

CAT2004 Original Paper with Solutions

SECTION – I (DI)

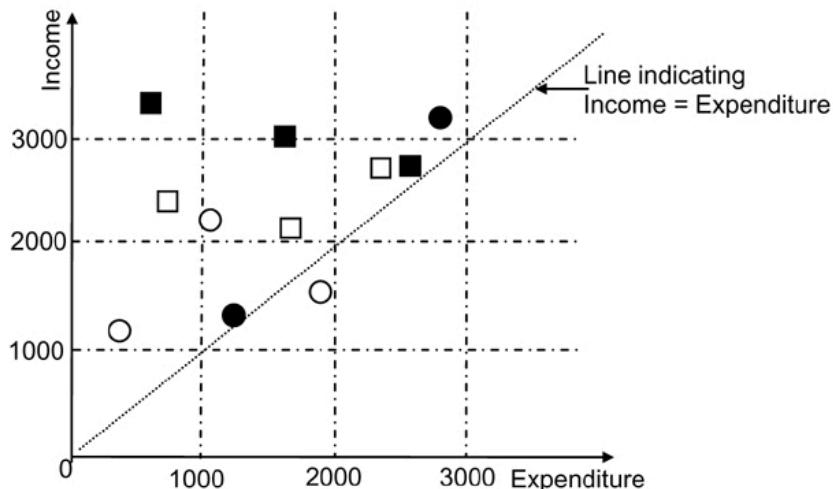
Sub-section I –A: Number of Questions = 26

Note: Questions 1 to 26 carry one mark each.

Directions for Questions 1 to 4: Answer the questions on the basis of the information given below.

The data points in the figure below represent monthly income and expenditure data of individual members of the Ahuja family (■), the Bose family (□), the Coomar family (○), and the Dubey family (●). For these questions savings is defined as

$$\text{Savings} = \text{Income} - \text{Expenditure}.$$



1. Which family has the lowest average income?
 (1) Ahuja (2) Bose (3) Coomar (4) Dubey

Solution:

By observation, the average income of the Coomar family is less than 2000 while that of other families is more than 2000.

Alternative Method:

The total income of the Ahuja family $\approx 3200 + 3000 + 2800 = 9000$

Approximate average income of the Ahuja family
 $= \frac{9000}{3} = 3000$

Similarly approximate average income of the Bose family
 $\approx \frac{2300 + 2100 + 2800}{3} = \frac{7200}{3} = 2400$

Approximate average income of the Coomar family
 $= \frac{1100 + 2200 + 1600}{3} = \frac{4900}{3} \approx 1633$

Approximate average income of the Dubey family
 $= \frac{3200 + 1200}{3} = \frac{4400}{2} = 2200$ Choice (3)

2. Which family has the highest average expenditure?
 (1) Ahuja (2) Bose (3) Coomar (4) Dubey

Solution:

By observation, the average expenditure of the Dubey family is close to 2000 while that of other families is less than 2000.

Alternative Method:

Approximate average expenditure of the Ahuja family
 $= \frac{800 + 1700 + 2700}{3} = \frac{5200}{3} \approx 1733$

Approximate average expenditure of the Bose family
 $= \frac{900 + 1600 + 2300}{3} = 1600$

Approximate average expenditure of the Coomar family
 $= \frac{400 + 1100 + 1900}{3} \approx 1133$

Approximate average expenditure of the Dubey family
 $= \frac{1200 + 2800}{2} = 2000$ Choice (4)

3. The highest amount of savings accrues to a member of which family?

- (1) Ahuja (2) Bose
 (3) Coomar (4) Dubey

Solution:

The highest amount of savings accrues to a member of the Ahuja family i.e., $3200 - 800 = 2400$.

Alternative Method:

To get the highest savings, the amount of expenditure should be closest to the y-axis and the income should be farthest from the x-axis. By observing the graph, we can see that a member from the Ahuja family is satisfying the condition.

Choice (1)

Solution:

$$\text{Approximate average savings of the Ahuja family} = \frac{2500 + 1300 + 100}{3} = \frac{3900}{3} = 1300$$

$$\text{Approximate average savings of the Bose family} = \frac{1600 + 400 + 400}{3} = \frac{2400}{3} = 800$$

$$\text{Approximate average savings of the Coomar family} = \frac{700 + 1100 - 300}{3} = 500$$

$$\text{Approximate average savings of the Dubey family} = \frac{0 + 400}{2} = 200$$

Choice (4)

Directions for Questions 5 to 8: Answer the questions on the basis of the information given below.

The Dean's office recently scanned student results into the central computer system. When their character reading software cannot read something, it leaves that space blank. The scanner output reads as follows:

Name	Finance	Marketing	Statistics	Strategy	Operations	GPA
Aparna		B	F			1.4
Bikas	D	D	F	F		
Chandra		D	A	F	F	2.4
Deepak	A	B		D	D	3.2
Fazal	D	F	B		D	2.4
Gowri	C	C	A		B	3.8
Hari		B	A		D	2.8
Ismet			B		A	
Jagdeep	A	A	B		C	3.8
Kunal	F		A	F	F	1.8
Leena	B	A		B	F	3.2
Manab			A	B	B	
Nisha	A	D	B	A	F	3.6
Osman	C		B	B	A	4.6
Preeti	F	D		D		3.2
Rahul	A	C	A		F	4.2
Sameer		C	F	B		
Tara	B					2.4
Utkarsh			F	C	A	3.0
Vipul	A		C	C	F	2.4

In the grading system, A, B, C, D, and F grades fetch 6, 4, 3, 2 and 0 grade points respectively. The Grade Point Average (GPA) is the arithmetic mean of the grade points obtained in the five subjects. For example Nisha's GPA is $(6 + 2 + 4 + 6 + 0)/5 = 3.6$.

Some additional facts are also known about the students' grades. These are

- (a) Vipul obtained the same grade in Marketing as Aparna obtained in Finance and Strategy.

(b) Fazal obtained the same grade in Strategy as Utkarsh did in Marketing.

(c) Tara received the same grade in exactly three courses.

5. What grade did Preeti obtain in Statistics?
(1) A (2) B (3) C (4) D

Solution:

Total points for Preeti = $3.2 \times 5 = 16$

Total points for Project = $3.2 \times 5 = 16$
 Grades in Finance, Marketing and Strategy are F, D & D respectively, which amounts to $(0 + 2 + 2) = 4$ marks
 \therefore In Statistics and Operations she has $(16 - 4) = 12$ marks.

12 marks
: She has to get both A grades Choice (1)

Choice (1)

Solution:

Total points for Tara is $2.4 \times 5 = 12$

It is given that she has the same number of points in exactly 3 courses. Since the total is 12, she can't have 3 As. She cannot have 3 Cs because she already has 1 B and with 3 Cs the total would become $3 \times 3 + 4 = 13$ which is more than 12. She cannot have 3 Ds because the total points from four subjects becomes 10. She must then have 1 more D in the last subject to make the total 12 i.e., she ends up with the same grade in 4 subjects, which violates the given condition.

She cannot have 3 Fs because irrespective of the grade she gets in the 5th subject, her total will not be 12.
 ∴ she can have 3 B's and 2 F's (total can be 12)
 ∴ In Operations she can get either B or F as the grade.
 Since Ismet, Hari and Jagdeep none have B or F as the grade in Operations, the answer is Manab.

Manab.
Choice (4)

7. What grade did Utkarsh obtain Finance?
 (1) B (2) C (3) D (4) F

Solution:

Total points for Fazal = 12
 \therefore Grade in Strategy would be B.
 \therefore Utkarsh's Marketing grade = B.
 Total points for Utkarsh = 15
 \therefore In Finance, Utkarsh's points = $15 - (4 + 0 + 3 + 6) = 2$
 \therefore i.e., Grade 'D'. Choice (3)

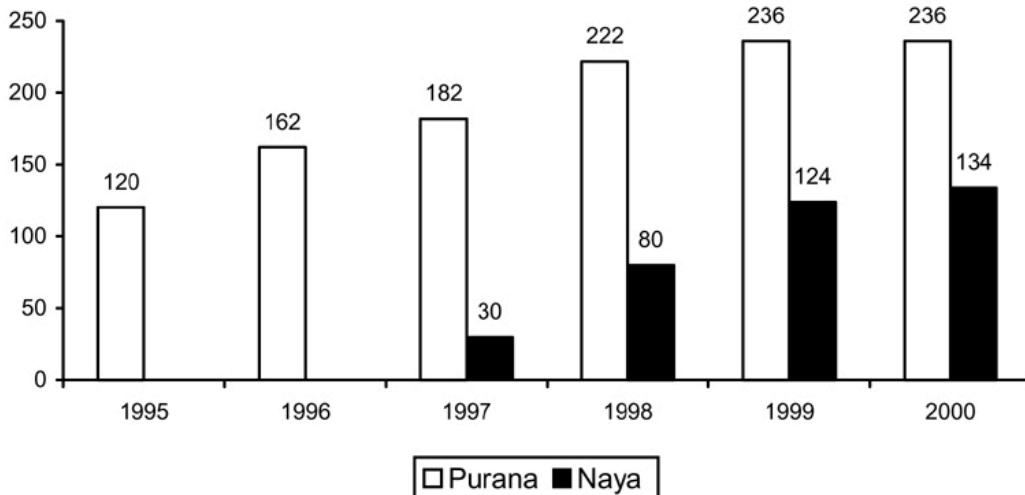
8. In Strategy, Gowri's grade point was higher than that obtained by
 (1) Fazal (2) Hari (3) Nisha (4) Rahul

Solution:

Total points for Gowri = $3.8 \times 5 = 19$
 \therefore In Strategy she has $19 - (3 + 3 + 6 + 4) = 3$ points i.e., Grade 'C'
 Since, Nisha, Fazal and Rahul have higher grades than Gowri, the only possibility could be Hari.
 Choice (2)

Directions for Questions 9 to 12: Answer the questions on the basis of the information given below.

Purana and Naya are two brands of kitchen mixer-grinder available in the local market. Purana is an old brand that was introduced in 1990, while Naya was introduced in 1997. 20% of the mixer-grinders bought in a particular year are disposed off as junk exactly two years later. It is known that 10 Purana mixer-grinders were disposed off in 1997. The following figures show the number of Purana and Naya mixer-grinders in operation from 1995 to 2000, as at the end of the year.



9. How many Naya mixer-grinders were purchased in 1999?
 (1) 44 (2) 50 (3) 55 (4) 64

Solution:

It is given that 20% of the mixer-grinders are disposed off after two years. Therefore, in the year 1999, $6 (= 20\% \text{ of } 30)$ mixer-grinders were disposed. Also, the number of mixer-grinders in circulation in 1999 is 124 and in 1998 is 80. The difference is 44.
 \therefore Total number of mixer-grinders purchased is $(44 + 6) = 50$. Choice (2)

10. How many Naya mixer-grinders were disposed off by the end of 2000?
 (1) 10
 (2) 16
 (3) 22
 (4) Cannot be determined from the data

Solution:

In the year 1998, $(80 - 30) = 50$ mixer-grinders were purchased.
 \therefore In the year 2000, $10 (= 20\% \text{ of } 50)$ were disposed. Similarly, number of mixer-grinders bought in 1997 is 30.
 \therefore the number of mixer-grinders disposed in 1999 is $6 (= 20\% \text{ of } 50)$
 \therefore Total number of mixer-grinders disposed off by the end of 2000 is 16. Choice (2)

11. How many Purana mixer-grinders were purchased in 1999?
 (1) 20
 (2) 23
 (3) 50
 (4) Cannot be determined from the data

Solution:

Since it is known that 10 purana mixer-grinders were disposed off in 1997, the number of mixer-grinders in circulation in 1997 should have been $162 - 10 = 152$. But it is given as 182 which implies that 30 were purchased.

\therefore Number of mixer-grinders disposed off in 1999 should be $6. (= 20\% \times 30)$ \therefore Number of mixer-grinders in circulation in 1999 should have been $222 - 6 = 216$. But it is given as 236, which implies that the number of purana mixer-grinders purchased in 1999 is $236 - 216 = 20$. Choice (1)

12. How many Purana mixer-grinders were disposed off in 2000?
 (1) 0
 (2) 5
 (3) 6
 (4) Cannot be determined from the data

Solution:

Since information about purana mixer-grinders is not known for the even-numbered years (1996, 1998, etc), the number of mixer-grinders disposed off in 2000 cannot be determined. Choice (4)

Directions for Questions 13 to 16: Answer the question on the basis of the information given below.

Prof. Singh has been tracking the number of visitors to his homepage. His services provider has provided him with the following data on the country of origin of the visitors and the university they belong to:

COUNTRY	Number of visitors		
	1	2	3
Canada	2	0	0
Netherlands	1	1	0
India	1	2	0
UK	2	0	2
USA	1	0	1

UNIVERSITY	Number of visitors		
	1	2	3
University 1	1	0	0
University 2	2	0	0
University 3	0	1	0
University 4	0	0	2
University 5	1	0	0
University 6	1	0	1
University 7	2	0	0
University 8	0	2	0

13. To which country does University 5 belong?

- (1) India or Netherlands but not USA
- (2) India or USA but not Netherlands
- (3) Netherlands or USA but not India
- (4) India or USA but not UK

14. University 1 can belong to

- (1) UK (2) Canada
- (3) Netherlands (4) USA

15. Visitors from how many universities from UK visited Prof. Singh's homepage in the three days?

- (1) 1 (2) 2 (3) 3 (4) 4

16. Which among the listed countries can possibly host three of the eight listed universities?

- (1) None (2) Only UK
- (3) Only India (4) Both India and UK

Solutions for questions 13 to 16:

Looking at the data, on day 3 there were "2 visitors" from UK and "1 visitor" from USA.

Also, on day 3, 2 visitors were from University 4.

∴ University 4 is located in UK.

Similarly, University 6 is in USA.

Likewise, on Day 2 there were

- (i) 2 visitors from India
 - (ii) 2 visitors from university 8
- From (i) and (ii), University 8 is located in India
Also on Day 2

- (iii) 1 visitor was from Netherlands
- (iv) 1 visitor was from University 3

From (iii) and (iv) University 3 is located in Netherlands.

The total number of visitors from USA on day 1 is 1 and on day 3 is also 1. From the above, we have observed that University 6 belongs to USA. The number of visitors from University 6 on day 1 is also 1.

∴ No other university belongs to USA.

The total number of visitors from UK on day 1 is 2. We have already observed that University 4 belongs to UK. But from University 4, the number of visitors on day 1 is 0, which means that from among University 2 and University 7, one belongs to UK and the other belongs to Canada (which has 2 visitors on day 1).

The total number of visitors from India on day 1 is 1. Between University 1 and University 5, one belongs to India and the other should belong to Netherlands which also has only 1 visitor on day 1. From the above explanation we deduce the following table

Hence,

University	Country
University 1	India/Netherlands
University 2	Canada/U.K.
University 3	Netherlands
University 4	U.K.
University 5	India/Netherlands
University 6	USA
University 7	Canada/U.K.
University 8	India

13. From the above table. Choice (1)

14. From the above table. Choice (3)

15. The universities that belong in UK are

- (1) University 4
- (2) One of university 2 and University 7.

∴ Number of universities from UK is 2.

Choice (2)

16. From the above table, it is clear that none of the countries has three universities. Choice (1)

Directions for Questions 17 to 20: Answer the questions on the basis of the information given below.

A study was conducted to ascertain the relative importance that employees in five different countries assigned to five different traits in their Chief Executive Officers. The traits were Compassion (C), Decisiveness (D), Negotiation skills (N), Public Visibility (P), and Vision (V). The level of dissimilarity between two countries is the maximum difference in the ranks allotted by the two countries to any of the five traits. The following table indicates the rank order of the five traits for each country.

Rank	Country				
	India	China	Japan	Malaysia	Thailand
1	C	N	D	V	V
2	P	C	N	D	C
3	N	P	C	P	N
4	V	D	V	C	P
5	D	V	P	N	D

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Solutions for questions 17 to 20:

Level of Dissimilarity = Maximum difference in ranks allotted to any two countries on any of the five traits.

For example, dissimilarity between India and China

Trait	India's Rank	China's Rank	Difference
C	1	2	1
P	2	3	1
N	3	1	2
V	4	5	1
D	5	4	1

From the above table the maximum difference is 2.
 \therefore The dissimilarity level between India and China is 2.

17. Calculating the level of dissimilarity for India Vs remaining countries
China : For the parameter N $(3 - 1) = 2$
Japan : For the parameter D $(5 - 1) = 4$
Malaysia : For the parameter C $(4 - 1) = 3$
Thailand : For the parameter V $(4 - 1) = 3$
 \therefore the least level of dissimilarity is 2 which is for China. Choice (1)

18. From above calculations, the highest level of dissimilarity is 4 which is for Japan. Choice (2)

19. The level of dissimilarity between
China and Japan is for the parameter D $(4 - 1) = 3$
India and China is for the parameter N $(3 - 1) = 2$
Malaysia and Japan is for the parameter V $(4 - 1) = 3$
Thailand and Japan is for the parameter D $(5 - 1) = 4$
Choice (4)

20. The level of dissimilarity between
Malaysia and China is for the parameter V $(5 - 1) = 4$
China and Thailand is for the parameter V $(5 - 1) = 4$
Thailand and Japan is for the parameter D $(5 - 1) = 4$
Japan and Malaysia is for the parameter V $(4 - 1) = 3$.
Choice (4)

Directions for Questions 21 to 26: Each question is followed by two statements, A and B. Answer each question using the following instructions:

Choose 1 if the question can be answered by using one of the statements alone but not by using the other statement alone.

Choose 2 if the question can be answered by using either of the statements alone.

Choose 3 if the question can be answered by using both statements together but not by either statement alone.

Choose 4 if the question cannot be answered on the basis of the two statements.

- 21.** Four candidates for an award obtain distinct scores in a test. Each of the four casts a vote to choose the winner of the award. The candidate who gets the largest number of votes wins the award. In case of a tie in the voting process, the candidate with the highest score wins the award. Who wins the award?

A: The candidates with top three scores each vote for the top scorer amongst the other three.

B: The candidate with the lowest score votes for the player with the second highest score.

Solution:

From statement (A) alone

The person with the highest score votes for the person with the second highest score and the person with the second highest score votes for the person with the highest score and the person with the third highest score votes for the person with the highest score.

∴ After this voting, the person with the highest score got 2 votes and the person with the second highest score got one vote.

No information is given about the person who got the lowest score. This person can vote for any other person. The possible cases are

Case (i) If this person votes for the top scorer, then the top scorer wins the award.

Case (ii) If this person votes for the second top scorer then, the second top scorer gets 2 votes and the winner gets one less than 2.

If there is a tie, the person with the highest score wins, i.e., the top scorer wins the award.

Case (iii) If this person votes for the third highest scorer, then the top scorer wins the award.

∴ Statement (A) alone is sufficient.

We know only about the person for which the person with lowest score voted, and nothing about the

persons for which the other persons voted.
∴ Statement (B) alone is not sufficient.

Choice (1)

- 22.** Zakib spends 30% of his income on his children's education, 20% on recreation and 10% on healthcare. The corresponding percentages for Supriyo are 40%, 25%, and 13%. Who spends more on children's education?

A: Zakib spends more on recreation than Supriyo.
B: Supriyo spends more on healthcare than Zakib.

Solution:

Let the incomes of Zakib and Supriyo be x and y respectively. The expenditure of Zakib and Supriyo on different heads is

	Zakib	Supriyo
Children's Education	0.3x	0.4y
Recreation	0.2x	0.25y
Health care	0.1x	0.13y

From statement (A) alone

$$0.2x > 0.25y$$

Multiplying the inequality with 1.5, we get $0.3x > 0.375y$

From this we cannot say whether $0.3x$ is greater than $0.4y$ or not.

∴ Statement (A) alone is not sufficient.

From statement (B) alone

$$0.1x < 0.13y$$

Multiplying the inequality with 3, we get $0.3x < 0.39y$

From this we can say that $0.3x$ is less than $0.4y$.

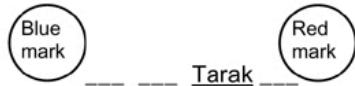
∴ Statement (B) alone is sufficient. Choice (1)

23. Tarak is standing 2 steps to the left of a red mark and 3 steps to the right of a blue mark. He tosses a coin. If it comes up heads, he moves one step to the right; otherwise he moves one step to the left. He keeps doing this until he reaches one of the two marks, and then he stops. At which mark does he stop?

A: He stops after 21 coins tosses.

B: He obtains three more tails than heads.

Solution:



From statement (A) alone

As the number of steps is odd, Tarak could not reach the Red mark, which is only 2 steps (i.e., even number of steps) away from Tarak. Tarak should have reached the Blue mark. Statement (A) alone is sufficient.

From statement (B) alone

As the net movement is three steps to the left side, he will reach the Blue mark.

∴ Statement (B) alone is sufficient.

Choice (2)

24. In a class of 30 students, Rashmi secured the third rank among the girls, while her brother Kumar studying in the same class secured the sixth rank in the whole class. Between the two, who had a better overall rank?

A: Kumar was among the top 25% of the boys merit list in the class in which 60% were boys.

B: There were three boys among the top five rank holders, and three girls among the top ten rank holders.

Solution:

From statement (A) alone

We only know that Kumar got one of the top four ranks among boys. As his exact rank is not known, we cannot determine who among Kumar or Rashmi got the better rank. This is because if Kumar got 1st, 2nd or 3rd rank among boys then his rank is not better than Rashmi's rank.

If Kumar got the 4th rank among boys then Kumar's rank is better than Rashmi's rank.

∴ Kumar's rank may or may not be better than Rashmi's rank.

∴ Statement (A) alone is not sufficient.

From statement (B) alone

As we know that there are three boys among the top five rank holders, there will only be two girls among the top five rank holders. So we can say that the third ranker among girls i.e., Rashmi will get a rank lower than 6 i.e., lower than the rank of Kumar.

∴ Statement (B) alone is sufficient. Choice (1)

25. Nandini paid for an article using currency notes of denominations Re.1, Rs.2, Rs.5 and Rs.10 using at least one note of each denomination. The total number of five and ten rupee notes used was one more than the total number of one and two rupee notes used. What was the price of the article?

A: Nandini used a total of 13 currency notes.

B: The price of the article was a multiple of Rs.10.

Solution:

Let the number of currency notes of denomination Re.1, Rs.2, Rs.5 and Rs.10 be represented by P, Q, R, and S respectively. It is given that $P + Q < R + S$. Using statement (A) alone,

$$P + Q + R + S = 13$$

$$\Rightarrow P + Q = 6, R + S = 7.$$

We cannot find the unique values of P, Q, R and S.

∴ Statement (A) alone is not sufficient

From statement (B) alone

As we do not know any thing about the number of notes of different denominations, statement (B) alone is not sufficient.

Using both the statements, we get $P + Q = 6$ and $R + S = 7$.

If $P = 2, Q = 4, R = 2$ and $S = 5$, we get the cost of the article as $2 + 8 + 10 + 50 = 70$.

If $P = 2, Q = 4, R = 4$ and $S = 3$, we get the cost of the article as $2 + 8 + 20 + 30 = 60$.

∴ The unique value of the cost of the article cannot be found. Choice (4)

26. Ravi spent less than Rs.75 to buy one kilogram each of potato, onion, and gourd. Which one of the three vegetables bought was the costliest?

A: 2 kg potato and 1 kg gourd cost less than 1 kg potato and 2 kg gourd.

B: 1 kg potato and 2 kg onion together cost the same as 1 kg onion and 2 kg gourd.

Solution:

Let cost of potato be represented by 'p', onion by 'n' and gourd by 'g'.

From statement (A) alone

$$2p + g < 1p + 2g \Rightarrow p < g$$

As we do not know anything about the cost of onion, we cannot answer the question.

From statement (B) alone

$$1p + 2n = 1n + 2g \Rightarrow 1p + 1n = 2g$$

This alone is not sufficient to answer the question.

Using both the statements,

$$As\ p < g\ and\ p + n = 2g \Rightarrow g < n$$

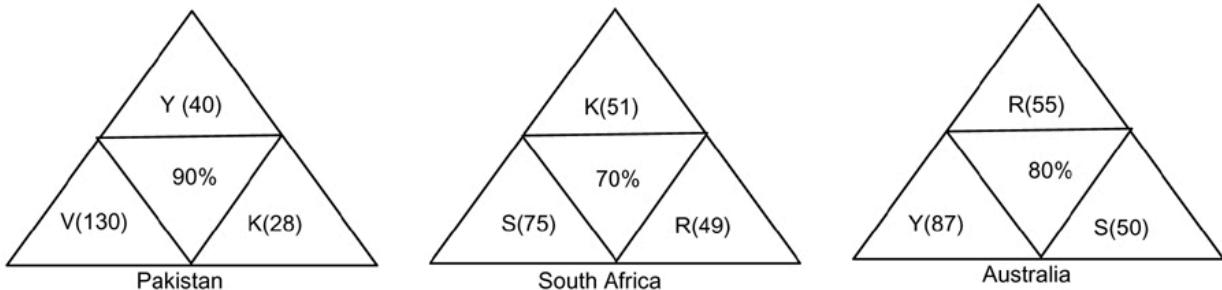
∴ We can answer using both the statements together. Choice (3)

Sub-section I – B: Number of Questions = 12

Note: Questions 27 to 38 carry two marks each.

Directions for Questions 27 to 30: Answer the questions on the basis of the information given below.

Coach John sat with the score cards of Indian players from the 3 games in a one-day cricket tournament where same set of players played for India and all the major batsmen got out. John summarized the batting performance through three diagrams, one for each game. In each diagram, the three outer triangles communicate the number of runs scored by the three top scorers from India, where K, R, S, V, and Y represent kaif, Rahul, Saurav, Virender and Yuvraj respectively. The middle triangle in each diagram denotes the percentage of total score that was scored by the top three Indian scorers in that game. No two players score the same number of runs in the same game. John also calculated two batting indices for each player based on his scores in the tournament; the R-index of a batsman is the difference between his highest and lowest scores in the 3 games while the M-index is the middle number, if his scores are arranged in a non-increasing order.



Solutions for questions 27 to 30:

R index = Highest score – Lowest score

M – Middle number when scores are arranged in non-increasing order.

Against Pakistan, total score of the top three batsmen

$$= Y + V + K = 40 + 130 + 28 = 198$$

As 198 is 90% of the total score, total score = $\frac{100}{90} \times 198 = 220$.

This means that the runs scored by the rest of the batsmen = $220 - 198 = 22$.

By similar reasoning, we get the following table:

	Pakistan	South Africa	Australia	Total	R-index	M-index (Taking highest and lowest possible values)
K	28	51	(≤ 48)	79 to 127	23 to 51	28 (for 51, 28, 0 to 28) 29 to 48 (for 51, 29 to 48, 28)
R	(≤ 22)	49	55	104 to 126	33 to 55	49 (for 55, 49, 0 to 22)
S	(≤ 22)	75	50	125 to 147	53 to 75	50 (for 75, 50, 0 to 22)
V	130	(≤ 48)	(≤ 48)	130 to 226	82 to 130	1 to 48 (for 130, 0 to 48, 0 to 48)
Y	40	(≤ 48)	87	127 to 176	47 to 87	41 to 48 (for 87, 41 to 48, 40) 40 (for 87, 40, 0 to 40)
Total (3 Batsman)	198 (90%)	175 (70%)	192 (80%)			
Total score	220	250	240			
Total (Rest of the batsmen)	22 (10%)	75 (30%)	48 (20%)			

27. As can be observed from the table, the total score of Rahul ranges from 104 to 126, whereas Yuvraj's score ranges from 127 to 176. ∴ Rahul definitely scored less than Yuvraj. The others may or may not score less than Yuvraj. Choice (2)

28. As it can be observed from the table, Sourav's M-index happens to be the best (i.e., 50). Choice (2)

29. From the table, we find that it is possible to calculate the exact M-index only for Rahul and Sourav. Choice (3)

30. Only Kaif, Rahul or Yuvraj can have the lowest R-index from the tournament, as each of them stands a chance of getting the R-index less than or equal to 51. Choice (1)

Directions for Questions 31 to 34: Answer the questions on the basis of the information given below.

Twenty-one participants from four continents (Africa, Americas, Australasia, and Europe) attended a United Nations conference. Each participant was an expert in one of four fields, labour, health, population studies, and refugee relocation. The following five facts about the participants are given.

- (a) The number of labour experts in the camp was exactly half the number of experts in each of the three other categories.
 - (b) Africa did not send any labour expert. Otherwise, every continent, including Africa, sent at least one expert for each category.
 - (c) None of the continents sent more than three experts in any category.
 - (d) If there had been one less Australasian expert, then the America would have had twice as many experts as each of the other continents.
 - (e) Mike and Alfano are leading experts of population studies who attended the conference. They are from Australasia.

34. If Ramos is the lone American expert in population studies, which of the following is NOT true about the numbers of experts in the conference from the four continents?

 - (1) There is one expert in health from Africa.
 - (2) There is one expert in refugee relocation from Africa.
 - (3) There are two experts in health from the Americas.
 - (4) There are three experts in refugee relocation from the Americas.

Solutions for questions 31 to 34:

It is given that the number of labour experts is half the number of experts in each of the other categories. Let the number of labour experts be x .

$$x + 2x + 2x + 2x = 21 \Rightarrow x = 3$$

∴ Number of labour experts = 3

and number of experts in each of the other categories = 6. Given that, if there had been one less Australasian expert, then the Americans would have had twice as many experts as each of the other continents.

Let the number of Americans be $2y$.

$$2y + y + (y + 1) + y = 21$$

$$\therefore y = 4.$$

So number of Americans = 8

Number of Australasian

Number of Africans = 4

It is also given that except Africa in labour category, every continent sent at least one expert in each category.

	Labour	Health	Pop. Studies	Refugee	
Africa (4)	0	1/2	½	1/2	4
Americas (8)	1	3/2	2/1	3/2	8
Australasia (5)	1	1	2	1	5
Europe (4)	1	1	1	1	4
	3	6	6	6	

31. It is given that Alex is one of the American experts in refugee relocation. From the table, there can be 1 more or 2 more American experts in the same category. Choice (3)

32. Number of labour experts from the Americas = 1
Number of health experts from Europe = 1
Number of health experts from Australia = 1
Number of experts in refugee relocation from Africa = 2/1 Choice (4)

33. From the given choices, the statements in the first three choices are possible from the given table.
The statement in choice (4) i.e., Africa and the Americas had 1 expert each in population studies attending the conference is not possible as in this case the total number of experts in population studies is 5. i.e., 2 from Australia, 1 from Africa, 1 from Europe and 1 from the Americas. ∴ This is not possible. Choice (4)

34. If the Americas had 1 expert in population studies, the remaining Americans should be distributed in 2 remaining fields i.e., 3 + 3. Hence the number of health experts from Americas cannot be 2. Choice (3)

Directions for Questions 35 to 38: Answer the questions on the basis of the information given below.

The year was 2006. All six teams in pool A of World Cup hockey, play each other only once. Each win earns a team three points, a draw earns one point and loss earns zero points. The two teams with the highest points qualify for the semi-finals. In case of a tie, the team with highest goal difference (Goal For- Goals Against) qualifies. In the opening match, Spain lost to Germany. After the second round (after each team played two matches), the pool table looked as shown below.

Pool A

Teams	Games Played	Won	Drawn	Lost	Goals For	Goals Against	Points
Germany	2	2	0	0	3	1	6
Argentina	2	2	0	0	2	0	6
Spain	2	1	0	1	5	2	3
Pakistan	2	1	0	1	2	1	3
New Zealand	2	0	0	2	1	6	0
South Africa	2	0	0	2	1	4	0

In the third round, Spain played Pakistan, Argentina played Germany, and New Zealand played South Africa. All the third round matches were drawn. The following are some results from the fourth and fifth round matches.

- (a) Spain won both the fourth and fifth round matches.
- (b) Both Argentina and Germany won their fifth round matches by 3 goals to 0.
- (c) Pakistan won both the fourth and fifth round matches by 1 goal to 0.

35. Which one of the following statements is true about matches played in the first two rounds?

- (1) Germany beat New Zealand by 1 goal to 0.
- (2) Spain beat New Zealand by 4 goals to 0.
- (3) Spain beat South Africa by 2 goals to 0.
- (4) Germany beat South Africa by 2 goals to 1.

36. Which one of the following statements is true about matches played in the first two rounds?

- (1) Pakistan beat South Africa by 2 goals to 1.
- (2) Argentina beat Pakistan by 1 goal to 0.
- (3) Germany beat Pakistan by 2 goals to 1.
- (4) Germany beat Spain by 2 goals to 1.

37. Which team finished at the top of the pool after five rounds of matches?

- (1) Argentina
- (2) Germany
- (3) Spain
- (4) Cannot be determined

38. If Pakistan qualified as one of the two teams from Pool A, which was the other team that qualified?

- (1) Argentina
- (2) Germany
- (3) Spain
- (4) Cannot be determined

Solutions for questions 35 to 38:

For the data given in the table, it is possible to find the exact results of all the first six matches. Here, the number of goals for and goals against (given in the table) are used along with the number of wins/losses of each team.

- (i) Given that Spain lost to Germany.
- (ii) Argentina's total goal position is 2 – 0 (in its favour) and number of wins is 2. Hence, the only possibility is that it won both its matches, 1 – 0 and 1 – 0.
- (iii) Germany's total goal position is 3 – 1 (in its favour) and number of wins is 2. Hence, the only possibility is that it won both its matches, 2 – 1 and 1 – 0.

Hence, Spain which scored a total of 5 goals and scored not more than 1 goal against Germany, must have scored at least 4 goals in its second match and won it.

- (iv) Now, considering the only teams against which Spain could have won its match by at least 4 goals (i.e., Pakistan, New Zealand and South Africa) Pakistan and South Africa are not possibilities. This is because (a) Pakistan has only 1 goal against it and (b) South Africa has only 4 goals against it and it lost two matches. So if Spain scored 4 goals against it, then the other team that won against South Africa should have scored 0 goals, which is not possible. Hence Spain won against New Zealand. Spain won the match with a score of 5 – 1 or 4 – 0. Since New Zealand's total goal tally is 1 – 6, New Zealand lost its other match with a score of 0 – 1 or 1 – 2.

- (v) Pakistan's total goal position is 2 – 1 (in its favour) and number of wins is 1. Hence, the only possibility is that it lost one match 0 – 1 and won the other 2 – 0. Pakistan could have won against South Africa, New Zealand or Spain. But Spain lost to Germany and won against New Zealand. So both of Spain's matches are accounted for. Also, as New Zealand could not have lost its other match with a score of 0 – 2, the only team against which Pakistan could have won is South Africa, and it must have won this match 2 – 0.

Therefore, South Africa lost its other match 1 – 2 (since its total goal position is 1 – 4, against it), and this could have been lost to either Germany or Argentina. But since Argentina won both its matches 1 – 0 and 1 – 0, it must have been Germany that won against South Africa.

- (vi) Now the only countries that won against New Zealand are Argentina and Spain. But from (ii) we know that Argentina won both its matches 1 – 0 and 1 – 0, therefore New Zealand lost its other match to Spain 1 – 5 (since its total goal position is 1 – 6, against it).

- (vii) Now the only possibility is that Argentina won its other match, over Pakistan 1 – 0.

Thus, the results of the first six matches are as tabulated.

Winner (W)	Germany	Germany	Argentina	Argentina	Pakistan	Spain
Loser (L)	Spain	South Africa	Pakistan	New Zealand	South Africa	New Zealand
Score (W – L)	1 – 0	2 – 1	1 – 0	1 – 0	2 – 0	5 – 1

35. Of the given statements, Germany beat South Africa by 2 goals to 1 is true.
Choice (4)

36. Of the given statements, Argentina beat Pakistan by 1 goal to 0 is true.
Choice (2)

Note for solutions to Questions 37 and 38:

In order to be able to solve the given data for further information it is necessary to closely observe the definition / meaning of the term "round", as used in the question. There are two possible interpretations as given below:

- (i) Each round is a definite set of 3 matches, played by six different teams. Thus, at the end of every round, every team would have played an equal number of matches. Thus, the total of 15 matches in the tournament, (i.e., ${}^6C_2/2$) are conducted in 5 rounds of 3 matches each, in that chronological order.
- (ii) Each round is a team-specific concept. In other words, the fourth match of South Africa could possibly be against the fifth match of Spain. Hence in a single match we have South Africa playing its fourth round but Spain playing its fifth round.

From the information given in the directions along with the table, it is possible to infer the following about the possible interpretations (either the first or the second) of "round".

- The statement "After the second round (after each team played two matches)," seems to suggest that the first interpretation is correct.
- Also, the statements (a) and (c) given below refer to "the fourth and fifth round matches" even when the term "round" is not defined.
- The statement (b) mentions "their fifth round" suggests that the second interpretation, i.e., "round" is a team specific concept, is correct.

Finally, due to the following two reasons, we feel that the second interpretation is what was intended by the CAT Examiner.

- (i) It is not clearly mentioned that after each round all the teams would have played an equal number of matches.
- (ii) The data given in statements (a), (b) and (c) will become inconsistent with the rest of the information, if the first interpretation is considered. [The statements together given four winners in round five, but the first interpretation allows for at most three winners only, i.e., only three matches, in a single round].

The two questions Q37 and Q38 are now solved under this interpretation of the term "round".

Third round matches

All the three third round matches are draws and the goal difference in each is 0.

Results of third round matches (The 7th, 8th and 9th matches)

Match between	Result	Goal difference of each team
Argentina – Germany	Draw	0
Spain – Pakistan	Draw	0
New Zealand – South Africa	Draw	0

Fourth and fifth round matches (The 10th match through the 15th match)

Of the total six matches, the winners are Spain in two matches, Pakistan in two matches, Argentina in one match and Germany in one match.

The losers are South Africa in two matches, New Zealand in two matches, Germany in one match and Argentina in one match.

Results of these six matches

Winner(W)	Spain	Spain	Pakistan	Pakistan	Germany	Argentina
Loser(L)						
Score (W – L)			1 – 0	1 – 0	3 – 0	3 – 0

Germany has already played with Spain and Argentina
∴ It lost its game against Pakistan
and it already played with South Africa
∴ It won its game against New Zealand.
Argentina already played with Germany and Pakistan.
∴ It lost its game against Spain
and it already played with New Zealand.
∴ It won its game against South Africa.
Spain already played against New Zealand in the first round.
∴ It won the other game (in fourth and fifth rounds) against South Africa.
Pakistan won the other game against New Zealand.

The results of fourth and fifth rounds are

Winner	Spain	Spain	Pakistan	Pakistan	Germany	Argentina
Loser	South Africa	Argentina	Germany	New Zealand	New Zealand	South Africa
Score	?	?	1 – 0	1 – 0	3 – 0	3 – 0

Number of wins, losses and draws of different teams after all the rounds

Team	Wins against	Losses against	Draws Against	Number of wins	Number of losses	Number of draws
Germany	Spain, New Zealand, South Africa	Pakistan	Argentina	3	1	1
Argentina	Pakistan, New Zealand, South Africa	Spain	Germany	3	1	1
Spain	Argentina, New Zealand, South Africa	Germany	Pakistan	3	1	1
Pakistan	Germany, New Zealand, South Africa	Argentina	Spain	3	1	1
South Africa	—	Argentina, Spain, Germany, Pakistan	New Zealand	0	4	1
New Zealand	—	Argentina, Spain, Germany, Pakistan	South Africa	0	4	1

As all the four teams – Germany, Spain, Argentina and Pakistan – scored equal number of wins and draws and each of these four teams will have a total of $3 \times 3 + 1 \times 0 + 1 \times 1 = 10$ points. Hence we have to calculate the goal difference of each team to find the order of the teams for qualifying them.

Note: There are two matches whose effect on the goal differences of the teams involved is not known. They are:

(1) Spain wins over South Africa.

(2) Spain wins over Argentina.

∴ Goal differences of different teams are

(i) Germany

Against	Spain	South Africa	Argentina	Pakistan	New Zealand
Result	win	win	draw	loss	Win
Score	1 – 0	2 – 1	-	0 – 1	3 – 0
Goal difference	+1	+1	+0	-1	+3

The goal difference for Germany is $+1 + 1 + 0 - 1 + 3 = +4$

(ii) Pakistan

Against	Argentina	South Africa	Spain	Germany	New Zealand
Result	Loss	win	draw	win	win
Score	0 – 1	2 – 0	-	1 – 0	1 – 0
Goal difference	-1	+2	+0	+1	+0

The goal difference for Pakistan is $-1 + 2 + 0 + 1 + 0 = +3$

(iii) Argentina

Against	Pakistan	New Zealand	Germany	Spain	South Africa
Result	Win	win	draw	loss	win
Score	1 – 0	1 – 0	-	-	3 – 0
Goal difference	+1	+1	+0	at most -1	+3

The goal difference for Argentina is $+1 + 1 + 0 + (at most -1) + 3 = at most +4$

(iv) Spain

Against	Germany	New Zealand	Pakistan	South Africa	Argentina
Result	Loss	win	draw	win	win
Score	0 – 1	5 – 1	-	-	-
Goal difference	-1	+4	+0	at least +1	at least +1

The goal difference for Spain is $-1 + 4 + 0 + (at least +1) + (at least +1) = at least +5$

Spain	at least +5
Germany	+4
Argentina	at most +4
Pakistan	+3

37. The team that finished at the top of the pool at the end of the tournament is Spain with the highest goal difference (i.e., at least +5.)

Choice (3)

38. As the goal difference for Pakistan is less when compared to that of both Germany and Spain, it is not possible for Pakistan to qualify as one of the two teams.

Hence, as the question talks of a situation that is not possible, we think that this question should be ignored.

Note: However, if the CAT Examiners, for any reason, do not reconsider this question, it is possible that they will consider choice (3) (i.e., Spain) to be the correct answer. This is since, anyone who does not work out the complete results of all the 15 matches could possibly come to the conclusion that the goal difference of Spain is more than that of Pakistan. Hence, it could be concluded that Pakistan qualifying means that Spain also qualified. But however Germany also has a higher goal difference than Pakistan.

Choice (3)

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45. Karan and Arjun run a 100-metre race, where Karan beats Arjun by 10 metres. To do a favour to Arjun, Karan starts 10 metres behind the starting line in a second 100-metre race. They both run at their earlier speeds. Which of the following is true in connection with the second race?

- (1) Karan and Arjun reach the finishing line at the same time.
- (2) Arjun beats Karan by 1 metre.
- (3) Arjun beats Karan by 11 metres.
- (4) Karan beats Arjun by 1 metre.

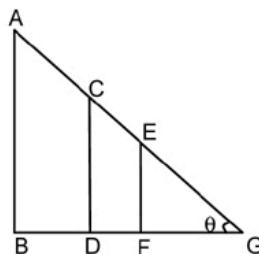
Solution:

In the first race when Karan runs 100m, Arjun runs only 90 meters. Hence the ratio of speeds of Arjun and Karan is $90 : 100 = 9 : 10$. In the second race, Karan has to run 110 meters. When he finishes the race, Arjun would have run $\frac{9}{10} \times 110 = 99$ m (i.e. 1 m less than 100 m). Hence Karan beats Arjun by 1 metre. **Choice (4)**

46. A father and his son are waiting at a bus stop in the evening. There is a lamp post behind them. The lamp post, the father and his son stand on the same straight line. The father observes that the shadows of his head and his son's head are incident at the same point on the ground. If the heights of the lamp post, the father and his son are 6 metres, 1.8 metres and 0.9 metres respectively, and the father is standing 2.1 metres away from the post, then how far (in metres) is the son standing from his father?
 (1) 0.9 (2) 0.75 (3) 0.6 (4) 0.45

Solution:

As the shadows of the father's head and son's head are incident at the same point of the ground, the angle between the ground and father's head, the angle between the ground and son's head, and the angle between the ground and the top of the post are the same.



Let the heights of the post, father and son be represented by AB, CD and EF respectively. Let DG be x. Given BD (distance between the father and the post) is 2.1 m, AB = 6 m, CD = 1.8 m and EF = 0.9 m.

$$\tan\theta = \frac{AB}{BG}, \text{ also } \tan\theta = \frac{CD}{DG}.$$

$$\therefore \frac{AB}{BG} = \frac{CD}{DG}$$

$$= \frac{6}{2.1+x} = \frac{1.8}{x}$$

Hence $x = 0.9$ m

Similarly, $\frac{CD}{DG} = \frac{EF}{FG}$

$$\text{So, } \frac{1.8}{0.9} = \frac{0.9}{FG} \Rightarrow FG = 0.45 \text{ m}$$

Hence $DF = DG - FG = 0.45 \text{ m.}$ **Choice (4)**

47. If the sum of first 11 terms of an arithmetic progression equals that of the first 19 terms, then what is the sum of the first 30 terms?

- (1) 0
- (2) -1
- (3) 1
- (4) Not unique

Solution:

Let the first term and the common difference of the progression be a and d respectively.

$$\text{Given, } S_{11} = S_{19} \text{ i.e. } \frac{11}{2}[2a + 10d] = \frac{19}{2}[2a + 18d]$$

$$\Rightarrow 16a + 232d = 0 \Rightarrow 2a + 29d = 0$$

$$\therefore S_{30} = \frac{30}{2}[2a + 29d] = 15(0) = 0 \quad \text{Choice (1)}$$

48. If $\frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b} = r$ then r cannot take any value except

- (1) 1/2
- (2) -1
- (3) 1/2 or -1
- (4) -1/2 or -1

Solution:

$$\text{As } \frac{a}{b+c} = \frac{b}{c+a} = \frac{c}{a+b} = \frac{a+b+c}{b+c+c+a+a+b}$$

$$= \frac{a+b+c}{2(a+b+c)} = r = \frac{1}{2}. \text{ (Assuming } a+b+c \neq 0)$$

If $a+b+c = 0$,

$$\frac{a}{b+c}, \frac{a}{b+c} = \frac{a}{a+b+c-a} \quad (\text{by adding and subtracting } a \text{ in the denominator})$$

$$= \frac{a}{0-a} = \frac{a}{-a} = r$$

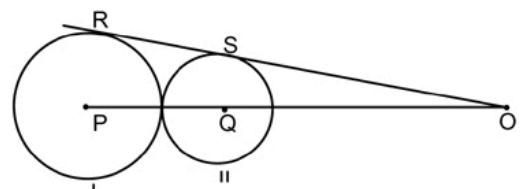
$$= -1. \quad (\text{Similarly } \frac{b}{c+a} = \frac{c}{a+b} = r = -1)$$

Hence r can take only $\frac{1}{2}$ or -1 as values.

Choice (3)

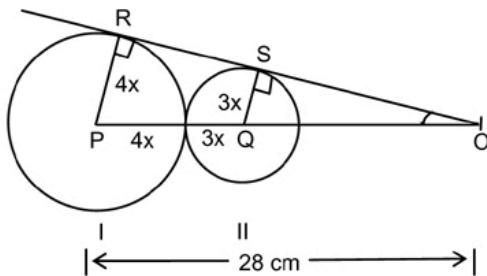
Directions for Questions 49 to 51: Answer the question on the basis of the information given below.

In the adjoining figure, I and II are circles with centres P and Q respectively. The two circles touch each other and have a common tangent that touches them at points R and S respectively. This common tangent meets the line joining P and Q at O. the diameters of I and II are in the ratio 4:3. It is also known that the length PO is 28 cm.



49. What is the ratio of the length of PQ to that of QO?
 (1) 1 : 4 (2) 1 : 3 (3) 3 : 8 (4) 3 : 4

Solution:



In $\triangle OSQ$ and $\triangle ORP$

$\angle O$ is the common angle

$\angle OSQ = \angle ORP = 90^\circ$ (angle between the radius and the tangent = 90°)

As the two angles are equal, the third angle should also be equal i.e. $\angle RPO = \angle SQO$.

$\therefore \triangle OSQ \sim \triangle ORP$

$$\therefore \frac{SQ}{RP} = \frac{OQ}{OP} = \frac{3}{4} \Rightarrow \frac{OQ}{OQ + PQ} = \frac{3}{4}$$

$$\Rightarrow 4OQ = 3OQ + 3PQ ; OQ = 3PQ$$

$$\frac{PQ}{OQ} = \frac{1}{3}$$

Choice (2)

50. What is the radius of the circle II?
 (1) 2 cm (2) 3 cm (3) 4 cm (4) 5 cm

Solution:

From the above problem,

as $PQ : QO$ is $1 : 3 \Rightarrow PQ : OP (= PQ + QO) = 1 : 4$

$$\therefore PQ = \frac{1}{4} \times OP = \frac{1}{4} \times 28 = 7.$$

PQ = Radius of circle I + radius of circle II

= $4x + 3x$ (as the diameters of the two circles in the ratio is $4 : 3$, the ratio of their radii is also $4 : 3$)

$$\therefore 7x = 7 \Rightarrow x = 1$$

\therefore radius of circle II is $3x = 3 \times 1 = 3$ cm

Choice (2)

51. The length of SO is

- (1) $8\sqrt{3}$ cm (2) $10\sqrt{3}$ cm
 (3) $12\sqrt{3}$ cm (4) $14\sqrt{3}$ cm

Solution:

As $\triangle SOQ$ is a right angled triangle

$$OS^2 + SQ^2 = OQ^2$$

$$OS^2 + 3^2 = 21^2$$

$$(OS)^2 + 9 = 441$$

$$(OS) = \sqrt{441 - 9} = \sqrt{432} = 12\sqrt{3} \text{ cm}$$

Choice (3)

Directions for Questions 52 to 58: Answer the questions independently of each other.

52. A milkman mixes 20 litres of water with 80 litres of milk. After selling one-fourth of this mixture, he adds water to replenish the quantity that he has sold. What is the current proportion of water to milk?
 (1) 2 : 3 (2) 1 : 2 (3) 1 : 3 (4) 3 : 4

Solution:

As one-fourth of the solution (milk + water = 80 litres + 20 litres) is sold, solution drawn out is $100 \times \frac{1}{4} = 25$ litres

Quantity of milk drawn out = $25 \times \frac{4}{5} = 20$ litres.

\therefore Quantity of water drawn out = 5 litres.

Now adding 25 litres of water, quantity of water = $20 - 5 + 25 = 40$ litres.

Also quantity of milk remaining = $80 - 20 = 60$ litres.

\therefore required ratio = $40 : 60 = 2 : 3$ Choice (1)

53. Let $f(x) = ax^2 - b|x|$, where a and b are constants.

Then at $x = 0$, $f(x)$ is

- (1) maximised whenever $a > 0, b > 0$
 (2) maximised whenever $a > 0, b < 0$
 (3) minimised whenever $a > 0, b > 0$
 (4) minimised whenever $a > 0, b < 0$

Solution:

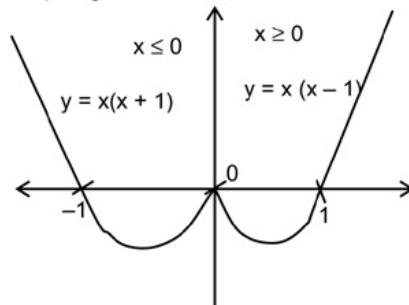
$$y = ax^2 - b|x|$$

As the options (1) and (3) include $a > 0, b > 0$

We take $a = b = 1$

Accordingly the equation becomes $y = x^2 - |x|$.

A quick plot gives us.

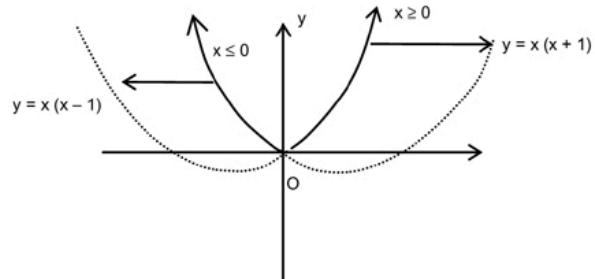


So at $x = 0$, we neither have a maxima nor a minima.

As the options (2) and (4) include $a > 0, b < 0$

We take $a = 1, b = -1$

Accordingly the equation becomes $y = x^2 + |x|$



So at $x = 0$, we have a minima.

Choice (4)

54. If $f(x) = x^3 - 4x + p$, and $f(0)$ and $f(1)$ are of opposite signs, then which of the following is necessarily true?

- (1) $-1 < p < 2$ (2) $0 < p < 3$
 (3) $-2 < p < 1$ (4) $-3 < p < 0$

Solution:

$$f(x) = x^3 - 4x + p$$

$$f(0) = p, f(1) = p - 3$$

Given $f(0)$ and $f(1)$ are of opposite signs,

$$p(p - 3) < 0$$

If $p < 0$ then $p - 3$ is also less than 0.

$\therefore p(p - 3) > 0$. i.e. p cannot be negative.

\therefore choices (1), (3) and (4) are eliminated.

$$0 < p < 3$$

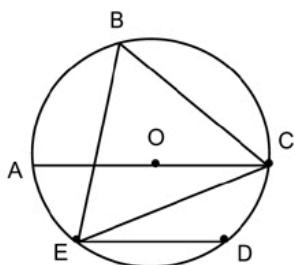
Choice (2)

Solution:

Any route from A to B consists of $3 + 5 = 8$ segments, where the car can move only 5 segments to the west and only 3 segments to the north. The number of distinct routes is equal to the number of ways of choosing 3 out of the 8 segments along which the car can go north or choosing 5 segments along which the car can go west. Therefore the number of distinct routes from A to B

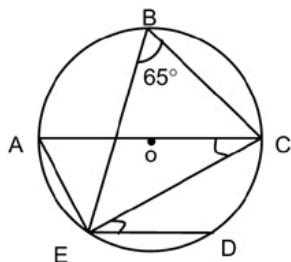
$$\text{is } {}^8C_3 = \frac{8(7)(6)}{1(2)(3)} = 56. \quad \text{Choice (2)}$$

60. In the adjoining figure, chord ED is parallel to the diameter AC of the circle. If $\angle CBE = 65^\circ$, then what is the value of $\angle DEC$?



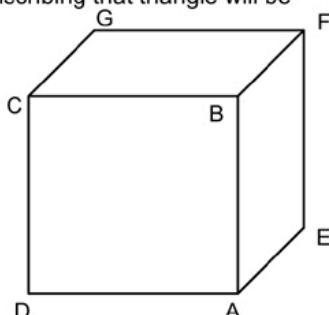
- (1) 35° (2) 55° (3) 45° (4) 25°

Solution:



$ED \parallel AC, \angle CBE = 65^\circ$
Now $\angle AEC = 90^\circ$ (angle in a semi-circle)
 $\angle CAE = \angle CBE = 65^\circ$ (angle in the same segment)
Since $\angle CAE = 65^\circ$ and $\angle AEC = 90^\circ$,
 $\angle ACE = 180^\circ - (90 + 65)^\circ$
 $\angle ACE = 25^\circ$
 $\angle ACE = \angle DEC$ (alternate angles are equal as $AC \parallel ED$)
 $\therefore \angle DEC = 25^\circ$ Choice (4)

61. If the length of diagonals DF, AG and CE of the cube shown in the adjoining figure are equal to the three sides of a triangle, then the radius of the circle circumscribing that triangle will be



- (1) equal to the side of the cube.
(2) $\sqrt{3}$ times the side of the cube.

(3) $\frac{1}{\sqrt{3}}$ times the side of the cube.

(4) impossible to find from the given information.

Solution:

Let the side of the cube be a . \therefore the diagonal of the cube is $\sqrt{3}a$. i.e. $DF = AG = CE = \sqrt{3}a$.

\therefore the length of the three sides of the triangle are each equal to $\sqrt{3}a$. So we have an equilateral triangle, of side $\sqrt{3}a$.

The altitude (or median) of this triangle is
 $\frac{\sqrt{3}}{2}(\sqrt{3}a) = \frac{3a}{2}$

Now radius of the circle circumscribing the triangle is
 $\frac{2}{3}$ of $\frac{3a}{2} = a$ (because centroid divides the altitude in the ratio of 2 : 1).

\therefore Radius of the circumcircle is equal to the side of the cube. Choice (1)

62. A sprinter starts running on a circular path of radius r metres. Her average speed (in metres/minute) is πr during the first 30 seconds, $\pi r/2$ during next one minute, $\pi r/4$ during next 2 minutes, $\pi r/8$ during the next 4 minutes, and so on. What is the ratio of the time taken for the n th round to that for the previous round?

- (1) 4 (2) 8 (3) 16 (4) 32

Solution:

The radius of the track is r metres
 \therefore the circumference is $2\pi r$ metres

The average speed for successive time intervals of 1/2, 1, 2, 4, etc minutes is πr , $\frac{\pi r}{2}$, $\frac{\pi r}{4}$, $\frac{\pi r}{8}$, etc metres/minute. Therefore in each interval (of increasing duration) the distances travelled are $\frac{\pi r}{2}$, $\frac{\pi r}{2}$, $\frac{\pi r}{2}$, $\frac{\pi r}{2}$ etc (i.e exactly the same).

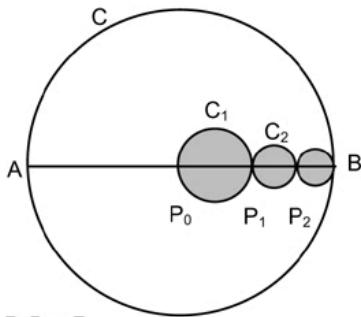
Four such intervals are needed to cover one round. The next four intervals are needed for the next round. As each interval in the second group is 16 times the corresponding interval in the previous group, the total time for each round is 16 times the time taken for the previous round.

Choice (3)

63. Let C be a circle with centre P_0 and AB be a diameter of C . Suppose P_1 is the mid point of the line segment P_0B , P_2 is the mid point of the line segment P_1B and so on. Let C_1, C_2, C_3, \dots be circles with diameters $P_0P_1, P_1P_2, P_2P_3, \dots$ respectively. Suppose the circles C_1, C_2, C_3, \dots are all shaded. The ratio of the area of the unshaded portion of C to that of the original circle C is

- (1) 8 : 9
(2) 9 : 10
(3) 10 : 11
(4) 11 : 12

Solution:



Let $P_0B = R$,

then Area of circle 'C' = πR^2

Now, $P_0P_1 = P_1B = R/2$ (diameter of C_1)

$$\therefore \text{Area of circle } C_1 = \pi \left(\frac{R}{4}\right)^2 = \frac{\pi R^2}{16}$$

$$P_1P_2 = P_2B = \frac{R}{4}; \text{ Area of circle } C_2 = \pi \left(\frac{R}{8}\right)^2$$

$$= \frac{\pi R^2}{64}$$

$$\text{Similarly, } P_3B = \frac{R}{8}.$$

$$\therefore \text{Area of circle } C_3 = \pi \left(\frac{R}{16}\right)^2 = \frac{\pi R^2}{256} \text{ and so on.}$$

\therefore Area of shaded position

= Area of C_1 + Area of C_2 + Area of C_3 +

$$= \pi R^2 / 16 + \pi R^2 / 64 + \pi R^2 / 256 +$$

$$= \frac{\pi R^2}{16} \left[1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \dots \right] = \frac{\pi R^2}{16} \left(\frac{1}{1 - \frac{1}{4}} \right)$$

$$= \frac{\pi R^2}{16} \times \frac{4}{3} = \frac{\pi R^2}{12}$$

$$\Rightarrow \text{Area of the unshaded portion} = \pi R^2 - \frac{\pi R^2}{12} =$$

$$\frac{11\pi R^2}{12}$$

hence, ratio of area of unshaded area to area of circle C is

$$= \frac{11\pi R^2}{12} : \pi R^2 = 11 : 12$$

Alternative Method:

Let the radius and area of the big circle (C) be R and A respectively. The diameter of the biggest of the smaller circles P_0P_1 is of $R/2$, i.e., its radius is $R/4$ and its area A_0 is $A/16$.

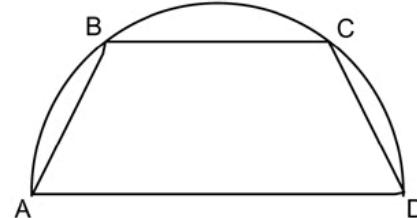
The areas of successive circles form a geometric progression with common ratio $1/4$. Therefore the

$$\text{shaded area is } \frac{A/16}{1-1/4} = \left(\frac{A}{16}\right)\left(\frac{4}{3}\right) = \frac{A}{12}$$

$$\text{The unshaded portion is } \frac{11A}{12}$$

The ratio of the unshaded portion to the total area of circle (C) is $11 : 12$.
Choice (4)

64. On a semicircle with diameter AD, chord BC is parallel to the diameter. Further, each of the chords AB and CD has length 2, while AD has length 8. What is the length of BC?



- (1) 7.5
(3) 7.75

- (2) 7
(4) None of the above

Solution:

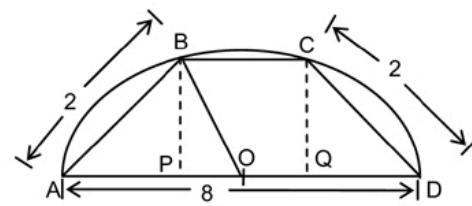


Fig (1)

$$BO = AO = \text{radius} = \frac{8}{2} = 4$$

Now, consider the triangle ABO.

From B, drop a perpendicular (BD) on to AD.

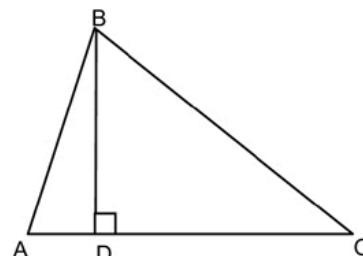


Fig (2)

\therefore Area of $\triangle ABO$ is $\frac{1}{2} \times AO \times BP$ which can also be

calculated as $\sqrt{s(s-a)(s-b)(s-c)}$.

$$\therefore \text{We have } \frac{1}{2} (4)(BP) = \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{4+4+2}{2} = 5$$

$$2(BP) = \sqrt{5(1)(1)(2)} = \sqrt{15}$$

$$BP = \frac{\sqrt{15}}{2}$$

In $\triangle BDO$, we have

$$OP^2 = (OB)^2 - (BD)^2$$

$$OP^2 = 16 - \frac{15}{4} = \frac{49}{4} \Rightarrow OP = \frac{7}{2}$$

Similarly $OQ = \frac{7}{2}$

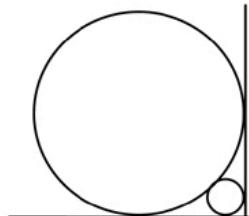
In fig (1), drop perpendiculars from B and C meeting AD at P and Q respectively.

\therefore we have $BC = PQ$ and $PQ = PO + OQ$

$$= \frac{7}{2} + \frac{7}{2} = 7.$$

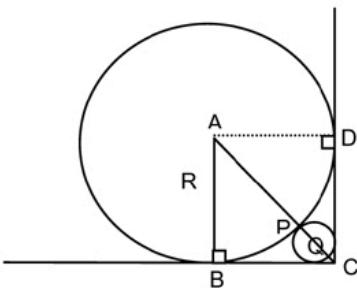
Choice (2)

65. A circle with radius 2 is placed against a right angle. Another smaller circle is also placed as shown in the adjoining figure. What is the radius of the smaller circle?



- (1) $3 - 2\sqrt{2}$ (2) $4 - 2\sqrt{2}$
 (3) $7 - 4\sqrt{2}$ (4) $6 - 4\sqrt{2}$

Solution:



Let the radii of the bigger and smaller circles be R and r respectively.

\therefore In the figure $AB = AD = R$.

As $\angle ADC = 90^\circ$; $\angle ABC = 90^\circ$ and $\angle DCB = 90^\circ$

\therefore ABCD is a square.

$\therefore BC = R$ and $AC = \sqrt{2}R$ and

$AC = AP + PQ + QC$

$= R + r + \sqrt{2}r$ ($QC = \sqrt{2}r$ can be proved in the same way as we proved $AC = \sqrt{2}R$)

$$\therefore r = \frac{(\sqrt{2}-1)R}{\sqrt{2}+1}$$

Rationalising the denominator, we get
 $r = (3-2\sqrt{2})R$ Given $R = 2$, we get
 $r = 2(3-2\sqrt{2}) = 6-4\sqrt{2}$. Choice (4)

66. The remainder, when $(15^{23} + 23^{23})$ is divided by 19 is
 (1) 4 (2) 15 (3) 0 (4) 18

Solution:

$a^n + b^n$ is always divisible by $a + b$ when n is odd.

$\therefore 15^{23} + 23^{23}$ is always divisible by $15 + 23 = 38$.
 As 38 is a multiple of 19, $15^{23} + 23^{23}$ is divisible by 19.

\therefore We get a remainder of 0. Choice (3)

67. A new flag is to be designed with six vertical stripes using some or all of the colours yellow, green, blue and red. Then, the number of ways this can be done such that no two adjacent stripes have the same colour is

- (1) 12×81 (2) 16×192
 (3) 20×125 (4) 24×216

Solution:

Any of the 4 colours can be chosen for the first stripe. Any of the remaining 3 colours can be used for the second stripe. The third stripe can again be coloured in 3 ways (we can repeat the colour of the first stripe but not use the colour of the second stripe).

Similarly, there are 3 ways to colour each of the remaining stripes.

\therefore The number of ways the flag can be coloured is
 $4(3)^5 = (12)(3^4)$. Choice (1)

Directions for Questions 68 and 69: Answer the question on the basis of the information given below.

$$\begin{aligned} f_1(x) &= x & 0 \leq x \leq 1 \\ &= 1 & x \geq 1 \\ &= 0 & \text{otherwise} \end{aligned}$$

$$\begin{aligned} f_2(x) &= f_1(-x) & \text{for all } x \\ f_3(x) &= -f_2(x) & \text{for all } x \\ f_4(x) &= f_3(-x) & \text{for all } x \end{aligned}$$

68. How many of the following products are necessarily zero for every x:

- $f_1(x)f_2(x)$, $f_2(x)f_3(x)$, $f_2(x)f_4(x)$?
 (1) 0 (2) 1 (3) 2 (4) 3

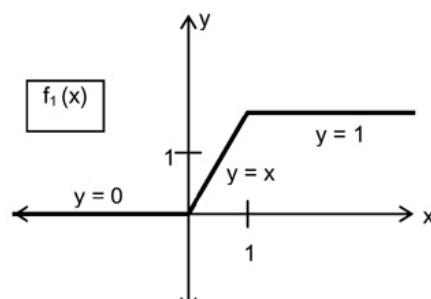
69. Which of the following is necessarily true?

- (1) $f_4(x) = f_1(x)$ for all x
 (2) $f_1(x) = f_3(-x)$ for all x
 (3) $f_2(-x) = f_4(x)$ for all x
 (4) $f_1(x) + f_3(x) = 0$ for all x

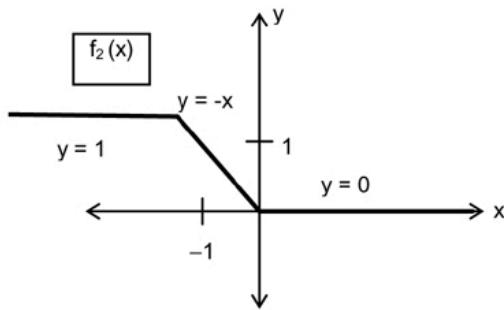
Solutions for questions 68 and 69:

Consider the function $f_1(x) = x$ for $0 \leq x \leq 1$
 $= 1$ for $x \geq 1$
 $= 0$ for all other values of x.

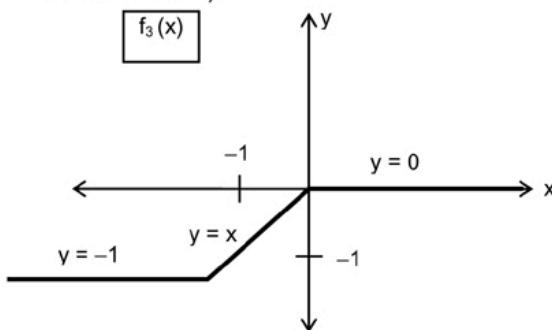
The graph of the function $f_1(x)$ is given below:



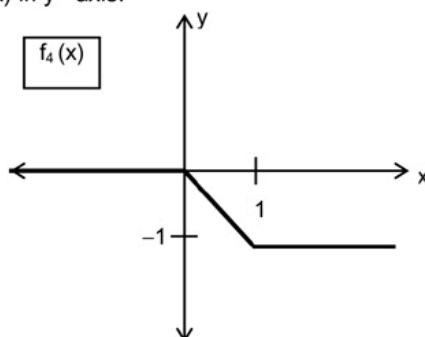
The graph of $f_2(x) = f_1(-x)$ is obtained by reflecting $f_1(x)$ in the y-axis. (Replacing x with $-x$ means reflecting in the y-axis)



The graph of $f_3(x) = -f_2(x)$, is obtained by reflecting $f_2(x)$ in x -axis. (Introduction of $-$ sign means reflection in x -axis).



The graph of $f_4(x) = f_3(-x)$, is obtained by reflecting $f_3(x)$ in y -axis.



68. Consider the product $f_1(x) \cdot f_2(x)$;

for $x \geq 0$ $f_2(x) = 0$, hence $f_1(x) \cdot f_2(x) = 0$

and for $x < 0$ $f_1(x) = 0$, hence $f_1(x) \cdot f_2(x) = 0$

Consider the product $f_2(x) \cdot f_3(x)$;

for $x \geq 0$, $f_2(x) = 0$, $f_3(x) = 0$, hence $f_2(x) \cdot f_3(x) = 0$

for $x < 0$, $f_2(x) > 0$, $f_3(x) < 0$, hence $f_2(x) \cdot f_3(x) < 0$

Consider the product $f_2(x) \cdot f_4(x)$

for $x \geq 0$, $f_2(x) = 0$, hence $f_2(x) \cdot f_4(x) = 0$

for $x < 0$, $f_4(x) = 0$, hence $f_2(x) \cdot f_4(x) = 0$

$\therefore f_1(x) \cdot f_2(x)$ and $f_2(x) \cdot f_4(x)$ always take a zero value.

Choice (3)

69. Choice (1): from the graphs it can be observed that $f_1(x) = f_4(x)$, for $x \leq 0$ but $f_1(x) \neq f_4(x)$ for $x > 0$.

Choice (2): The graph of $f_3(x)$ is to be reflected in x -axis followed by a reflection in y -axis (in either order), to obtain the graph of $-f_3(-x)$ this would give the graph of $f_1(x)$.

Choice (3): The graph of $f_2(-x)$ is obtained by the reflection of the graph of $f_2(x)$ in y -axis, which gives us the graph of $f_1(x)$ and not $f_4(x)$, hence option 3 is ruled out.

Choice (4): for $x > 0$ $f_1(x) > 0$ and $f_3 = 0$,

hence $f_1(x) + f_3(x) > 0$

Choice (2)

Directions for Questions 70 and 71: Answer the questions independently of each other.

70. Consider the sequence of numbers a_1, a_2, a_3, \dots to infinity where $a_1 = 81.33$ and $a_2 = -19$ and $a_j = a_{j-1} - a_{j-2}$ for $j \geq 3$. What is the sum of the first 6002 terms of this sequence?

- (1) -100.33 (2) -30.00
(3) 62.33 (4) 119.3

Solutions:

The terms of the given sequence are as follows:

$$\begin{array}{ll} a_1 = 81.33 & a_7 = a_1 \\ a_2 = -19 & a_8 = a_2 \\ a_3 = a_2 - a_1 & a_9 = a_3 \\ a_4 = -a_1 & a_{10} = a_4 = -a_1 \\ a_5 = -a_2 & a_{11} = a_4 = -a_2 \\ a_6 = -a_2 + a_1 & a_{12} = a_6 = -a_3 \text{ and so on} \end{array}$$

The sum of the first six terms, the next six terms and so on is 0.

The sum of first 6002 terms can be written as the sum of the first 6000 terms + 6001st term + 6002nd term.

From the above explanation the sum of the first 6000 terms is zero, 6001st term will be a_1 and 6002nd term will be a_2 . \therefore the sum of the first 6002 terms will be $a_1 + a_2 = 81.33 + (-19) = 62.33$. Choice (3)

71. Let $u = (\log_2 x)^2 - 6 \log_2 x + 12$ where x is a real number. Then the equation $x^n = 256$, has

- (1) no solution for x
(2) exactly one solution for x
(3) exactly two distinct solutions for x
(4) exactly three distinct solutions for x

Solution:

$$u = (\log_2 x)^2 - 6(\log_2 x) + 12$$

$$\text{let } \log_2 x = p \quad - \quad (1)$$

$$\Rightarrow u = p^2 - 6p + 12$$

$$x^u = 256 (= 2^8)$$

Applying log to base 2 on both sides we get = u
 $\log_2 x = \log_2 2^8$.

$$u \log_2 x = 8 \quad - \quad (2)$$

Dividing (2) by (1) we get

$$u = 8/p$$

$$\Rightarrow 8/p = p^2 - 6p + 12 \Rightarrow 8 = p^3 - 6p^2 + 12p$$

$$\text{or } p^3 - 6p^2 + 12p - 8 = 0$$

$$(p-2)^3 = 0$$

$$p = 2$$

$$\log_2 x = 2 \Rightarrow x = 2^2 = 4$$

Thus we have exactly one solution. Choice (2)

Directions for Questions 72 and 73: Answer the questions on the basis of the information given below.

In an examination, there are 100 questions divided into three groups A, B and C such that each group contains at least one question. Each question in group A carries 1 mark, each question in group B carries 2 marks and each question in group C carries 3 marks. It is known that the questions in group A together carry at least 60% of the total marks.

72. If group B contains 23 questions, then how many questions are there in group C?

- (1) 1 (2) 2
(3) 3 (4) Cannot be determined

Solution:

'Blunt' means 'very direct' with respect to a remark. 'Devious' in choice (4) means 'dishonest' and is incorrect as the statement is a frank one. For the same reason 'tactful' in choice (3) is also not appropriate.

Solution:

'Interest' is the most appropriate word because the original amount he owed to the department accumulated to the said figure. 'Taxes' is redundant while, 'principal' usually refers to a loan (in this case it isn't). 'Returns' is what one gets rather than pays.

Choice (1)

Solution:

'Sanctions' is used for an official permission or order that limits trade and is rarely used for an amount. 'Fees' are paid for a service and 'refunds' are what one gets back. 'Fines' is the best choice because of the penalty component.

Solution:

'Attach' is the word used for officially taking something away. 'Impound' means 'confiscate' and is generally used in the context of illegal goods or contraband. Other choices are in no way comparable.

Solution:

'Smashed' in choice (1) and 'dismantled' in choice (3) are far from being logical. 'Frozen' is a wrong choice. 'Frozen' is used in the context of making bank accounts inoperable etc. Automobiles are seized.

Solution:

Clearly the topic is about a person who has violated income tax regulations and he should be called an 'offender' of the law. Choice (4)

Directions for Question 84 to 86: Identify the incorrect sentence or sentences.

Solution:

Only statements B and C are grammatically incorrect. In statement C, the error is 'took shower', the correction is 'took a shower'. In statement B, 'what to do' is incorrect. 'What she should do' is correct. Choice (1)

Solution:

There are errors in statements B and D.
In statement B, 'efforts gave fruit' is incorrect. The correction is 'efforts bore fruit'.
In statement C, 'complemented her for' is incorrect.

Solution:

There are errors in both B and D. The error in B is "pleaded guilty of". The correction is "pleaded guilty to ". In D, the error is "sentenced for three years". The correction is "sentenced to three years".

Directions for Questions 87 to 89: Each statement has a part missing. Choose the best option from the four options given below the statement to make up the missing part.

87. Archaeologists believe that the pieces of red-ware pottery excavated recently near Bhavnagar and _____ she light on a hitherto dark 600-year period in the Harappan history of Gujarat.

 - (1) estimated with a reasonable certainty as being about 3400 years old,
 - (2) are estimated reasonably certain to be about 3400 years old
 - (3) estimated at about 3400 years old with reasonable certainty,
 - (4) estimated with reasonable certainty to be about 3400 years old.

Solution:

Choice (4) fits into the blank. In choice (1) the usage of the indefinite article is erroneous. Choices (2) and (3) are erroneous due to the incorrect ordering of words.

88. Many people suggest _____ and still others would like to convince people not to buy pirated cassettes.

(1) to bring down audiocassette prices to reduce the incidence of music piracy, others advocate strong legal action against the offenders.

- (2) bringing down audiocassette prices to reduce the incidents of music piracy, others are advocating strong legal action against offenders,
 (3) bringing down audiocassette prices to reduce the incidence of music piracy, others advocate strong legal action against offenders,
 (4) audiocassette prices to be brought down to reduce incidence of music piracy, others advocate that strong legal action must be taken against offenders,

Solution:

Choices (1) and (4) are ruled out because 'suggest' does not go with 'to + verb' form. Choice (2) cannot fit in the blank because of the error in parallelism. The appropriate structure is "Many people suggest and others advocate". Choice (3)

89. The ancient Egyptians believed _____ so that when these objects were magically reanimated through the correct rituals, they would be able to function effectively.
- that it was essential that things they portrayed must have every relevant feature shown as clearly as possible.
 - it was essential for things they portray to have had every relevant feature shown as clearly as possible,
 - it was essential that the things they portrayed had every relevant feature shown as clearly as possible,
 - that when they portrayed things, it should have every relevant feature shown as clearly as possible

Solution:

89. The tense in choices (1) and (2) is not consistent. Moreover, choice (1) uses both 'essential' and 'must', thus rendering either one of these words redundant. In choice (4) 'things' the plural form cannot take 'it'. Choice (3)

Directions for Questions 90 to 92: In each question, the word at the top of the table is used in four different ways, numbered 1 to 4. Choose the option in which the usage of the word is INCORRECT or INAPPROPRIATE.

90. FALLOUT

(1)	Nagasaki suffered from the fallout of nuclear radiation.
(2)	People believed that the political fallout of the scandal would be insignificant.
(3)	Who can predict the environmental fallout of the WTO agreements?
(4)	The headmaster could not understand the fallout of several of his good students at the public examination.

Solution:

'Fallout' as used in choice (1) refers to the aftereffects of nuclear radiation. The word as used in choices (2) and (3) refers to 'political impact' and 'environmental impact' in the respective sentences. The usage is appropriate in all these choices. However, it has been used inappropriately in choice (4). The word that should have been used in place of 'fallout' is 'failure'. Choice (4)

91. PASSING

(1)	She did not have passing marks in mathematics.
(2)	The mad woman was cursing everybody passing her on the road.
(3)	At the birthday party all the children enjoyed a game of passing the parcel.
(4)	A passing taxi was stopped to rush the accident victim to the hospital.

Solution:

'Passing marks' is erroneous. The correction is 'pass marks'. The word has been used correctly in the other choices.

Choice (1)

92. BOLT

(1)	The shopkeeper showed us a bolt of fine silk.
(2)	As he could not move, he made a bolt for the gate.
(3)	Could you please bolt the door?
(4)	The thief was arrested before he could bolt from the scene of the crime.

Solution:

The word 'bolt' has been used correctly in choices (1), (3) and (4). 'A bolt of silk' refers to silk wound around a long metal tube. 'Bolt' as used in choice (4) means 'to escape'. However, the usage is inappropriate in choice (2). Bolt means to 'make a dash for'. But how can a person make a bolt for the gate, when he is unable to move? Choice (2)

Directions for Questions 93 to 95: The sentence given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.

- In the west, Allied Forces had fought their way through southern Italy as far as Rome.
 - In June 1944 Germany's military position in World War Two appeared hopeless.
 - In Britain, the task of amassing the men and materials for the liberation of northern Europe had been completed.
 - The Red Army was poised to drive the Nazis back through Poland.
 - The situation on the eastern front was catastrophic.
- (1) EDACB (2) BEDAC (3) BDECA (4) CEDAB

Solution:

'B' opens the paragraph as it launches the topic – "Germany's military position in World War Two". E follows B; the word 'catastrophic' in 'E' gives continuation to the idea expressed in B. Further, E talks about the eastern front. D talks about Poland and A talks about the western front. Hence EDA go together. Finally C concludes. Choice (2)

- He felt justified in bypassing Congress altogether on a variety of moves.
- At times he was fighting the entire Congress.
- Bush felt he had a mission to restore power to the presidency.
- Bush was not fighting just the democrats.

- E. Representative democracy is a messy business, and a CEO of the White House does not like a legislature of second guessers and time wasters.
(1) CAEDB (2) DBAEC (3) CEADB (4) ECDBA

Solution:

'C' is the opening statement as it introduces the topic of the paragraph i.e., Bush's mission to restore power to the presidency. Statement E presents the problem that he must tackle i.e., a legislature of second guessers and time wasters. Hence CE. Further, 'A' tells us what Bush did to tackle the problem, He bypassed the Congress (the U.S. legislative house). Thus CEA. Also 'DB' tells us that he wasn't merely fighting the entire Congress. Hence CEADB.

Choice (3)

95. A. The two neighbours never fought each other.
B. Fights involving three male fiddler crabs have been recorded, but the status of the participants was unknown.
C. They pushed or grappled only with the intruder.
D. We recorded 17 cases in which a resident that was fighting an intruder was joined by an immediate neighbour, an ally.
E. We therefore tracked 268 intruder males until we saw them fighting a resident male.
(1) BEDAC (2) DEBAC (3) BDCAE (4) BCEDA

Solution:

B opens the paragraph. The words "the status of the participants was unknown" in B give a hint that E should follow it i.e., the words "we therefore tracked" continue the idea in B. The words 'resident male' in E find a continuation in D. The words 'the two neighbours' and 'they' in A and C respectively are linked. Hence BEDAC.

Choice (1)

Directions for Questions 96 and 97: Four alternative summaries are given below each text. Choose the option that best captures the essence of the text.

96. The human race is spread all over the world, from the polar regions to the tropics. The people of whom it is made up eat different kinds of food, partly according to the climate in which they live, and partly according to the kind of food which their country produces. In hot climates, meat and fat are not much needed; but in the Arctic regions they seem to be very necessary for keeping up the heat of the body. Thus, in India, people live chiefly on different kinds of grains, eggs, milk, or sometimes fish and meat. In Europe, people eat more meat and less grain. In the Arctic regions, where no grains and fruits are produced, the Eskimo and other races live almost entirely on meat and fish.

- (1) Food eaten by people in different regions of the world depends on the climate and produce of region, and varies from meat and fish in the Arctic to predominantly grains in the tropics.
(2) Hot climate require people to eat grains while cold regions require people to eat meat and fish.
(3) In hot countries people eat mainly grains while in the Arctic, they eat meat and fish because they cannot grow grains.
(4) While people in Arctic regions like meat and fish and those in hot regions like India prefer mainly grains, they have to change what they eat depending on the local climate and the local produce.

Solution:

The main idea expressed in the paragraph is that the food habits of people ranging from the Arctic to the tropics differ because of the climate and produce of their respective regions. This is best expressed in choice 1. Choice (2) is incomplete as it fails to mention that the produce of the region is a factor in shaping food habits. Choice (3) is incomplete as it does not mention the role that the weather plays in shaping food habits. Finally, choice (4) is a misrepresentation of the idea mentioned in the text. The original text does not say that people eat what they do because of preference. Further, the text does not say that people should change their food habits.

Choice (1)

97. You seemed at first to take no notice of your school-fellows, or rather to set yourself against them because they were strangers to you. They knew as little of you as you did of them; this would have been the reason for their keeping aloof from you as well, which you would have felt as a hardship. Learn never to conceive a prejudice against others because you know nothing about them. It is bad reasoning, and makes enemies of half the worlds. Do not think ill of them till they behave ill to you; and then strive to avoid the faults which you see in them. This will disarm their hostility sooner than pique of resentment or complaint.

- (1) The discomfort you felt with your school fellows was because both sides knew little of each other. You should not complain unless you find others prejudiced against you and have attempted to carefully analyze the faults you have observed in them.
(2) The discomfort you felt with your school fellows was because both sides knew little of each other. Avoid prejudice and negative thoughts till you encounter bad behaviour from others, and then win them over by shunning the faults you have observed.
(3) You encountered hardship amongst your school fellows because you did not know them well. You should learn to not make enemies because of your prejudices irrespective of their behaviour towards you.
(4) You encountered hardship amongst your school fellows because you did not know them well. You should learn to not make enemies because of your prejudices unless they behave badly with you.

Solution:

The paragraph conveys the idea that initially it is natural to be wary of one's school fellows as one knows them well. It also says that one needs to avoid prejudice. Further, one must avoid the faults that one sees in others and thus win them over. These ideas are best expressed in choice (2). Choice (1) suggests that one must complain when one finds others prejudiced. This is a distortion of the meaning of the original text. Choice (3) omits the point that one must avoid the faults that one finds in others. Choice (4) implies that one should make enemies with others if they behave badly. This is a misrepresentation.

Choice (2)

Directions for Questions 98 to 101: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 760

Recently I spent several hours sitting under a tree in my garden with the social anthropologist William Ury, a Harvard University professor who specializes in the art of negotiation and wrote the best selling book, *Getting to yes*. He captivated me with his theory that tribalism protects people from their fear of rapid change. He explained that the pillars of tribalism that humans rely on for security would always counter any significant cultural or social change. In this way, he said, change is never allowed to happen too fast. Technology, for example, is a pillar of society. Ury believes that every time technology moves in a new or radical direction, another pillar such as religion or nationalism will grow stronger – in effect, the traditional and familiar will assume greater importance to compensate for the new and untested. In this manner, human tribes avoid rapid change that leaves people insecure and frightened.

But we have all heard that nothing is as permanent as change. Nothing is guaranteed. Pithy expressions, to be sure, but no more than clichés. As Ury says, people don't live that way from day-to-day. On the contrary, they actively seek certainty and stability. They want to know they will be safe.

Even so, we scare ourselves constantly with the idea of change. An IBM CEO once said: 'we only re-structure for a good reason, and if we haven't re-structured in a while, that's a good reason.' We are scared that competitors, technology and the consumer will put us out of business – so we have to change all the time just to stay alive. But if we asked our fathers and grandfathers, would they have said that they lived in a period of little change? Structure may not have changed much. It may just be the speed with which we do things.

Change is over-rated, anyway. Consider the automobile. It's an especially valuable example, because the auto industry has spent tens of billions of dollars on research and product development in the last 100 years. Henry Ford's first car had a metal chassis with an internal combustion, gasoline-powered engine, four wheels with rubber tyres, a foot operated clutch assembly and brake system, a steering wheel, and four seats, and it could safely do 18 miles per hour. A hundred years and tens of thousands of research hours later, we drive cars with a metal chassis with an internal combustion, gasoline-powered engine, four wheels with rubber tyres, a foot operated clutch assembly and brake system, a steering wheel, four seats – and the average speed in London in 2001 was 17.5 miles per hour!

That's not a hell of a lot of return for the money. Ford evidently doesn't have much to teach us about change. The fact that they're still manufacturing cars is not proof that Ford Motor Co. is a sound organization, just proof that takes very large companies to make cars in great quantities – making for an almost impregnable entry barrier.

Fifty years after the development of the jet engine, planes are also little changed. They've grown bigger, wider and can carry more people. But those are incremental, largely cosmetic changes.

Taken together, this lack of real change has come to mean that in travel – whether driving or flying – time and technology have not combined to make things much better. The safety and design have of course accompanied the times and the new volume of cars and flights, but nothing of any significance has changed in the basic assumptions of the final product.

At the same time, moving around in cars or aeroplanes becomes less and less efficient all the time. Not only has there been no great change, but also both forms of transport have deteriorated as more people clamour to use them. The same is true for telephones, which took over hundred years to become mobile, or photographic film, which also required an entire century to change.

The only explanation for this is anthropological. Once established in calcified organizations, humans do two things: sabotage changes that might render people dispensable, and ensure industry-wide emulation. In the 1960s German auto companies developed plans to scrap the entire combustion engine for an electrical design. (The same existed in the 1970s in Japan, and in the 1980s in France.) So for 40 years we might have been free of the wasteful and ludicrous dependence on fossil fuels. Why didn't it go anywhere? Because auto executives understood pistons and carburetors, and would be loath to cannibalise their expertise, along with most of their factories.

98. Which of the following best describes one of the main ideas discussed in the passage?

- (1) Rapid change is usually welcomed in society.
- (2) Industry is not as innovative as it is made out to be.
- (3) We should have less change than what we have now.
- (4) Competition spurs companies into radical innovation.

Solution:

Refer paragraph 4 which shows that the changes that have taken place in the automobile are insignificant. Paragraph 6 says the same for planes. Further, the last paragraph talks about 'calcified organisations' and 'industry-wide emulation'. Hence it confirms that industry is not very innovative.

Choice (2)

99. According to the passage, which of the following statements is true?
- (1) Executives of automobile companies are inefficient and ludicrous.
 - (2) The speed at which an automobile is driven in a city has not changed much in a century.
 - (3) Anthropological factors have fostered innovation in automobiles by promoting use of new technologies.
 - (4) Further innovation in jet engines has been more than incremental.

Solution:

Paragraph 4, line 5 and the last line confirm choice (2).
Choice (2)

100. Which of the following views does the author fully support in the passage?
- (1) Nothing is as permanent as change.
 - (2) Change is always rapid.
 - (3) More money spent on innovation leads to more rapid change.

- (4) Over decades, structural change has been incremental.

Solution:

Paragraph 3, last line supports choice (4).
Choice (4)

101. According to the passage, the reason why we continued to be dependent on fossil fuels is that:
- (1) Auto executives did not wish to change.
 - (2) No alternative fuels were discovered.
 - (3) Change in technology was not easily possible.
 - (4) German, Japanese and French companies could not come up with new technologies.

Solution:

The last line of the passage indicates choice (1).
Choice (1)

Directions for Questions 102 to 106: The passage given below is followed by a set of five questions. Choose the best answer to each question.

Number of words in this passage : 818

The painter is now free to paint anything he chooses. There are scarcely any forbidden subjects, and today everybody is prepared to admit that a painting of some fruit can be as important as a painting of a hero dying. The Impressionists did as much as anybody to win this previously unheard-of freedom for the artist. Yet, by the next generation, painters began to abandon the subject altogether, and began to paint abstract pictures. Today the majority of pictures painted are abstract.

Is there a connection between these two developments? Has art gone abstract because the artist is embarrassed by his freedom? Is it that, because he is free to paint anything, he doesn't know what to paint? Apologists for abstract art often talk of it as the art of maximum freedom. But could this be the freedom of the desert island? It would take too long to answer these questions properly. I believe there is a connection. Many things have encouraged the development of abstract art. Among them has been the artists' wish to avoid the difficulties of finding subjects when all subjects are equally possible.

I raise the matter now because I want to draw attention to the fact that the painter's choice of a subject is a far more complicated question than it would at first seem. A subject does not start with what is put in front of the easel or with something, which the painter happens to remember. A subject starts with the painter deciding he would like to paint such-and-such because for some reason or other he finds it meaningful. A subject begins when the artist selects something for *special mention*. (What makes it special or meaningful may seem to the artist to be purely visual—its colours or its form.) When the subject has been selected, the function of the painting itself is to communicate and justify the significance of that selection.

It is often said today that subject matter is unimportant. But this is only a reaction against the excessively literary and moralistic interpretation of subject matter in the nineteenth century. In truth the subject is literally the beginning and end of a painting. The painting begins with a selection (I will paint this and not everything else in the world); it is finished when that selection is justified (now you can see all that I saw and felt in this and how it is more than merely itself).

Thus, for a painting to succeed it is essential that the painter and his public agree about what is significant. The subject may have a personal meaning for the painter or individual spectator; but there must also be the possibility of their agreement on its general meaning. It is at this point that the culture of the society and period in question precedes the artist and his art. Renaissance art would have meant nothing to the Aztecs—and vice versa. If, to some extent, a few intellectuals can appreciate them both today it is because their culture is an historical one; its inspiration is history and therefore it can include within itself, in principle if not in every particular, all known developments to date.

When a culture is secure and certain of its values, it presents its artists with subjects. The general agreement about what is significant is so well established that the significance of a particular subject accrues and becomes traditional. This is true, for instance, of reeds and water in China, of the nude body in Renaissance, of the animal in Africa. Furthermore, in such cultures the artist is unlikely to be a free agent: he will be employed *for the sake of particular subjects*, and the problem, as we have just described it, will not occur to him.

When a culture is in a state of disintegration or transition the freedom of the artist increases – but the question of subject matter becomes problematic for him: he, himself, has to choose for society. This was at the basis of all the increasing crisis in European art during the nineteenth century. It is too often forgotten how many of the art scandals of that time were provoked by the choice of subject (Gericault, Courbet, Daumier, Degas, Lautree, VanGogh, etc.)

By the end of the nineteenth century there were, roughly speaking, two ways in which the painter could meet this challenge of deciding what to paint and so choosing for society. Either he identified himself with the people and so allowed their lives to dictate his subjects to him; or he had to find his subjects within himself as painter. By *people* I mean everybody except the bourgeoisie. Many painters did of course work for the bourgeoisie according to their copy-book of approved subjects, but all of them, filling the Salon and the Royal Academy year after year, are now forgotten, buried under the hypocrisy of those they served so sincerely.

102. In the sentence, “I believe there is a connection” (second paragraph), what two developments is the author referring to?

- (1) Painters using a dying hero and using a fruit as a subject of painting.
- (2) Growing success of painters and an increase in abstract forms.
- (3) Artists gaining freedom to choose subjects and abandoning subjects altogether.
- (4) Rise of Impressionists and an increase in abstract forms.

Solution:

The statement is made in the context of the artists' freedom to choose a subject and the absence of subject in abstract art. Refer paragraph 2, lines 1 and 2.
Choice (3)

103. When a culture is insecure, the painter choose his subject on the basis of:

- (1) The prevalent style in the society of his time.
- (2) Its meaningfulness to the painter.
- (3) What is put in front of the easel.
- (4) Past experience and memory of the painter.

Solution:

Paragraph 7, line 1 states that when a culture is in a state of disintegration or transition, in other words insecure, the freedom of the artist increases. This clearly indicates that choice (2) is correct.
Choice (2)

104. Which of the following views is taken by the author?

- (1) The more insecure a culture, the greater the freedom of the artist.
- (2) The more secure a culture, the greater the freedom of the artist.
- (3) The more secure a culture, more difficult the choice of subject.
- (4) The more insecure a culture, the less significant the choice of the subject.

Solution:

Paragraph 7 shows that when a culture is insecure the artist has freedom.
Choice (1)

105. Which of the following is NOT necessarily among the attributes needed for a painter to succeed:

- (1) The painter and his public agree on what is significant.
- (2) The painting is able to communicate and justify the significance of its subject selection.
- (3) The subject has a personal meaning for the painter.
- (4) The painting of subjects is inspired by historical developments.

Solution:

The passage lists answer choices (1), (2) and (3) as necessary attributes for a painter to succeed. Choice (1) is supported by paragraph 5, line 1; choice (2) is supported by paragraph 5, line 3; and choice (3) is supported by paragraph 5, line 2. However, choice (4) is not supported by the passage.
Choice (4)

106. In the context of the passage, which of the following statements would NOT be true?

- (1) Painters decided subjects based on what they remembered from their own lives.
- (2) Painters of reeds and water in China faced no serious problem of choosing a subject.
- (3) The choice of subject was a source of scandals in nineteenth century European art.
- (4) Agreement on the general meaning of a painting is influenced by culture and historical context.

Solution:

Choice (2), (3) and (4) are true according to the passage. Choice (2) is supported by paragraph 6, lines 1 – 3. Choice (3) is supported by paragraph 7, lines 3 and 4. Choice (4) is supported by paragraph 5, lines 3 – 7. The passage says that the artist and his art is preceded by the culture of the society. Further, it goes on to say that if intellectuals are able to appreciate Renaissance art and Aztec art, it is because they are aware of the culture and history that inspired those works of art. This clearly implies that choice (4) is true. Choice (1) however is incorrect. Paragraph 3, lines 2 and 3 state that 'a subject does not start with something that the author happens to remember'.
Choice (1)

Directions for Questions 107 to 110: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 734

Throughout human history the leading causes of death have been infection and trauma. Modern medicine has scored significant victories against both, and the major causes of ill health and death are now the chronic degenerative diseases, such as coronary artery disease, arthritis, osteoporosis, Alzheimer's macular degeneration, cataract and cancer. These have a long latency period before symptoms appear and a diagnosis is made. It follows that the majority of apparently healthy people are pre-ill.

But are these conditions inevitably degenerative? A truly preventive medicine that focused on the pre-ill, analysing the metabolic errors, which lead to clinical illness, might be able to correct them before the first symptom. Genetic risk factors are known for all the chronic degenerative diseases, and are important to the individuals who possess them. At the population level, however, migration studies confirm that these illnesses are linked for the most part to lifestyle factors – exercise, smoking and nutrition. Nutrition is the easiest of these to change, and the most versatile tool for affecting the metabolic changes needed to tilt the balance away from disease.

Many national surveys reveal that malnutrition is common in developed countries. This is not the calorie and/or micronutrient deficiency associated with developing nations (Type A malnutrition); but multiple micronutrient depletion, usually combined with calorific balance or excess (Type B malnutrition). The incidence and severity of Type B malnutrition will be shown to be worse if newer micronutrient groups such as the essential fatty acids xanthophylls and flavorous are included in the surveys. Commonly ingested levels of these micronutrients seem to be far too low in many developed countries.

There is now considerable evidence that Type B malnutrition is a major cause of chronic degenerative diseases. If this is the case, then it is logical to treat such diseases not with drugs but with multiple micronutrient repletion, or 'pharmacognutrition'. This can take the form of pills and capsules – 'nutraceuticals', or food formats known as 'functional foods'. This approach has been neglected hitherto because it is relatively unprofitable for drug companies—the products are hard to patent – and it is a strategy which does not sit easily with modern medical interventionism. Over the last 100 years, the drug industry has invested huge sums in developing a range of subtle and powerful drugs to treat the many diseases we are subject to. Medical training is couched in pharmaceutical terms and this approach has provided us with an exceptional range of therapeutic tools in the treatment of disease and in acute medical emergencies. However, the pharmaceutical model has also created an unhealthy dependency culture, in which relatively few of us accept responsibility for maintaining our own health. Instead, we have handed over this responsibility to health professionals who know very little about health maintenance, or disease prevention.

One problem for supporters of this argument is lack of the right kind of hard evidence. We have a wealth of epidemiological data linking dietary factors to health profiles/disease risks, and a great deal of information on mechanism: how food factors interact with our biochemistry. But almost all intervention studies with micronutrients, with the notable exception of the omega 3 fatty acids, have so far produced conflicting or negative results. In other words, our science appears to have no predictive value. Does this invalidate the science? Or are we simply asking the wrong questions?

Based on pharmaceutical thinking, most intervention studies have attempted to measure the impact of a single micronutrient on the incidence of disease. The classical approach says that if you give a compound formula to test subjects and obtain positive results, you cannot know which ingredient is exerting the benefit, so you must test each ingredient individually. But in the field of nutrition, this does not work. Each intervention on its own will hardly make enough difference to be measured. The best therapeutic response must therefore combine micronutrients to normalise our internal physiology. So do we need to analyse each individual's nutritional status and then tailor a formula specifically for him or her? While we do not have the resources to analyse millions of individual cases, there is no need to do so. The vast majority of people are consuming sub optimal amounts of most micronutrients, and most of the micronutrients concerned are very safe. Accordingly, a comprehensive and universal program of micronutrient support is probably the most cost-effective and safest way of improving the general health of the nation.

107. Why are a large number of apparently healthy people deemed pre-ill?

- (1) They may have chronic degenerative diseases.
- (2) They do not know their own genetic risk factors, which predispose them to diseases.
- (3) They suffer from Type-B malnutrition.
- (4) There is a lengthy latency period associated with chronically degenerative diseases.

Solution:

Paragraph 1, line 4 supports choice (4).

Choice (4)

108. Type-B malnutrition is a serious concern in developed countries because

- (1) developing countries mainly suffer from Type-A malnutrition.
- (2) it is a major contributor to illness and death.
- (3) pharmaceutical companies are not producing drugs to treat this condition.
- (4) national surveys on malnutrition do not include newer micronutrient groups.

Solution:

Paragraph 1, line 2 and paragraph 4, line 1 indicate that choice (2) is correct.
Choice (2)

- 109.** Tailoring micronutrient-based treatment plans to suit individual deficiency profiles is not necessary because
- (1) it very likely to give inconsistent or negative results.
 - (2) it is a classic pharmaceutical approach not suited to micronutrients.
 - (3) most people are consuming sub optimal amounts of safe-to-consume micronutrients.
 - (4) it is not cost effective to do so.

Solution:

Last paragraph, line 6 and line 8 support choice (3).
Choice (3)

- 110.** The author recommends micronutrient-repletion for large-scale treatment of chronic degenerative diseases because
- (1) it is relatively easy to manage.
 - (2) micronutrient deficiency is the cause of these diseases.
 - (3) it can overcome genetic risk factors
 - (4) it can compensate for other lifestyle factors.

Solution:

Refer paragraph 3, lines 2 and 3, and paragraph 4, line 1.
Choice (2)

Directions for Questions 111 to 114: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 745

Fifty feet away three male lions lay by the road. They didn't appear to have a hair on their heads. Nothing the colour of their noses (leonine noses darken as they age, from pink to black), Craig estimated that they were six years old-young adults. "This is wonderful!" he said, after staring at them for several moments. "This is what we came to see. They really are maneless." Craig, a professor at the University of Minnesota, is arguably the leading expert on the majestic Serengeti lion, whose head is mantled in long, thick hair. He and Peyton West, a doctoral student who has been working with him in Tanzania, had never seen the Tsavo lions that live some 200 miles east of the Serengeti. The scientists had partly suspected that the maneless males were adolescents mistaken for adults by amateur observers. Now they knew better.

The Tsavo research expedition was mostly Peyton's show. She had spent several years in Tanzania, compiling the data she needed to answer a question that ought to have been answered long ago: Why do lions have manes? It's the only cat, wild or domestic, that displays such ornamentation. In Tsavo she was attacking the riddle from the opposite angle. Why do its lions not have manes? (Some "maneless" lions in Tsavo East do have partial manes, but they rarely attain the regal glory of the Serengeti lions'.) Does environmental adaptation account for the trait? Are the lions of Tsavo, as some people believe, a distinct subspecies of their Serengeti cousins?

The Serengeti lions have been under continuous observation for more than 35 years, beginning with George Schaller's pioneering work in the 1960s. But the lions in Tsavo, Kenya's oldest and largest protected ecosystem, have hardly been studied. Consequently, legends have grown up around them. Not only do they look different, according to the myths, they behave differently, displaying greater cunning and aggressiveness. "Remember too," Kenya: *The Rough Guide* warns, "Tsavo's lions have a reputation of ferocity." Their fearsome image became well-known in 1898, when two males stalled construction of what is now Kenya Railways by allegedly killing and eating 135 Indian and African laborers. A British Army officer in charge of building a railroad bridge over the Tsavo River, Lt. Col. J. H. Patterson, spent nine months pursuing the pair before he brought them to bay and killed them. Stuffed and mounted, they now glare at visitors to the Field Museum in Chicago. Patterson's account of the leonine reign of terror, *The Man-Eaters of Tsavo*, was an international best-seller when published in 1907. Still in print, the book has made Tsavo's lions notorious. That annoys some scientists. "People don't want to give up on mythology," Dennis King told me one day. The zoologist has been working in Tsavo off and on for four years. "I am so sick of this man-eater business. Patterson made a helluva lot of money off that story, but Tsavo's lions are no more likely to turn man-eater than lions from elsewhere."

But tales of their savagery and willingness don't all come from sensationalist authors looking to make a buck. Tsavo lions are generally larger than lions elsewhere, enabling them to take down the predominant prey animal in Tsavo, the Cape buffalo, one of the strongest, most aggressive animals of Earth. The buffalo don't give up easily: They often kill or severely injure an attacking lion, and a wounded lion might be more likely to turn to cattle and humans for food.

And other prey is less abundant in Tsavo than in other traditional lion haunts. A hungry lion is more likely to attack humans. Safari guides and Kenya Wildlife Service rangers tell of lions attacking Land Rovers, raiding camps, stalking tourists. Tsavo is a tough neighbourhood, they say, and it breeds tougher lions.

But are they really tougher? And if so, is there any connection between their manelssness and their ferocity? An intriguing hypothesis was advanced two years ago by Gnoske and Peterhans: Tsavo lions may be similar to the unmanned cave lions of the Pleistocene. The Serengeti variety is among the most evolved of the species – the latest model, so to speak – while certain morphological differences in Tsavo lions (bigger bodies, smaller skulls, and may be even lack of a mane) suggest that they are closer to the primitive ancestor of all lions. Craig and Peyton had serious doubts about this idea, but admitted that Tsavo lions pose a mystery to science.

- 111.** The book *Man-Eaters of Tsavo* annoys some scientists because
(1) it revealed that Tsavo lions are ferocious.
(2) Patterson made a helluva lot of money from the book by sensationalism.
(3) it perpetuated the bad name Tsavo lions had.
(4) it narrated how two male Tsavo lions were killed.

Solution:

Paragraph 3, line 11 supports choice (3).
Choice (3)

- 112.** The sentence which concludes the first paragraph, "Now they knew better", implies that:
(1) The two scientists were struck by wonder on seeing maneless lions for the first time.
(2) Through Craig was an expert on the Serengeti lion, now he also knew about the Tsavo lions.
(3) Earlier, Craig and West thought that amateur observers had been mistaken.
(4) Craig was not able to confirm that darkening of the noses as lions aged applied to Tsavo lions as well.

Solution:

The statement implies that Craig and Peyton West felt that the amateur observers were incorrect in believing that the maneless lions were adults. Now they know that the amateurs were in fact right.

Choice (3)

- 113.** Which of the following, if true, would weaken the hypothesis advanced by Gnoske and Peterhans most?
(1) Craig and Peyton develop even more serious doubts about the idea that Tsavo lions are primitive.
(2) The maneless Tsavo East lions are shown to be closer to the cave lions.
(3) Pleistocene cave lions are shown to be far less violent than believed.
(4) The morphological variations in body and skull size between the cave and Tsavo lions are found to be insignificant.

Directions for Questions 115 to 118: The passage given below is followed by a set of four questions. Choose the best answer to each question.

Number of words in this passage : 719

The viability of the multinational corporate system depends upon the degree to which people will tolerate the unevenness it creates. It is well to remember that the 'New Imperialism' which began after 1870 in a spirit of Capitalism Triumphant, soon became seriously troubled and after 1914 was characterized by war, depression, breakdown of the international economic system and war again, rather than Free Trade, Pax Britannica and Material Improvement. A major reason was Britain's inability to cope with the by-products of its own rapid accumulation of capital; i.e., a class-conscious labour force at home; a middle class in the hinterland; and rival centres of capital on the Continent and in America. Britain's policy tended to be atavistic and defensive rather than progressive – more concerned with warding off new threats than creating new areas of expansion. Ironically, Edwardian England revived the paraphernalia of the landed aristocracy it had just destroyed. Instead of embarking on a 'big push' to develop the vast hinterland of the Empire, colonial administrators often adopted policies to arrest the development of either a native capitalist class or a native proletariat which could overthrow them.

As time went on, the centre had to devote an increasing share of government activity to military and other unproductive expenditures; they had to rely on alliances with an inefficient class of landlords, officials and soldiers in the hinterland to maintain stability at the cost of development. A great part of the surplus extracted from the population was thus wasted locally.

Solution:

The last paragraph states the hypothesis. It is that the Tsavo lions are similar to the cave lions of Pleistocene. If the Pleistocene lions are shown to be less violent than earlier thought, then the aggressiveness of the Tsavo lion cannot be reconciled with the lack of it in cave lions of Pleistocene. This calls into question the hypothesis that the two are similar. Hence choice (3) weakens the hypothesis. Choice (1) will neither strengthen nor weaken the hypothesis. Choice (2) will strengthen the hypothesis. Choice (4) will also strengthen the hypothesis as it states that the morphological variations are insignificant.

Choice (3)

- 114.** According to the passage, which of the following has NOT contributed to the popular image of Tsavo lions as savage creatures?

- (1) Tsavo lions have been observed to bring down one of the strongest and most aggressive animals – the Cape buffalo.
(2) In contrast to the situation in traditional lion haunts, scarcity of non-buffalo prey in the Tsavo makes the Tsavo lions more aggressive.
(3) The Tsavo lion is considered to be less evolved than the Serengeti variety.
(4) Tsavo lions have been observed to attack vehicles as well as humans.

Solution:

Choice (1), (2) and (4) refer to facts that have contributed to the popular image of the Tsavo lion as being very aggressive. Choice (3) however, has not contributed to that image.

Choice (3)

The New Mercantilism (as the Multinational Corporate System of special alliances and privileges, aid and tariff concessions is sometimes called) faces similar problems of internal and external division. The centre is troubled: excluded groups revolt and even some of the affluent are dissatisfied with the roles. Nationalistic rivalry between major capitalist countries remains an important divisive factor. Finally, there is the threat presented by the middle classes and the excluded groups of the underdeveloped countries. The national middle classes in the underdeveloped countries came to power when the centre weakened but could not, through their policy of import substitution manufacturing, establish a viable basis for sustained growth. They now face a foreign exchange crisis and an unemployment (or population) crisis – the first indicating their inability to function in the international economy and the second indicating their alienation from the people they are supposed to lead. In the immediate future, these national middle classes will gain a new lease of life as they take advantage of the spaces created by the rivalry between American and non-American oligopolists striving to establish global market positions.

The native capitalists will again become the champions of national independence as they bargain with multinational corporations. But the conflict at this level is more apparent than real, for in the end the fervent nationalism of the middle class asks only for promotion within the corporate structure and not for a break with that structure. In the last analysis their power derives from the metropolis and they cannot easily afford to challenge the international system. They do not command the loyalty of their own population and cannot really compete with the large, powerful, aggregate capitals from the centre. They are prisoners of the taste patterns and consumption standards set at the centre.

The main threat comes from the excluded groups. It is not unusual in underdeveloped countries for the top 5 per cent to obtain between 30 and 40 per cent of the total national income, and for the top one-third to obtain anywhere from 60 to 70 per cent. At most, one-third of the population can be said to benefit in some sense from the dualistic growth that characterizes development in the hinterland. The remaining two-thirds, who together get only one-third of the income, are outsiders, not because they do not contribute to the economy, but because they do not share in the benefits. They provide a source of cheap labour which helps keep exports to the developed world at a low price and which has financed the urban-biased growth of recent years. In fact, it is difficult to see how the system in most underdeveloped countries could survive without cheap labour since removing it (e.g. diverting it to public works projects as is done in socialist countries) would raise consumption costs to capitalists and professional elites.

115. According to the author, the British policy during the 'New Imperialism' period tended to be defensive because

- (1) it was unable to deal with the fallouts of a sharp increase in capital.
- (2) its cumulative capital had undesirable side-effects.
- (3) its policies favoured developing the vast hinterland.
- (4) it prevented the growth of a set-up which could have been capitalistic in nature.

Solution:

Paragraph 1, lines 5 and 6 say that Britain was unable 'to cope with the by-products of its own rapid accumulation of capital'.

Choice (1)

116. The author is in a position to draw parallels between New Imperialism and New Mercantilism because

- (1) both originated in the developed Western capitalist countries.
- (2) New Mercantilism was a logical sequel to New Imperialism.
- (3) they create the same set of outputs – a labour force, middle classes and rival centres of capital.
- (4) both have comparable uneven and divisive effects.

Solution:

The underlying sentiment in paragraph 3 shows that New Mercantilism like New Imperialism (paragraph 1) has uneven and divisive effects. Refer paragraph 3, line 2.

Choice (4)

117. Under New Mercantilism, the fervent nationalism of the native middle classes does not create conflict with the multinational corporations because they (the middle classes)

- (1) negotiate with the multinational corporations.
- (2) are dependent on the international system for their continued prosperity.
- (3) are not in a position to challenge the status quo.
- (4) do not enjoy popular support.

Solution:

Refer paragraph 4, line 4. The sentence states that the native middle class could not afford to challenge the international system.

Choice (2)

118. In the sentence, "They are prisoners of the taste patterns and consumption standards set at the centre." (fourth paragraph), what is the meaning of 'centre'?

- (1) National government.
- (2) Native capitalists.
- (3) New capitalists.
- (4) None of the above.

Solution:

Refer paragraph 3, lines 5 and 6. The national middle class came to power In other words they became the centre.

Choice (4)

Sub-section III – B: Number of Questions = 5

Note: Questions 119 to 123 carry two marks each.

Directions for Questions 119 and 120: The sentences given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences from among the given choices to construct a coherent paragraph.

Solution:

'C' begins the paragraph. There is a reference to 'fuel cells' in C. E continues the idea of 'total fuel economy' which is expressed in C. Hence CE go together. D is the continuation as it says that the 30% efficiency is twice as good as the efficiency of the internal combustion engine. Hence CED. 'B' introduces another facet i.e., reducing carbon emissions. 'A' continues, as it talks about a full-hearted leap, which is a reference to what is mentioned in B. Hence CEDBA.

Choice (1)

Solution:

The paragraph starts with 'E' as it launches the topic of how much is known about the rich and the poor in Egypt. The sentence ends with the statement that 'monuments were made for the rich'. This should be logically followed by what was made for the poor. Hence 'D' should follow. Hence CD. Then the discussion moves on to sources of information. Hence EDC. 'Papyri' in B and 'sources of information' in C are linked as 'papyri' refer to documents which are sources of information. Hence EDCB. 'A' rounds up the discussion by stating that notwithstanding the discussion in the preceding statements, death is not the only preoccupation of the Egyptians. Hence EDCBA.

Directions for questions 121 to 123: Four alternative summaries are given below each text. Choose the option that best captures the essence of the text.

121. Modern bourgeois society, said Nietzsche, was decadent and enfeebled – a victim of the excessive development of the rational faculties at the expense of will and instinct. Against the liberal-rationalist stress on the intellect, Nietzsche urged recognition of the dark mysterious world of instinctual desires – the true forces of life. Smother the will with excessive intellectualizing and you destroy the spontaneity that sparks cultural creativity and ignites a zest for living. The critical and theoretical outlook destroyed the creative instincts. For man's manifold potential to be realized, he must forego relying on the intellect and nurture again the instinctual roots of human existence.

 - (1) Nietzsche urges the decadent and enfeebled modern society to forego intellect and give importance to creative instincts.
 - (2) Nietzsche urges the decadent and enfeebled modern society to smother the will with excessive intellectualising and ignite a zest for living.
 - (3) Nietzsche criticizes the intellectuals for enfeebling the modern bourgeois society by not nurturing man's creative instincts.
 - (4) Nietzsche blames excessive intellectualization for the decline of modern society and suggests nurturing creative instincts instead.

Solution:

The central idea of the paragraph is that Nietzsche opined that excessive intellectualisation is responsible for the decline of modern society and suggests nurturing creative instincts instead. Choice (4) captures this correctly.

Choice (4)

- 122.** Local communities have often come in conflict with agents trying to exploit resources, at a faster pace, for an expanding commercial-industrial economy. More often than not, such agents of resource-intensification are given preferential treatment by the state, through the grant of generous long leases over mineral or fish stocks, for example, or the provision of raw material at an enormously

subsidized price. With the injustice so compounded, local communities at the receiving end of this process have no recourse except direct action, resisting both the state and outside exploiters through a variety of protest techniques. These struggles might perhaps be seen as a manifestation of a new kind of class conflict.

- (1) A new kind of class conflict arises from preferential treatment given to agents of resource-intensification by the state, which the local community sees as unfair.
- (2) The grant of long leases to agents of resource-intensification for an expanding commercial-industrial economy leads to direct protests from the local community, which sees it as unfair.
- (3) Preferential treatment given by the state to agents of resource-intensification for an expanding commercial-industrial economy exacerbates injustice to local communities and leads to direct protests from them, resulting in a new type of class conflict.
- (4) Local communities have no option but to protest against agents of resource-intensification and create a new type of class conflict when they are given raw material at subsidized prices for an expanding commercial-industrial economy.

Solution:

The main idea expressed is that the state has given preferential treatment to agents of resource-intensification to intensity an expanding commercial-industrial economy. This action is protested by the local communities which has in turn resulted in class conflict. All these ideas are expressed in choice (3). Choice (3)

123. Although almost all climate scientists agree that the Earth is gradually warming, they have long been of two minds about the process of rapid climate shifts within larger period of change. Some have

speculated that the process works like a giant oven or freezer, warming or cooling the whole planet at the same time. Others think that shifts occur on opposing schedules in the Northern and Southern Hemispheres, like exaggerated seasons. Recent research in Germany examining climate patterns in the Southern Hemisphere at the end of the last Ice Age strengthens the idea that warming and cooling occurs at alternate times in the two hemispheres. A more definitive answer to this debate will allow scientists to better predict when and how quickly the next climate shift will happen.

- (1) Scientists have been unsure whether rapid shifts in the Earth's climate happen all at once or on opposing schedules in different hemispheres; research will help find a definitive answer and better predict climate shifts in future.
- (2) Scientists have been unsure whether rapid shifts in the Earth's climate happen all at once or on opposing schedules in different hemispheres; finding a definitive answer will help them better predict climate shifts in future.
- (3) Research in Germany will help scientists find a definitive answer about warming and cooling of the Earth and predict climate shifts in the future in a better manner.
- (4) More research rather than debates on warming or cooling of the Earth and exaggerated seasons in its hemispheres will help scientists in Germany predict climate changes better in future.

Solution:

The paragraph mainly talks about scientists not being sure about the changes in the Earth's climate; whether they happen all at once or at different times in both the hemispheres. A definitive answer will help them to predict future climatic changes. These ideas are best expressed in choice (2). Choice (2)

