \times (x-3) = 36$$

Or $x = 13$ days.

Solution 72:

Refer to the figure



$$SO = 4 - r.$$

Applying Pythagoras theorem in triangle POS, we get

$$(4+r)^2 = 4^2 + (4-r)^2$$

$$\Rightarrow (4+r)^2 - (4-r)^2 = 16$$

$$\Rightarrow 4 \times 4 \times r = 16$$

$$\Rightarrow r = 1$$

Solution 73:

Given A = 72

Also, $A = 0.9 \times B \Rightarrow B = A/0.9 = 72/0.9 = 80$.

And $B = 1.25 \times C \Rightarrow C = B/1.25 = 80/1.25 = 64$

And $C = 0.8 \times D \Rightarrow D = C/0.8 = 64/0.8 = 80$.

Solution 74:

Time taken by cyclist to cover the distance AB = 60 min

Given, starting from 10:01 am, every minute a motor cycle leaves A and moves towards B.

Forty-five such motor cycles reach B by 11 am.

Also, the speed of all the motor cycles is same.

That means that the 45th motor cycle which started at 10:45 am, reached B exactly at 11

am. Rest all reached B some time before B.

Therefore, each motor cycle takes 15 min to cover the distance AB.

Now, if the cyclist doubles his speed, then he will reach B in 30 min i.e. at 10:30 am.

So, the 15th motor cycle (started at 10:15 am from A) would be the last motor cycle to reach point B at 10:30 am.

Hence, there will be 15 motor cycles would have reached B by the time the cyclist reached B.

Solution 75:

Let a be the average of 20 numbers whose average does not exceed 5.

Let b be the average of rest of the 10 numbers. Clearly, $b > 5$ i.e. the average of these numbers exceeds 5.

Therefore,

$$30 \times 5 = 20a + 10b$$

$$\Rightarrow 2a + b = 15$$

$$\Rightarrow b = 15 - 2a$$

Going by the options, we can say that when $a = 4.5$, $b = 6$ which satisfies all the conditions.

Solution 76:

$$\text{Speed of John} = 6 \text{ kmph} = 6 \times \frac{5}{18} = \frac{5}{3} \text{ m/s}$$

$$\text{Speed of Mary} = 7.5 \text{ kmph} = 7.5 \times \frac{5}{18} = \frac{25}{12} \text{ m/s}$$

Let the track length of A and B be x and y respectively.

Given, $x + y = 325$ (1)

Time taken by John to cover one round of A = $\frac{x}{5/3}$ sec

Therefore, time taken to cover 9 rounds = $9 \times \frac{x}{5/3} = \frac{27}{5}x$ sec

Therefore, time taken to cover 5 rounds = $5 \times \frac{y}{25/12} = \frac{12}{5}y$ sec

As per the condition :

$$\frac{27}{5}x = \frac{12}{5}y$$

$$\Rightarrow \frac{x}{y} = \frac{12}{27} = \frac{4}{9}$$

Putting in equation (1) we get $x=100$ and $y=225$.

Time taken by Mary to cover one round of A = $\frac{100}{25/12} = 48$ sec

Solution 77:

Let the number be ABCDEF, where A, B, C, D, E, and F be the digits.

Given,

$$C=A$$

$$B=2A$$

$$F=A+B+C=A+2A+A=4A$$

$$E=A+B=A+2A=3A$$

$$D=E+F=3A + 4A=7A.$$

Since A and D both are digit, the maximum possible value of $A=1$. Therefore, the maximum value of $D=7$.

Solution 78:

$$\text{Sum of roots} = 4a+3a=7a=-b$$

$$\text{Or } b=-7a$$

$$\text{Product of roots} = 4a \times 3a = c$$

$$\text{Or } c = 12a^2$$

$$\text{Now, } b^2 + c = (-7a)^2 + 12a^2 = 61a^2$$

Comparing the options.

Option 1: $61a^2 = 3721 \Rightarrow a^2 = 61$, clearly a is not an integer.

Option 2: $61a^2 = 549 \Rightarrow a^2 = 9$ we can have $a = -3$ or 3 (an integer)

Option 3: $61a^2 = 427 \Rightarrow a^2 = 7$, clearly a is not an integer.

Option 4: $61a^2 = 361 \Rightarrow a^2 = \frac{361}{61}$ clearly a is not an integer.

Solution 79:

$$2^{6x} + 2^{3x} \times 2^2 - 21 = 0$$

Take $2^{3x} = y$

$$\Rightarrow y^2 + 4y - 21 = 0$$

$$\Rightarrow (y - 3)(y + 7) = 0$$

$$\Rightarrow y = 3 \text{ or } y = -7$$

$$\Rightarrow 2^{3x} = 3 \text{ or } 2^{3x} = -7 \{ \text{No solution} \}$$

$$\Rightarrow 3x = \log_2 3$$

$$\Rightarrow x = \frac{\log_2 3}{3}$$

Solution 80:

for $n = 1$, $a_1 = n \Rightarrow a_1 = 1$

for $n = 2$, $a_1 - a_2 = 2 \Rightarrow a_2 = -1$

for $n = 3$, $a_1 - a_2 + a_3 = 3 \Rightarrow a_3 = 1$

for $n = 4$, $a_1 - a_2 + a_3 - a_4 = 4 \Rightarrow a_4 = -1$

From the pattern, each odd term = 1 and each even term = -1

$$\Rightarrow a_{51} + a_{52} + \dots + a_{1022} = 0$$

Therefore the value is equal to $a_{1023} = 1$

Solution 81:

Let the track length be $10x$.

When they meet at 10 am, ant A travelled $6x$ of the distance and ant B travelled $4x$ of the distance.

Therefore, $\frac{\text{Speed of ant A}}{\text{Speed of ant B}} = \frac{6x}{4x} = \frac{3}{2}$

And, the ratio of time taken by A and B to cover the same distance = $\frac{2}{3}$

The distance by ant A from meeting point to point P was $4x$. Similarly, the distance covered

by ant B from meeting point to point P was $6x$.

Given, ant A took 12 min to reach P.

Therefore, to cover a distance of $4x$, time taken by ant B = $\frac{3}{2} \times 12 = 18$ min.

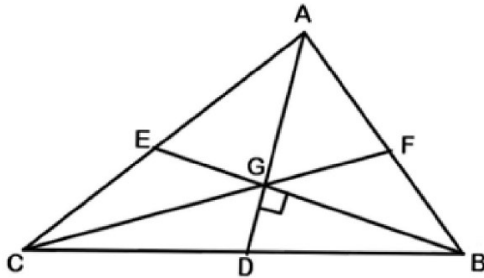
But, ant B has to cover a total of $6x$ distance.

Hence, the time required = $\frac{6x}{4x} \times 18 = 27$ min.

Therefore, ant B reaches P at 10:27 am.

Solution 82:

Refer to the figure below:



Draw the third median CF. We know the following facts:

1. The intersection point of medians i.e. centroid (G) divides each median into 2:1.
2. All three medians divide the triangle into 6 parts of equal area.

$$GD = \frac{1}{3} \times AD = \frac{1}{3} \times 12 = 4$$

$$GB = \frac{2}{3} \times BE = \frac{2}{3} \times 9 = 6$$

$$\text{Area of triangle BGD} = \frac{1}{2} \times GB \times GD = \frac{1}{2} \times 6 \times 4 = 12$$

$$\text{Hence, area of triangle ABC} = 6 \times 12 = 72$$

Solution 83:

Let there number of fiction and non fiction books in 2010 be x and y respectively.

From the first condition:

$$x + y = 11500 \dots (1)$$

From the second condition:

$$1.1 \times x + 1.2 \times y = 11500 \dots (2)$$

Solving both the equations, we get $x = 6000$.

In 2015, the number of fiction books = $1.1x = 6600$

Solution 84:

Initial amount of salt in vessel A = 10 gms per 100 ml, therefore in 500 ml the amount of salt = 50 gms

Initial amount of salt in vessel B = 22 gms per 100 ml, therefore in 500 ml the amount of salt = 110 gms

Initial amount of salt in vessel C=32 gms per 100 ml, therefore in 500 ml the amount of salt =160 gms

When 100 ml is trasfered from A to B, the amount of salt now in B = 10+110=120 gms in 600ml.

The new concentration of salt in B = 120/600=20 gms per 100 ml.

Also, the amount of salt lef in A =50-10 =40 gms in 400ml.

Now, when 100 ml is trasfered from B to C, the amount of salt now in C = 20+160=180 gms in 600ml.

The new concentration of salt in C= 180/600=30 gms per 100 ml.

Finally, when 100 ml is trasfered from C to A, the amount of salt now in A = 30+40=70 gms in 500ml.

Therefore, the strength of salt in $A = \frac{70}{500} \times 100 = 14\%$

Solution 85:

$$2^4 \times 3^5 \times 10^4 = 2^8 \times 3^5 \times 5^4$$

For perfect squares, we have to take only even powers of the prime factors of the number.

The number of ways 2's can be used is 5 i.e. $2^0, 2^2, 2^4, 2^6, 2^8$

The number of ways 3's can be used is 3 i.e. $3^0, 3^2, 3^4$

The number of ways 5's can be used is 3 i.e. $5^0, 5^2, 5^4$

Therefore, the total number of factors which are perfect squares = $5 \times 3 \times 3 = 45$

But this also includes the number 1. Hence excluding 1, the required number is $45-1=44$.

Solution 86:

$$\frac{n^2 + 7n + 12}{n^2 - n - 12} = \frac{(n+3)(n+4)}{(n-4)(n+3)} = \frac{(n+4)}{(n-4)}$$

$$\Rightarrow \frac{(n+4)}{(n-4)} = \frac{(n-4+8)}{(n-4)} = 1 + \frac{8}{(n-4)}$$

The expression is positive integer if $\frac{8}{(n-4)}$ is integer.

Or (n-4) must be factor of 8.

For n to be largest, n-4=8

Or n =12

Solution 87:

Shortcut:

We can take a=5, b=0, x=13 and y=0 as values which satisfies all three equations.

Hence, $k = ay - bx = 5 \times 0 - 0 \times 13 = 0$

Solution 88:

For quadratic equation $ax^2 + bx + c = 0$ the, roots are real and distinct if $b^2 - 4ac > 0$

Given, $x^2 - 4x - \log_2 A = 0$

$$\therefore (-4)^2 - 4 \times 1 \times (-\log_2 A) > 0$$

$$\Rightarrow 16 + 4 \log_2 A > 0$$

$$\Rightarrow \log_2 A > -4$$

$$\Rightarrow A > 2^{-4}$$

$$\Rightarrow A > \frac{1}{16}$$

Solution 89:

Cost of table for Aman = $1.2p$

Cost of table for Asim = $0.8p$

Aman sells to Bimal at $1.3 \times 1.2p = 1.56p = \text{cost of table for Bimal} = x$

Asim sells table to Barun at $0.7 \times 0.8p = 0.56p = \text{cost of table for Barun} = y$

Therefore, $\frac{x - y}{p} = \frac{1.56p - 0.56p}{p} = 1$

Solution 90:

Let the cost of each bicycle be x .

From the given condition:

$$10x + 2000 = 6 \times 1.25x + 4 \times 0.75x$$

$$\Rightarrow x = 4000$$

Solution 91:

Let the number of hours for regular and overtime work be x and y respectively.

We have two equations:

$$x + y = 172 \dots (1)$$

$$114y = \frac{15}{100} \times 57x \dots (2)$$

On solving both the equations, we get $x = 160$ and $y = 12$.

Hence, his overtime work = 12 hours

Solution 92:

To get the minimum number of cylinders, the volume of each of the cylinder must be HCF of 405, 783, and 351

$$\Rightarrow HCF(405, 783, 351) = 27$$

Therefore, number of cylinders of iron = $\frac{405}{27} = 15$

and, number of cylinders of aluminum = $\frac{783}{27} = 29$

and, number of cylinders of copper = $\frac{351}{27} = 13$

Hence, the total number of a cylinders = $15 + 29 + 13 = 57$

Also, volume of each cylinder = 27 cc

$$\Rightarrow \pi r^2 h = 27$$

$$\Rightarrow \pi \times 3^2 \times h = 27$$

$$\Rightarrow h = \frac{3}{\pi}$$

And total surface area of each cylinder = $2\pi r(r + h)$

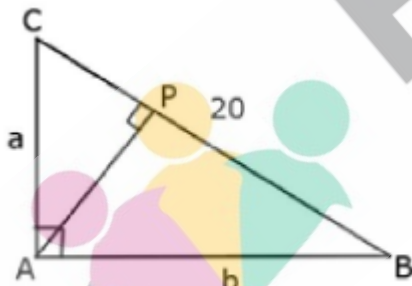
$$= 2\pi \times 3 \left(3 + \frac{3}{\pi} \right) = 18(\pi + 1)$$

Hence, total surface area of 57 cylinders = $57 \times 18(\pi + 1)$

$$= 1026(\pi + 1)$$

Solution 93:

Refer to the figure:



For this right angle triangle, we have the following relations.

$$a^2 + b^2 = 20^2 = 400 \dots (1) \text{ and}$$

$$AP = \frac{ab}{20} \dots (2)$$

For maximum value of AP, we have to maximize the product ab.

Applying $AM \geq GM$ inequality we get

$$\frac{a^2 + b^2}{2} \geq \sqrt{a^2 \times b^2}$$

$$\Rightarrow \frac{400}{2} \geq ab$$

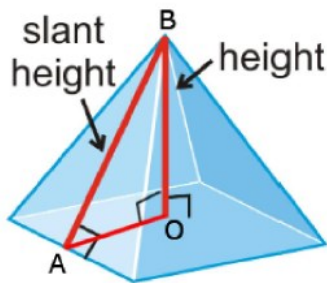
$$\Rightarrow ab \leq 200$$

Hence the maximum value of $ab = 200$.

Therefore, the maximum value of $AP = \frac{200}{20} = 10$

Solution 94:

From the diagram, it is obvious that AB is the height of the equilateral triangle and is also the slant height of the pyramid.



$$\text{Therefore, } AB = \frac{\sqrt{3}}{2} \times \text{side} = \frac{\sqrt{3}}{2} \times 20 = 10\sqrt{3}$$

$$\text{And } AO = \frac{1}{2} \times \text{side} = \frac{1}{2} \times 20 = 10$$

Applying Pythagoras theorem in triangle AOB

$$OB^2 = AB^2 - OA^2$$

$$= (10\sqrt{3})^2 - 10^2$$

$$= 200$$

Hence, the height of the pyramid $(OB) = 10\sqrt{2}$

Solution 95:

$$\text{Given, } f(mn) = f(m)f(n)$$

$$\text{Also, } f(24) = 54$$

$$\Rightarrow f(24) = 2 \times 3 \times 3 \times 3$$

$$\Rightarrow f(2 \times 12) = f(2)f(12) = f(2)f(2 \times 6) = f(2)f(2)f(6) = f(2)f(2)f(2 \times 3) =$$

$$f(2)f(2)f(2)f(3) = 2 \times 3 \times 3 \times 3$$

Given that $f(1)$, $f(2)$ and $f(3)$ are all positive integers, by comparison, we get

$$f(2) = 3 \text{ and } f(3) = 2. \text{ And we can safely take } f(1) = 1$$

$$\text{Now, } f(18) = f(2)(9) = f(2)f(3 \times 3) = f(2)f(3)f(3) = 3 \times 2 \times 2 = 12$$

Solution 96:

The sequence $(2n+1) + (2n+3) + (2n+5) + \dots + (2n+47) = 5280$, is in arithmetic progression with first term $(a) = 2n+1$, common difference $(d) = 2$ and last term $(t_n) = 2n+47$.

Let 'm' be the number of terms in this sequence.

The last term of A.P. is given by $a+(n-1)d$

$$\Rightarrow (2n+1) + (m-1)(2) = 2n+47$$

$$\Rightarrow m = 24$$

Also,

$$(2n+1) + (2n+3) + (2n+5) + \dots + (2n+47) = 5280,$$

$$= \frac{24}{2} [2(2n+1) + (24-1) \times 2]$$

$$= 24(2n+1+23) = 48(n+12)$$

$$\text{Therefore, } 48(n+12) = 5280 \Rightarrow n = 98$$

$$\text{Hence, } 1+2+3+\dots+n = \frac{n(n+1)}{2} = \frac{98 \times 99}{2} = 4851$$

Solution 97:

Taking 2nd equation

Taking 2nd equation

$5^{x-1} + 3^{y+1} = 9686$, the last digit of 5^{x-1} will always be 5 for all positive integral values of x

The power cycle of 3 is:

$$3^{4k+1} \equiv 3$$

$$3^{4k+2} \equiv 9$$

$$3^{4k+3} \equiv 7$$

$$3^{4k} \equiv 1$$

Clearly 3^{y+1} must be in the form of 3^{4k} as the unit digit of R.H.S. =6

We have $3^4 = 81$, and $3^8 = 6561$

Also, $9686 - 8|1 = 9605$ and $9686 - 6561 = 3125$

Observe that $3125 = 5^5$

Hence $5^{x-1} = 5^5$

or $x = 6$ and $3^{y+1} = 3^8 \Rightarrow y = 7$

($x=6$ and $y=7$ also satisfies the first equation)

Therefore, $x + y = 6 + 7 = 13$

Solution 98:

The formula for each interior angle = $180 - \frac{360}{n}$ where 'n' is the side of the regular polygon

$$\Rightarrow 180 - \frac{360}{2a} = \frac{3}{2} \left(180 - \frac{360}{a} \right)$$

$$\Rightarrow 360 - \frac{360}{a} = 540 - \frac{3 \times 360}{a}$$

$$\Rightarrow \frac{2 \times 360}{a} = 180$$

$$\Rightarrow a = \frac{2 \times 360}{180}$$

$$\Rightarrow a = 4 \text{ and } b = 2a = 8$$

Polygon with each side = $a + b = 4 + 8 = 12$, will have each interior angle = $180 - \frac{360}{12}$

=150

Solution 99:

Both the sequences are in arithmetic progression.

The common difference (d_1) for the first sequence = 4

The common difference (d_2) for the first sequence = 5

The first term common is 19.

The common terms will also be in arithmetic progression with common difference

$$LCM(d_1, d_2) = LCM(4, 5) = 20$$

Let there be 'n' terms in this sequence, then the last term would be ≤ 415

$$\text{i.e. } a + (n-1)d \leq 415$$

$$\Rightarrow 19 + (n-1) \times 20 \leq 415$$

$$\Rightarrow (n-1) \times 20 \leq 415 - 19$$

$$\Rightarrow (n-1) \times 20 \leq 396$$

$$\Rightarrow (n-1) = \left[\frac{396}{20} \right] \text{ where } [] \text{ is the greatest integer}$$

$$\Rightarrow (n-1) = 19$$

$$\Rightarrow n = 20$$

Solution 100:

Let the amount invested by Bimal be Rs. P

Given, the interest incomes for both are equal. Therefore,

$$\left[12000 \left(1 + \frac{8}{100} \right) - 12000 \right] + \left[10000 \left(1 + \frac{3}{100} \right)^2 - 10000 \right] = \frac{P \times 7.5 \times 1}{100}$$

Solving for P we get P = Rs. 20920

