Directions for the following 4 (four) items:
Read the following two passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

Maintaining an ecosystem just to conserve biodiversity will affect its commercial potential as well as the livelihoods dependent on the ecosystem. There is also a conflict between using an ecosystem only for livelihoods, for commercial exploitation, or strictly for conservation. Deforestation caused due to commercial exploitation will lead to indirect harm like floods, siltation problems and microclimatic instability, apart from adversely affecting livelihoods dependent on forests. These conflicts are particularly acute in developing countries where the dependence of people on the ecosystem is significant, and commercial exploitation has the potential to boost national income.

Q.1) Which one of the following statements best reflects the critical message conveyed by the author of the passage?

a) Conservation of biodiversity is not an issue to be worried about when some people depend on ecosystems for their livelihoods.
b) Commercial exploitation of forests goes against the fundamental rights of the people dependent on forests for food and shelter.
c) Sustenance of livelihood and degradation of ecosystem while being together exacerbate one another, leading to conflicts and imbalance.
d) Commercial exploitation of ecosystems should be completely stopped.

Ans) c

Exp) Option c is the correct answer

Option a is incorrect: The passage does not suggest that biodiversity conservation is unimportant. In fact, it stresses the conflict between conservation, livelihood, and commercial exploitation, without downplaying any one aspect. Saying it's “not an issue to be worried about” misrepresents the author’s balanced concern for both biodiversity and livelihood. **Hence option (a) is incorrect.**

Option b is incorrect: While the passage does discuss how commercial exploitation harms the livelihoods of those dependent on forests, it does not frame the issue in terms of fundamental rights. The author avoids a rights-based discourse and focuses more on practical consequences like floods, siltation, instability, and the broader conflict of objectives. **Hence option (b) is incorrect.**

Option c is correct: It captures the central theme of the passage — the mutual exacerbation of ecosystem degradation and livelihood pressures, leading to conflicts and imbalance. The author emphasizes the trade-offs and tensions between conservation, commercial use, and

dependence for livelihood, especially in developing countries. This option reflects that complexity well. **Hence option (c) is correct.**

Option d is incorrect: This is too extreme. The passage does not advocate for a total ban on commercial exploitation. Rather, it highlights the negative consequences and the need to manage trade-offs. Suggesting complete stoppage overstates the author's position and misses the nuance. **Hence option (d) is incorrect.**

Therefore Option (c) is the correct answer.

Q.2) With reference to above passage, the following assumptions have been made:
I. No country needs to depend on ecosystems to boost national income.
II. Resource-rich countries need to share their resources with those of scant resources so as to prevent the degradation of ecosystems.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) d

Exp) Option d is the correct answer
Statement I is invalid: The passage specifically mentions that in developing countries, commercial exploitation of ecosystems has the potential to boost national income, especially where people are heavily dependent on those ecosystems. Therefore, saying that "no country needs to depend" directly contradicts the passage. The passage implies that some countries do need to, particularly those with limited alternatives. **Hence Statement I is incorrect.**

Statement II is invalid: The passage does not mention or imply anything about resource sharing among countries as a strategy to prevent ecosystem degradation. It focuses instead on internal conflicts within countries — such as between conservation, livelihood dependence, and commercial use. No reference to international cooperation or resource redistribution is made. **Hence Statement II is incorrect.**

Both Statement I and II are invalid.

There option (d) is the correct answer.

Passage-2

The history of renewable energy suggests there is a steep learning curve, meaning that, as more is produced, costs fall rapidly because of economies of scale and learning by doing. The firms' green

innovation is path-dependent: the more a firm does, the more it is likely to do in the future. The strongest evidence for this is the collapse in the price of solar energy, which became about 90% cheaper during the 2010s, repeatedly beating forecasts. Moving early and gradually gives economies more time to adjust, allowing them to reap the benefits of path-dependent green investment without much disruption. A late, more chaotic transition is costlier.

Q.3) Which one of the following statements best reflects the central idea of the passage?
a) Economies of scale is essential for transition to green growth.
b) Modern technological progress is intensely linked to path-dependent innovations.
c) Countries with large economies are in a better position to adopt green technologies.
d) Timing plays a crucial role in the case of green technology development.

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: This is partially true, but not the central idea. While the passage mentions economies of scale, it does so in the context of the broader idea of the learning curve and early adoption. Focusing only on economies of scale narrows the message too much. **Hence option (a) is incorrect.**

Option b is incorrect: This is factually correct based on the passage, but again, it is not the main point. Path-dependence is discussed, but as part of a broader argument about timing and investment strategy, not as the central message on its own. **Hence option (b) is incorrect.**

Option c is incorrect: This is incorrect. The passage does not mention anything about large economies being better positioned. It talks about moving early and gradual adjustment, which could apply to any economy. **Hence option (c) is incorrect.**

Option d is correct: This is the correct answer. The author emphasizes that early and gradual movement allows for adjustment and reduces disruption, while late transition is costlier. Hence, timing is portrayed as crucial, making this the best reflection of the central idea. **Hence option (d) is correct.**

Therefore Option (d) is the correct answer.

Q.4) With reference to the above passage, the following assumptions have been made:
I. Path-dependent green investments will eventually most likely benefit growth as well as public finances in a country like India.
II. If other green technologies follow the same pattern as that of solar energy, there will most likely be an easy green transition.
Which of the above assumptions is/are valid?
a) I only

b) II only
c) Both I and II
d) Neither I nor II

Ans) b

Exp) Option b is the correct answer

Statement I is invalid: This is partially valid, but not directly supported in the passage. The passage discusses the benefits of path-dependence, but does not mention specific countries like India or its public finances. So, this assumption extrapolates too much beyond what is stated. **Hence Statement I is incorrect.**

Statement II is valid: This is reasonable based on the evidence of solar energy given in the passage. The author mentions solar as a case study showing that early and consistent efforts can lead to significant cost reduction and smoother transition. Assuming other green technologies follow suit is a valid generalization consistent with the passage. **Hence Statement II is correct.**

Therefore, Statement I is incorrect and Statement II is correct.

Hence Option (b) is the correct answer.

Q.5) A natural number N is such that it can be expressed as N = p + q + r, where p, q and r are distinct factors of N. How many numbers below 50 have this property?
a) 6
b) 7
c) 8
d) 9

Ans) c
Exp) Option c is correct answer

Start by looking for the smallest number that has at least three distinct factors,

The first such number is 6.
Factors of 6: 1, 2, 3, 6
Now, 6 = 1 + 2 + 3
So 6 satisfies the condition.

If we multiply the equation by 2 it becomes

12 = 2+ 4 + 6

This means 12 also satisfies the criteria given in question.

Like wise all the multiples of 6, will satisfy the criteria in the question.

List of all the multiples of 6 below 50:

6, 12, 18, 24, 30, 36, 42, 48

There are 8 such numbers.

NO number which not a multiple of 6 satisfies this criteria.

So, the answer is 8.

Q.6) Three prime numbers p, q and r, each less than 20, are such that p − q = q − r. How many distinct possible values can we get for (p + q + r)?
a) 4
b) 5
c) 6
d) More than 6

Ans) a

Exp) Option a is the correct answer

Given that there are three prime numbers p, q and r each less than 20 such that p-q = q-r.

Consider p-q = q-r

Rearranging we get

2q = p+r

q = (p+r)/2

Therefore, we need to find triplets of prime numbers less than 20 such that one of the numbers is the average of other two.

Below is the list of prime numbers less than 20:

2, 3, 5, 7, 11, 13, 17, 19

By introspection we find the following triplets satisfying the above conditions:

- 3, 5, 7

- 3, 7, 11
- 5, 11, 17
- 7, 13, 19

In each of the above triplets, the middle number is the average of the other two.

Distinct possible value for "p+q+r" are given by:

- 3+5+7 = 15
- 3+7+11 = 21
- 5+11+17 = 33
- 7+13+19 = 39

Thus, there are four distinct possible values.

Hence Option (a) is the correct answer.

Q.7) How many possible values of (p + q + r) are there satisfying $\frac{1}{p} + \frac{1}{q} + \frac{1}{r} = 1$, where p, q and r are natural numbers (not necessarily distinct)?
a) None
b) One
c) Three
d) More than three

Ans) c

Exp) Option c is the correct answer

The problem asks us to find the number of distinct possible values for the sum (p + q + r) given the equation 1/p + 1/q + 1/r = 1, where p, q, and r are natural numbers (positive integers: 1, 2, 3, ...). The numbers p, q, and r are not necessarily distinct.

Let's assume, without loss of generality, that 1 <= p <= q <= r. This ordering helps us systematically find all possible unique sets of (p, q, r). Once we find these sets, we can calculate their sums (p + q + r) and then count the number of distinct sum values.

From the equation 1/p + 1/q + 1/r = 1, since p, q, and r are natural numbers, 1/p, 1/q, and 1/r must be positive.

The possible values for p are given by:-

Since p <= q <= r, it follows that 1/p >= 1/q >= 1/r. Therefore, 1 = 1/p + 1/q + 1/r <= 1/p + 1/p + 1/p = 3/p. So, 1 <= 3/p, which implies p <= 3.

This means p can only be 1, 2, or 3.

Let's check each case for p:

Case 1: p = 1 If p = 1, the equation becomes 1/1 + 1/q + 1/r = 1. This simplifies to 1 + 1/q + 1/r = 1, which means 1/q + 1/r = 0. Since q and r are natural numbers, 1/q and 1/r are both positive. Their sum cannot be 0. Therefore, p cannot be 1.

Case 2: p = 2 If p = 2, the equation becomes 1/2 + 1/q + 1/r = 1. Subtracting 1/2 from both sides gives 1/q + 1/r = 1 - 1/2 = 1/2.

Now, we need to find natural numbers q and r such that q >= p (so q >= 2) and r >= q. Since q <= r, we have 1/q >= 1/r. So, 1/2 = 1/q + 1/r <= 1/q + 1/q = 2/q. This implies 1/2 <= 2/q, which means q <= 4.

So, when p = 2, the possible values for q are 2, 3, or 4.

- **Subcase 2.1: p = 2, q = 2** The equation becomes 1/2 + 1/2 + 1/r = 1. 1 + 1/r = 1, which means 1/r = 0. This is not possible for a natural number r. So, (2, 2, r) is not a solution.
- **Subcase 2.2: p = 2, q = 3** The equation becomes 1/2 + 1/3 + 1/r = 1. To find 1/r, subtract 1/2 and 1/3 from 1: 1/r = 1 - 1/2 - 1/3 1/r = (6 - 3 - 2) / 6 1/r = 1/6 So, r = 6. This gives the ordered solution (p, q, r) = (2, 3, 6). Check if this satisfies p <= q <= r: 2 <= 3 <= 6. Yes. Sum for this solution: p + q + r = 2 + 3 + 6 = 11.
- **Subcase 2.3: p = 2, q = 4** The equation becomes 1/2 + 1/4 + 1/r = 1. To find 1/r: 1/r = 1 - 1/2 - 1/4 1/r = (4 - 2 - 1) / 4 1/r = 1/4 So, r = 4. This gives the ordered solution (p, q, r) = (2, 4, 4). Check if this satisfies p <= q <= r: 2 <= 4 <= 4. Yes. Sum for this solution: p + q + r = 2 + 4 + 4 = 10.

Case 3: p = 3 If p = 3, the equation becomes 1/3 + 1/q + 1/r = 1. Subtracting 1/3 from both sides gives 1/q + 1/r = 1 - 1/3 = 2/3.

Now, we need to find natural numbers q and r such that q >= p (so q >= 3) and r >= q. Since q <= r, we have 1/q >= 1/r. So, 2/3 = 1/q + 1/r <= 1/q + 1/q = 2/q. This implies 2/3 <= 2/q, which means q <= 3.

So, when p = 3, the only possible value for q (given q >= 3) is q = 3.

- **Subcase 3.1: p = 3, q = 3** The equation becomes 1/3 + 1/3 + 1/r = 1. 2/3 + 1/r = 1. To find 1/r: 1/r = 1 - 2/3 1/r = 1/3 So, r = 3. This gives the ordered solution (p, q, r) = (3, 3, 3).

Check if this satisfies p <= q <= r: 3 <= 3 <= 3. Yes. Sum for this solution: p + q + r = 3 + 3 + 3 = 9.

Summary of Unique Ordered Solutions (p, q, r) and their sums (p + q + r):

1. (2, 3, 6) -> Sum = 11
2. (2, 4, 4) -> Sum = 10
3. (3, 3, 3) -> Sum = 9

These are the only possible sets of natural numbers (up to reordering) that satisfy the given equation. The problem asks for the number of possible values of (p + q + r).

The distinct sums we found are 9, 10, and 11.

There are three distinct possible values for p + q + r.

Therefore Option (c) is the correct answer.

Q.8) What comes at X and Y respectively in the following sequence?
January, January, December, October, X, March, October, Y, September
a) July, May
b) July, April
c) June, May
d) June, April

Ans) b

Exp) Option b is the correct answer

Given sequence is:

January, January, December, October, X, March, October, Y, September

Consider the table given below:

S.No	Month
1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
10	October
11	November
12	December

Upon closer introspection we find that in the sequence the months move backwards in the order of 0,1,2,3 so on.

- For instance, January coming after January indicates a movement of 0 months
- December coming after January indicates a backward movement of 1 month from January
- Similarly, October is the second month from December when seen in the backward direction.
- Next, we need to find the third month from October in the backward direction which is July

Therefore X= July

And the sequence continues

Similarly, the month Y will be the sixth month from October in the backward direction which is April

Therefore Y = April

Therefore X=July and Y=April

Hence Option (b) is the correct answer.

Q.9) Team X scored a total of N runs in 20 overs. Team Y tied the score in 10% less overs. Had team Y's average run rate (runs per over) been 50% higher, the scores would have been tied in 12 overs. How many runs were scored by team X?
a) 72
b) 144
c) 216
d) Cannot be determined

Ans) d

Exp) Option d is the correct answer

Given:

- Team X scored N runs in 20 overs.
- Team Y tied the score, i.e., also scored N runs, but did so in 10% fewer overs, which is 18 overs.
- If Team Y's run rate had been 50% higher, they would have tied the score in 12 overs.

Let Team Y's actual run rate be denoted by R. Since they scored N runs in 18 overs, their actual run rate is:

$R = N \div 18$

If this run rate increased by 50%, the new rate becomes:

$\text{New rate} = 1.5 \times R = 1.5 \times (N \div 18)$

At this new rate, in 12 overs, the runs scored would be:

$\text{Runs} = \text{New rate} \times 12 = 1.5 \times (N \div 18) \times 12$

Simplifying:

Runs = (3N ÷ 2) × (2 ÷ 3) = N

So, both scenarios lead to a total of N runs being scored.

Conclusion:

The equation simplifies to an identity (N = N), which means no unique value for N can be determined. The given information is consistent but insufficient to calculate an exact number of runs and hence cannot be determined.

Hence Option (d) is the correct answer.

Q.10) The price (p) of a commodity is first increased by k%; then decreased by k%; again increased by k%; and again decreased by k%. If the new price is q, then what is the relation between p and q?
a) $p(10^4 - k^2)^2 = q \times 10^8$
b) $p(10^4 - k^2)^2 = q \times 10^4$
c) $p(10^4 - k^2) = q \times 10^4$
d) $p(10^4 - k^2) = q \times 10^8$

Ans) a

Exp) Option a is the correct answer

The price p of the commodity undergoes a series of changes, each involving an increase or decrease by k%.

1. First, the price is increased by $k\%$:
   The new price becomes $p \times \left(1 + \frac{k}{100}\right)$.
2. Next, the price is decreased by $k\%$:
   The price from the previous step is now subject to a $k\%$ decrease.
   The price becomes $p \times \left(1 + \frac{k}{100}\right) \times \left(1 - \frac{k}{100}\right)$.
   Using the difference of squares formula, $(a + b)(a - b) = a^2 - b^2$, this simplifies to:
   $p \times \left(1^2 - \left(\frac{k}{100}\right)^2\right) = p \times \left(1 - \frac{k^2}{100^2}\right)$.
3. Subsequently, the price is again increased by $k\%$:
   Applying the $k\%$ increase to the price from the previous step:
   The price becomes $p \times \left(1 - \frac{k^2}{100^2}\right) \times \left(1 + \frac{k}{100}\right)$.
4. Finally, the price is again decreased by $k\%$:
   Applying the $k\%$ decrease to the price from the previous step, the final price, q, is:
   $q = p \times \left(1 - \frac{k^2}{100^2}\right) \times \left(1 + \frac{k}{100}\right) \times \left(1 - \frac{k}{100}\right)$.
   Again, using the difference of squares formula for the last two terms:
   $q = p \times \left(1 - \frac{k^2}{100^2}\right) \times \left(1^2 - \left(\frac{k}{100}\right)^2\right)$.
   This simplifies to:
   $q = p \times \left(1 - \frac{k^2}{100^2}\right)^2$.

$q = p \times \left(\frac{10^4 - k^2}{10^4}\right)^2$.
$q = p \times \frac{(10^4 - k^2)^2}{(10^4)^2}$.
$q = p \times \frac{(10^4 - k^2)^2}{10^8}$.

To express the relationship in the form of the options provided, we can multiply both sides by 10^8:
$q \times 10^8 = p \times (10^4 - k^2)^2$.

Therefore Option (a) is the correct answer.

Directions for the following 4 (four) items:
Read the following two passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

Each State in India faces a distinctive set of challenges regarding the impact of warming, but also offers its own set of opportunities for reducing emissions depending on its natural resources. For example, coastal States need to take action to protect their shores from sea level rise, districts that are drier need to prepare for variable monsoon precipitation. Himalayan regions have their own unique challenges, and selected parts of peninsular India and offshore areas offer great opportunities for harnessing wind power. These various aspects need to be considered for developing clear and sustainable goals for the future.

Q.11) Which one of the following statements best reflects the most logical, rational and pragmatic message conveyed by the author of the passage?

a) The mitigation and adaptation strategies to address/tackle the climate change is essentially the responsibility of each State.
b) India is too diverse to implement any effective strategy or programme to address/tackle the climate change.
c) It is basically the responsibility of the Union Government to implement the climate action plans and ensure net zero emissions.
d) India needs to formulate effective climate change mitigation and adaptation strategies at the State/region level.

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: While the passage does highlight state-specific challenges and opportunities, it does not imply that it is essentially the responsibility of each state alone. That is too absolutist and ignores the cooperative federalism needed. **Hence option (a) is incorrect**.

Option b is incorrect: The passage never claims that India is too diverse to implement a strategy. It highlights diversity, but not in a pessimistic or defeatist tone. It talks of opportunity in diversity. **Hence option (b) is incorrect.**

Option c is incorrect: The Union Government is not mentioned directly in the passage as having exclusive responsibility. The emphasis is more on regional/state-level approaches based on unique challenges. **Hence option (c) is incorrect.**

Option d is correct: This best captures the pragmatic and rational message of the passage – that state-specific strategies are needed in line with their unique geography and climate risks. **Hence option (d) is correct.**

Therefore Option (d) is the correct answer.

Q.12) With reference to the passage, the following assumptions have been made:
I. Green energy production can be linked to/integrated with the climate change mitigation and adaptation strategies.

II. Effects of climate change are much more severe in coastal and mountainous regions.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) a

Exp) Option a is the correct answer

Statement I is valid: The passage clearly mentions that certain regions such as peninsular India and offshore areas offer great opportunities for harnessing wind power. This is mentioned in the context of reducing emissions and developing sustainable goals, which implies a connection to mitigation strategies. So, assuming that green energy can be integrated into broader mitigation/adaptation strategies is reasonable and supported by the passage. **Hence Statement I is correct.**

Statement II is invalid: The passage does not claim that coastal and mountainous regions experience more severe effects. It only says these regions face distinctive challenges (e.g., sea level rise, monsoon variability). Severity is a comparative term, and the author doesn't rank one region's suffering as greater than another's. So, assuming that climate change is more severe in coastal/mountainous regions goes beyond what is stated. **Hence Statement II is incorrect.**

Therefore, Statement I is correct and Statement II is incorrect.

Hence option (a) is the correct answer.

Passage-2

If the social inequality is the most acutely felt social problem in India, insecurity, more than poverty, is the most acutely felt economic problem. Besides those below the official poverty line, even those just over the poverty line are subject to multiple economic insecurities of various kinds (due to wealth and/or health risks, market fluctuations, job-related uncertainties). Many Government policies are actually intended towards mitigating these insecurities.

Q.13) Which one of the following statements best reflects the critical message conveyed by the passage?
a) India's political executive should be aware that poverty and social inequality and the consequent sense of insecurity is the main social problem.
b) In India, poverty is the primary reason for social inequality and insecurity.
c) Poverty and social inequality are so intricately linked that they pose an unmanageable crisis for India.
d) Insecurity, more than poverty, is the main economic issue that Government policies must address.

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: While the passage acknowledges poverty and social inequality, its central message revolves around "insecurity" as the "most acutely felt economic problem," even for those above the poverty line. It doesn't solely focus on the political executive's awareness as the *main* message. **Hence option (a) is incorrect.**

Option b is incorrect: The passage states that "social inequality is the most acutely felt social problem" and "insecurity... is the most acutely felt economic problem." While poverty contributes, the passage highlights insecurity as a broader economic issue that affects people beyond the poverty line. It doesn't explicitly claim poverty as the *primary* reason for social inequality and insecurity in an exclusive sense. **Hence option (b) is incorrect.**

Option c is incorrect: The passage describes poverty, social inequality, and insecurity as significant problems, but it does not suggest that they form an "unmanageable crisis." Instead, it notes that "Many Government policies are actually intended towards mitigating these insecurities," implying that efforts are being made to address them. **Hence option (c) is incorrect.**

Option d is correct: This statement directly aligns with the passage's explicit declaration: "insecurity, more than poverty, is the most acutely felt economic problem." The passage further elaborates on the various forms of economic insecurity affecting people beyond the poverty line and states that government policies are aimed at mitigating these. **Hence option (d) is correct.**

Therefore Option (d) is the correct answer.

Q.14) With reference to the above passage, the following assumptions have been made:
I. People above the poverty line also are prone to suffer from anxiety about economic insecurity.
II. Eradication of poverty can result in peace and social equality in the country.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) a

Exp) Option a is the correct answer

Statement I is valid: The passage explicitly states, "Besides those below the official poverty line, even those just over the poverty line are subject to multiple economic insecurities of various

kinds (due to wealth and/or health risks, market fluctuations, job-related uncertainties)." This directly supports the assumption that people above the poverty line can also suffer from anxiety about economic insecurity. **Hence Statement I is correct.**

Statement II is invalid: The passage identifies social inequality as the most acutely felt social problem and insecurity as the most acutely felt economic problem. While poverty eradication is a noble goal and could contribute to peace and social equality, the passage does not make a direct claim that its eradication will result in peace and social equality. It focuses on the existence of these problems and the government's efforts to mitigate insecurity, not on a causal link between poverty eradication and complete peace and social equality. **Hence Statement II is incorrect.**

Therefore, Statement I is correct and Statement II is incorrect.

Hence option (a) is the correct answer.

Q.15) A solid cube is painted yellow on all its faces. The cube is then cut into 60 smaller but equal pieces by making the minimum number of cuts. Which of the following statements is/are correct?
I. The minimum number of cuts is 9.
II. The number of smaller pieces which are not painted on any face is 6.
Select the correct answer using the code given below:
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) c

Exp) Option c is the correct answer

When a cube is cut into smaller, equal-sized pieces, cuts are made parallel to its faces.

If a cube is cut x times along one dimension, y times along a second dimension, and z times along a third dimension, the total number of smaller pieces produced is (x+1) *(y+1) *(z+1). To minimize the number of cuts for a given number of pieces, the number of cuts along each dimension should be as close as possible to each other.

A solid cube is painted yellow on all its faces. This means the outer layer of smaller cubes will have at least one face painted yellow. Pieces that are not painted on any face are those that come from the very interior of the original cube, unaffected by the painting.

Let the total number of smaller pieces be N=60.

Let the number of cuts along the three dimensions be c1, c2, c3.

The number of pieces along each dimension will be (c1+1), (c2+1), (c3+1).

So, N=(c1+1) *(c2+1) *(c3+1) =60.

To minimize the total number of cuts, C=c1+c2+c3, the values of (c1+1), (c2+1), and (c3+1) should be as close to each other as possible. We need to find three integers whose product is 60 and whose sum is minimized.

Let n1=c1+1, n2=c2+1, n3=c3+1. So, n1*n2*n3=60.

The closest possible values of n1, n2 and n3 such that their product is 60 is given by n1=3; n2=4 and n3=5.

Therefore c1=2, c2=3 and c3=4

Therefore, the sum of the cuts = 2+3+4=9;

Statement I assert: "The minimum number of cuts is 9." Based on the analysis above, the minimum number of cuts is indeed 9. **Therefore, Statement I is correct.**

The smaller pieces that are not painted on any face are the "inner" cubes. These are the cubes that do not form any part of the outer surface of the original large cube.

If the large cube is cut into n1×n2×n3 smaller pieces, where n1=c1+1, n2=c2+1, n3=c3+1, then the number of inner cubes is given by (n1−2) *(n2−2) *(n3−2). This formula subtracts 2 from each dimension because the outermost layer (1 cube thickness) on both ends of each dimension is removed.

From our finding for minimum cuts, the dimensions of the smaller pieces are 3×4×5. So, n1=3, n2=4, n3=5.

The number of unpainted smaller pieces is: (3−2) *(4−2) *(5−2) = (1) *(2) *(3) =6.

Therefore, the number of smaller pieces which are not painted on any face is 6.

Therefore, Statement II is correct.

Both Statement I and Statement II are correct.

Hence option (c) is the correct answer.

Q.16) If 7 * 24 = 25 and 12 * 16 = 20, then what is 16 * 63 equal to?
a) 70
b) 66

c) 65
d) 64

Ans) c

Exp) Option c is the correct answer

We observe that the operator * used in the question does not signify conventional multiplication. Instead, it appears to represent a different mathematical operation. To identify the pattern, consider the first equation:

Case 1:

$7 * 24 = 25$

Calculate:

$7^2 = 49$
$24^2 = 576$
$49 + 576 = 625$
$\sqrt{625} = 25$

Hence, the equation can be rewritten as:
$7 * 24 = \sqrt{(7^2 + 24^2)} = 25$

Case 2:

$12 * 16 = 20$

Calculate:

$12^2 = 144$
$16^2 = 256$
$144 + 256 = 400$
$\sqrt{400} = 20$

Therefore, $12 * 16 = \sqrt{(12^2 + 16^2)} = 20$

This suggests that the operator * is defined as follows:

For any two numbers a and b,
$a * b = \sqrt{(a^2 + b^2)}$

This is the formula used to calculate the hypotenuse of a right-angled triangle when the two perpendicular sides are known.

Applying the pattern:

We are required to compute 16 * 63.

Compute:

$16^2 = 256$
$63^2 = 3969$
$256 + 3969 = 4225$
$\sqrt{4225} = 65$

Therefore,
$16 * 63 = \sqrt{(16^2 + 63^2)} = \sqrt{4225} = 65$.

Hence option (c) is the correct answer.

Q.17) The petrol price shot up by 10% as a result of the hike in crude oil prices. The price of petrol before the hike was 90 per litre. A person travels 2200 km every month and his car gives a mileage of 16 km per litre. By how many km should he reduce his travel if he wants to maintain his expenditure at the previous level?
a) 180 km
b) 200 km
c) 220 km
d) 240 km

Ans) b

Exp) Option b is the correct answer

To solve this problem, we compare the person's fuel consumption and expenditure before and after the price increase.

1. Original petrol price and monthly fuel consumption:

The original price of petrol is given as ₹90 per litre.
The distance travelled by the person every month is 2200 kilometres.
The mileage of the car is 16 kilometres per litre.

Therefore, the quantity of petrol required for travelling 2200 kilometres is:
2200 ÷ 16 = 137.5 litres.

2. Original monthly expenditure:

The expenditure on petrol before the price increase is calculated by multiplying the quantity of petrol consumed with the original price per litre:
137.5 litres × ₹90 = ₹12,375.

This is the total amount the person used to spend on petrol each month.

3. Petrol price after the increase:

The price increases by 10 percent. Ten percent of ₹90 is:
(10 ÷ 100) × 90 = ₹9.

Therefore, the new price of petrol becomes:
₹90 + ₹9 = ₹99 per litre.

4. Maximum fuel that can now be purchased within the same budget:

The person wants to maintain the same monthly expenditure of ₹12,375.
At the new price of ₹99 per litre, the quantity of petrol he can now afford is:
12,375 ÷ 99 = 125 litres.

5. Maximum distance he can now travel:

With 125 litres of petrol and a car that runs 16 kilometres per litre, the maximum distance that can be covered is:
125 × 16 = 2000 kilometres.

6. Required reduction in monthly travel:

Originally, the person travelled 2200 kilometres per month.
Now, he can only travel 2000 kilometres within the same budget.
Hence, the reduction in monthly travel required is:
2200 − 2000 = 200 kilometres.

Hence option (b) is the correct answer.

Q.18) A 4-digit number N is such that when divided by 3, 5, 6, 9 leaves a remainder 1, 3, 4, 7 respectively. What is the smallest value of N?
a) 1068
b) 1072
c) 1078
d) 1082

Ans) c

Exp) Option c is the correct answer

Let the 4-digit number be N.

We are given the following conditions about N:

When N is divided by 3, the remainder is 1.

This means that N can be written in the form 3 times some integer 'a' plus 1.

So, N = 3a + 1.

If we subtract 1 from N, the result (N - 1) will be perfectly divisible by 3.

When N is divided by 5, the remainder is 3.

This means N = 5b + 3 for some integer 'b'.

If we subtract 3 from N, the result (N - 3) will be perfectly divisible by 5.

When N is divided by 6, the remainder is 4.

This means N = 6c + 4 for some integer 'c'.

If we subtract 4 from N, the result (N - 4) will be perfectly divisible by 6.

When N is divided by 9, the remainder is 7.

This means N = 9d + 7 for some integer 'd'.

If we subtract 7 from N, the result (N - 7) will be perfectly divisible by 9.

Let's look at the relationship between the divisors and their remainders:

For divisor 3, remainder 1: The difference is 3 - 1 = 2.

For divisor 5, remainder 3: The difference is 5 - 3 = 2.

For divisor 6, remainder 4: The difference is 6 - 4 = 2.

For divisor 9, remainder 7: The difference is 9 - 7 = 2.

Since the difference between the divisor and the remainder is consistently 2 in all cases, this tells us something important: If we add 2 to N, the new number (N + 2) will be exactly divisible by 3, 5, 6, and 9.

In other words, N + 2 is a common multiple of 3, 5, 6, and 9.

To find the smallest such N, N + 2 must be the Least Common Multiple (LCM) of these numbers, or a multiple of their LCM.

LCM (3,5,6,9) =90.

So, N + 2 must be a multiple of 90. We can write this as N + 2 = 90k, where 'k' is a positive integer. Therefore, N = 90k - 2.

We are looking for the smallest 4-digit number N. A 4-digit number is any integer from 1000 to 9999. So, we need to find the smallest integer value of 'k' such that 90k - 2 is greater than or equal to 1000.

Let's set up the inequality: 90k - 2 >= 1000

Add 2 to both sides: 90k >= 1000 + 2 90k >= 1002

Now, divide by 90: k >= 1002 / 90 k >= 11.133...

Since 'k' must be a whole number (an integer), the smallest integer value for 'k' that satisfies this condition is 12.

Now, substitute k = 12 back into the equation for N: N = 90 * 12 - 2 N = 1080 - 2 N = 1078.

Therefore Option (c) is the correct answer.

Q.19) Consider the following statements:
I. If A ≤B > C < D > E > F≥G = H; then B is always greater than E.
II. IF P > Q = R ≥ S = T ≤U = V > W; then S is always less than V.
Which of the statements given above is/are correct?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) d

Exp) Option d is the correct answer

To determine the correctness of the given statements, each statement will be analysed based on the provided inequalities.

Statement I: If A <= B > C < D > E > F >= G = H; then B is always greater than E.

Let's break down the relationships:

- A is less than or equal to B (A <= B)
- B is greater than C (B > C)
- C is less than D (C < D)
- D is greater than E (D > E)
- E is greater than F (E > F)

- F is greater than or equal to G (F >= G)
- G is equal to H (G = H)

We need to establish the relationship between B and E. From the given inequalities, we have:

B > C < D > E

Consider the chain B > C < D > E. From B > C and C < D, we cannot definitively establish a direct relationship between B and D. For example: Case 1: Let C = 5. B could be 6. D could be 10. Then B = 6, D = 10. Now, D > E means 10 > E. E could be 9. In this case, B (6) is not greater than E (9). This single counterexample is sufficient to demonstrate that B is not *always* greater than E.

Therefore, Statement I is incorrect.

Statement II: If P > Q = R >= S = T <= U = V > W; then S is always less than V.

Let's break down the relationships:

- P is greater than Q (P > Q)
- Q is equal to R (Q = R)
- R is greater than or equal to S (R >= S)
- S is equal to T (S = T)
- T is less than or equal to U (T <= U)
- U is equal to V (U = V)
- V is greater than W (V > W)

We need to establish the relationship between S and V. From the given inequalities, we have:

S = T <= U = V

Combining these, we get: S = T <= U = V This directly implies S <= V.

The statement claims that S is *always* less than V (S < V). However, our derivation shows S <= V, which means S could be equal to V. For example, let S = 5. Then T = 5. If U = 5, then T <= U (5 <= 5) is true. If V = 5, then U = V (5 = 5) is true. In this scenario, S = 5 and V = 5, so S is equal to V, not strictly less than V. This counterexample demonstrates that S is not *always* strictly less than V.

Therefore, Statement II is incorrect.

Hence neither Statement I nor Statement II is conclusively correct.

Therefore Option (d) is the correct answer.

Q.20) What is the unit digit in the multiplication of 1 x 3 x 5 x 7 x 9 x . . . x 999?
a) 1
b) 3
c) 5
d) 9

Ans) c

Exp) Option c is the correct answer

The give product is: 1 x 3 x 5 x 7 x 9 x ... x 999.

A key observation for this problem is the presence of the number 5 within the sequence of numbers being multiplied.

When considering the unit digit of a product, only the unit digits of the numbers being multiplied are relevant. Let's examine the behaviour of multiplying numbers by a number ending in 5:

- If a number ending in 5 is multiplied by any odd digit (1, 3, 7, 9, etc.), the unit digit of the resulting product will always be 5.
    - For example:
        - 1 x 5 = 5 (unit digit is 5)
        - 3 x 5 = 15 (unit digit is 5)
        - 7 x 5 = 35 (unit digit is 5)
        - 9 x 5 = 45 (unit digit is 5)

In the given product, 1 x 3 x 5 x 7 x 9 x ... x 999, every number is an odd integer. Since the number 5 is part of this multiplication, and all other numbers are odd, any partial product involving 5 and any other odd number will result in a number whose unit digit is 5.

It is important to note that if an even number were present in the sequence, the unit digit would become 0 (e.g., 5 x 2 = 10, 5 x 4 = 20). However, as established, all numbers in this specific product are odd.

Therefore, the unit digit of the entire multiplication 1 x 3 x 5 x 7 x 9 x ... x 999 is 5.

Therefore Option (c) is the correct answer.

Directions for the following 4 (four) items :
Read the following two passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage – 1

One of the dismal realities of the agricultural sector in independent India has been that it never experienced a high-growth phase, unlike the non-agricultural economy. The highest decadal growth (compound annual growth rate or CAGR) for agriculture has been just 3-5% in the 1980s. Also, after experiencing a spurt in decadal growth during the 1980s, agricultural growth suffered relative stagnation thereafter. This is in sharp contrast to non-agricultural growth, which consistently increased from the 1980s to 2000s.

Q.21) Which one of the following statements best reflects the corollary to the above passage?
a) The benefit of economic reforms percolates down more slowly to the agriculture sector than in other sectors of the economy.
b) For India, the green revolution was not as useful as it was expected to be.
c) India lagged behind other countries in adapting mechanized modern farming.
d) Rural-to-urban migration resulted in the stagnant agriculture Sector.

Ans) a

Exp) Option a is the correct answer

Option a is correct: The passage highlights the "dismal reality" of the agricultural sector never experiencing a high-growth phase, unlike the non-agricultural economy, which "consistently increased from the 1980s to 2000s." This direct contrast implies a slower or less effective transmission of economic growth to the agricultural sector. **Hence option (a) is correct.**

Option b is incorrect: The passage discusses agricultural growth generally, particularly its stagnation after the 1980s, but it does not mention or evaluate the effectiveness of the green revolution. Therefore, drawing conclusions about the green revolution's utility is outside the scope of the passage. **Hence option (b) is incorrect.**

Option c is incorrect: The passage focuses on India's agricultural growth performance relative to its non-agricultural sector, not its performance compared to other countries in terms of adopting mechanized and modern farming. This statement is an outside assumption not supported by the text. **Hence option (c) is incorrect.**

Option d is incorrect: The passage attributes the stagnation of the agricultural sector to its inherent lack of a high-growth phase and relative stagnation after the 1980s, in contrast to the

non-agricultural sector. It does not mention rural-to-urban migration as a cause for this stagnation. **Hence option (d) is incorrect.**

Hence option (a) is the correct answer.

Q.22) With reference to the passage, the following assumptions have been made:
The growing divergence between the fortunes of the agricultural and non-agricultural economy in India could have reduced/contained by :
I. adapting large-scale cultivation of commercial crops and viable corporate farming.
II. providing free insurance for all crops and heavily subsidizing seeds, fertilizers, electricity and farm machinery at, par with developed countries.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) d

Exp) Option d is the correct answer

Statement I is invalid: The passage describes the agricultural sector's stagnation in contrast to the growth in the non-agricultural economy. While adopting large-scale cultivation of commercial crops and viable corporate farming could be strategies to boost agricultural growth, the passage itself does not explicitly state or imply that these specific methods would have reduced the divergence. The passage only highlights the problem of stagnation without offering solutions. **Hence Statement I is incorrect.**

Statement II is invalid: Similar to Statement I, while providing free insurance and heavy subsidies might be suggested policies to aid the agricultural sector, the passage does not discuss specific policy interventions or their potential impact on reducing the divergence. The passage is descriptive of the historical performance rather than prescriptive of solutions. **Hence Statement II is incorrect.**

Hence option (d) is the correct answer.

Passage-2

In our country, handlooms are equated with a culture that ensures a continuity of tradition, This idea has become part of the public policy-framing and provides a legitimate basis for the State to support the sector. But the notion of tradition as a single, linear entity is being strongly contested today. The

narratives dominant in defining culture/tradition in a particular way are seen to have emerged as the identities and histories of large sections. The discounted and, at times, forcibly stifled identities are fighting for their rightful place in history. Against this backdrop, when we promote handloom as a traditional industry, it is not surprising that large sections of our population choose to ignore it.

Q.23) Which one of the following statements best reflects the most logical and rational message conveyed by the author of the passage?

a) We need to free the handloom industry from the limited narrative linked to preserving cultural heritage.
b) Continued State support to the handloom industry ensures the preservation of some of our glorious art forms and old traditions.
c) Household units of the handloom sector should be modernized and made an economically viable organized industry.
d) Handloom products need to be converted to machine-made designer products so as to make them more popular.

Ans) a

Exp) Option a is the correct answer

Option a is correct: The passage argues that the "notion of tradition as a single, linear entity is being strongly contested today" and that promoting handloom solely as a "traditional industry" leads to "large sections of our population choosing to ignore it." This implies that the current, limited narrative is problematic and needs to be broadened or changed for the handloom sector to thrive. **Hence option (a) is correct.**

Option b is incorrect: The passage states that State support is based on the idea of handlooms ensuring "continuity of tradition," but then immediately critiques this notion of tradition. It suggests that this limited view of tradition leads to people ignoring handlooms, implying that continued support based solely on this limited view may not be effective for preservation or popularity. **Hence option (b) is incorrect.**

Option c is incorrect: The passage describes the problem with the current narrative surrounding handlooms and tradition; it does not offer specific solutions such as modernizing household units or making it an organized industry. While these might be potential solutions, they are not the direct, logical message conveyed *by the author* in explaining the current predicament. **Hence option (c) is incorrect.**

Option d is incorrect: The passage does not suggest converting handloom products to machine-made designer products. Its focus is on the *perception* and *narrative* of handloom, not on changing its fundamental production method to machine-made. This would contradict the essence of handloom. **Hence option (d) is incorrect.**

Therefore Option (a) is the correct answer.

Q.24) With reference to the above passage, the following assumptions have been made:
I. There is no need for the State to be involved in any manner in the handloom sector.
II. Handloom products are no longer appealing and attractive in the rapidly changing modern world.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) d

Exp) Option d is the correct answer

Statement I is invalid: The passage states that the idea of handlooms ensuring "continuity of tradition... provides a legitimate basis for the State to support the sector." While it then critiques the basis of this support (the contested notion of tradition), it does not imply that the State should have no involvement whatsoever. It rather suggests a re-evaluation of the reason for state involvement. **Hence Statement I is incorrect.**

Statement II is invalid: The passage states that "when we promote handloom as a traditional industry, it is not surprising that large sections of our population choose to ignore it." This implies that the way handloom is presented (as solely a traditional industry) makes it unappealing to large sections, not necessarily that the products themselves are inherently unappealing or unattractive in the modern world. The problem is with the narrative, not necessarily the inherent appeal of the products**. Hence Statement II is incorrect.**

Hence option (d) is the correct answer.

Q.25) Consider the first 100 natural numbers. How many of them are not divisible by any one of 2, 3, 5, 7 and 9?
a) 20
b) 21
c) 22
d) 23

Ans) c

Exp) Option c is the correct answer

We need to find the count of natural numbers from 1 to 100 that are *not* divisible by any of 2, 3, 5, 7, and 9.

First, observe that if a number is divisible by 9, it is automatically divisible by 3. This means if we ensure a number is not divisible by 3, it also won't be divisible by 9. So, the condition "not divisible by 9" is redundant if "not divisible by 3" is already stated. Therefore, the problem simplifies to finding the count of numbers from 1 to 100 that are *not* divisible by 2, 3, 5, or 7.

Let U be the universal set of natural numbers from 1 to 100. So, n(U) = 100.

Let A be the set of numbers in U divisible by 2. Let B be the set of numbers in U divisible by 3. Let C be the set of numbers in U divisible by 5. Let D be the set of numbers in U divisible by 7.

We want to find the number of elements that are *not* in A, B, C, or D. This can be found by: n(U) - n(A ∪ B ∪ C ∪ D)

Using the Principle of Inclusion-Exclusion for n(A ∪ B ∪ C ∪ D): n(A ∪ B ∪ C ∪ D) = Sum of (n(individual sets)) - Sum of (n(intersections of two sets)) + Sum of (n(intersections of three sets)) - n(intersection of four sets)

Let's calculate each part:

1. Numbers divisible by a single prime:

- n(A) = numbers divisible by 2 = ⌊100/2⌋ = 50
- n(B) = numbers divisible by 3 = ⌊100/3⌋ = 33
- n(C) = numbers divisible by 5 = ⌊100/5⌋ = 20
- n(D) = numbers divisible by 7 = ⌊100/7⌋ = 14 Sum = 50 + 33 + 20 + 14 = 117

2. Numbers divisible by the product of two primes (LCM of two primes):

- n(A ∩ B) = numbers divisible by LCM(2,3) = 6 = ⌊100/6⌋ = 16
- n(A ∩ C) = numbers divisible by LCM(2,5) = 10 = ⌊100/10⌋ = 10
- n(A ∩ D) = numbers divisible by LCM(2,7) = 14 = ⌊100/14⌋ = 7
- n(B ∩ C) = numbers divisible by LCM(3,5) = 15 = ⌊100/15⌋ = 6
- n(B ∩ D) = numbers divisible by LCM(3,7) = 21 = ⌊100/21⌋ = 4
- n(C ∩ D) = numbers divisible by LCM(5,7) = 35 = ⌊100/35⌋ = 2 Sum = 16 + 10 + 7 + 6 + 4 + 2 = 45

3. Numbers divisible by the product of three primes (LCM of three primes):

- n(A ∩ B ∩ C) = numbers divisible by LCM(2,3,5) = 30 = ⌊100/30⌋ = 3

- n(A ∩ B ∩ D) = numbers divisible by LCM(2,3,7) = 42 = ⌊100/42⌋ = 2
- n(A ∩ C ∩ D) = numbers divisible by LCM(2,5,7) = 70 = ⌊100/70⌋ = 1
- n(B ∩ C ∩ D) = numbers divisible by LCM(3,5,7) = 105 = ⌊100/105⌋ = 0 Sum = 3 + 2 + 1 + 0 = 6

4. Numbers divisible by the product of four primes (LCM of four primes):

- n(A ∩ B ∩ C ∩ D) = numbers divisible by LCM(2,3,5,7) = 210 = ⌊100/210⌋ = 0

Now, substitute these values into the Inclusion-Exclusion formula: n(A ∪ B ∪ C ∪ D) = 117 - 45 + 6 - 0 n(A ∪ B ∪ C ∪ D) = 72 + 6 n(A ∪ B ∪ C ∪ D) = 78

This value, 78, represents the count of numbers from 1 to 100 that *are* divisible by at least one of 2, 3, 5, or 7.

To find the count of numbers that are *not* divisible by any of these, we subtract this from the total: Count = n(U) - n(A ∪ B ∪ C ∪ D) Count = 100 - 78 Count = 22

Therefore, there are 22 natural numbers in the first 100 that are not divisible by any of 2, 3, 5, 7, and 9.

Hence Option (c) is the correct answer.

Q.26) If $4 \leq x \leq 8$ and $2 \leq y \leq 7$, then what is the ratio of maximum value of $(x + y)$ to minimum value of $(x - y)$?

a) 6

b) $\frac{15}{2}$

c) $-\frac{15}{2}$

d) None of the above

Ans) d

Exp) Option d is the correct answer

Given $4 \leq x \leq 8$ and $2 \leq y \leq 7$, we need to find the ratio of the maximum value of $x+y$ to the minimum value of $x-y$.

1. **Maximum value of x+y**:
    - The maximum value occurs when both x and y are at their maximum values.
    - Maximum x=8 and maximum y=7.
    - Therefore, the maximum value of x+y=8+7=15.

2. **Minimum value of x−y**:
    - The minimum value occurs when x is at its minimum and y is at its maximum.
    - Minimum x=4 and maximum y=7.
    - Therefore, the minimum value of x−y=4−7=−3.
3. **Ratio Calculation**:
    - The ratio of the maximum value of x+y to the minimum value of x−y is 15/−3=−5.

The calculated ratio −5 is not among the given options (a), (b) and (c). Therefore, the correct answer is d.

Q.27) Let both p and k be prime numbers such that $(p^2 + k)$ is also a prime number less than 30. What is the number of possible values of k?
a) 4
b) 5
c) 6
d) 7

Ans) b

Exp) Option b is the correct answer

Given that both p and k are prime numbers such that p^2+k is also a prime number less than 30, we need to determine the number of possible values of k.

1. **Identify possible primes p**:
    - Since p^2+k must be less than 30, the possible values of p are 2, 3, and 5 (as $7^2=49$ which exceeds 30).
2. **Check each prime p**:
    - **For p=2**:
        - $P^2=4$
        - Possible k values such that 4+k is a prime less than 30: 3, 7, 13, 19 (resulting in primes 7, 11, 17, 23 respectively).
    - **For p=3**:
        - $p^2=9$
        - Possible k value such that 9+k is a prime less than 30: 2 (resulting in prime 11).

- **For p=5**:
  - $p^2=25$
  - No k values such that 25+k is a prime less than 30.

3. **Collect unique primes k**:
   - From p=2: 3, 7, 13, 19
   - From p=3: 2
   - Distinct values of k: 2, 3, 7, 13, 19

Thus, the number of possible values of k is 5.

Q.28) There are n sets of numbers each having only three positive integers with LCM equal to 1001 and HCF equal to 1. What is the value of n?
a) 6
b) 7
c) 8
d) More than 8

Ans) d

Exp) Option d is the correct answer

To determine the number of sets of three positive integers with LCM 1001 and HCF 1, we start by factorizing 1001 as 7×11×13. Each prime (7, 11, 13) must appear in at least one number, but not all three, to satisfy the HCF condition.

Key Steps:

Systematic Counting: Enumerate valid sets by ensuring LCM is 1001 and HCF is 1:

- **Sets with distinct primes**: {7,11,13}
- **Sets including 1**: {1,77,91},{1,77,143},{1,91,143}
- **Sets with one product of two primes and two single primes**: {7,11,77},{7,11,143},{7,13,77},{7,13,143},{11,13,77},{11,13,91}
- **Sets with two products of two primes and one single prime**: {77,91,143},{7,77,143},{7,91,143},{11,77,91}

Valid Sets:

1. {7,11,13}
2. {1,77,91}
3. {1,77,143}

4. {1,91,143}
5. {7,11,91}
6. {7,11,143}
7. {7,13,77}
8. {7,13,143}
9. {11,13,77}
10. {11,13,91}
11. {77,91,143}
12. {7,77,143}
13. {7,91,143}
14. {11,77,91}

The number of valid sets n is **more than 8**.

Q.29) Let PQR be a 3-digit number, PPT be a 3-digit number and PS be a 2-digit number, where P, Q, R, S, T are distinct non-zero digits. Further, PQRPS PPT. If Q=3 and T < 6, then what is the number of possible values of (R, S)?
a) 2
b) 3
c) 4
d) More than 4

Ans) b

Exp) Option b is the correct answer

Given the problem where PQR, PPT, and PS are numbers with distinct non-zero digits, and the equation PQR−PS=PPT holds, we need to find the number of possible values of (R,S). The digits Q is given as 3, and T is less than 6.

1. **Breaking down the numbers**:

   PQR=100P+10Q+R

   PS=10P+S

   PPT=100P+10P+T=110P+T

2. **Substituting the given equation**:

$100P+10Q+R-(10P+S)=110P+T$

Simplifying this, we get:

$90P+10Q+R-S=110P+T$

Rearranging terms:

$-20P+10Q+R-S-T=0$

Substituting $Q=3$:

$30=20P+S+T-R$

Rearranging for R:

$R=20P+S+T-30$

3. **Determining possible values for P**:
   - Since R must be a digit (1-9), $20P+S+T$ must be between 31 and 39.
   - This implies $P=1$ (since 20P must be within the range 20-40, and P must be an integer).
4. **Checking possible values for T**:
   - T must be less than 6 and distinct from $P=1$ and $Q=3$. Thus, $T \in \{2,4,5\}$.
5. **Calculating R and S**:
   - For $T=2$:
     - $R=S+2-10$. $S=9S=9$ gives $R=1R=1$ (invalid as R=1 is P).
   - For $T=4$:
     - $R=S+4-10$. Valid solutions: $S=8$ gives $R=2$.
   - For $T=5$:
     - $R=S+5-10$. Valid solutions: $S=7$ gives $R=2$, $S=9$ gives $R=4$.
6. **Valid pairs**:
   - $(R,S)=(2,8), (2,7), (4,9)$.

After verifying all distinct digits and valid solutions, the number of possible values of (R,S) is 3

Q.30) Consider the sequence AB_CC_A BCCC_BBC_C that follows certain pattern. Which one of the following completes the sequence?

a) B, C, B, C, A
b) A, C, B, C, A
c) B, C, B, A, C
d) C, B, B, A, C

Ans) c

Exp) Option c is the correct answer

AB_CC_A_BCCC_BBC_C that follows a certain pattern.

As the number of alphabets in the sequence is 18. So, it must be repeating itself in a certain pattern of factors of 18.

Let's consider the sequence repeats in a pattern of 6-

AB_CC_/A_BCCC/_BBC_C

The sequence follows the pattern like A is written once and B is written twice and C is written thrice.

So, the sequence becomes

AB**B**CC**C**/A**B**BCCC/**A**BBC**C**C

Hence, the required Alphabets to fill in the blanks shall be- B,C, B, A,C.

Directions for the following 4 (four) items:
Read the following **two passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

In our country, regrettably, teaching and learning for the examination have been our forte but the new demands of society and the future of work require critical and independent thinking, learning through doing, asking questions from multiple disciplinary perspectives on the same issue, using evidence for building arguments, and reflecting and articulation. Higher education should not "either be a mere servant of the government policy or a passive respondent to public mood." Higher learning is all about how to think rather than what to think. Teaching has to be re-invented.

Q.31) Which one of the following statements best reflects the central idea conveyed by the passage?
a) India does not have enough resources for promoting quality education in its universities.
b) The institutions of higher learning in the country should not be under the control of the Government.
c) Classroom approach to higher education should be done away with.
d) Classroom needs to be reimagined and teaching needs to be re-invented.

Ans) d

Exp) Option d is the correct answer

The passage critiques the exam-centric focus of Indian higher education and emphasizes the need to shift toward **critical thinking, interdisciplinary learning, and evidence-based reasoning**. It

argues that teaching must adapt to societal and workplace demands, focusing on "how to think" rather than rote learning.

Key Reasons for Eliminating Other Options:

- **(a)** India does not have enough resources for promoting quality education in its universities

  Incorrect: The passage does **not** discuss resource scarcity; it critiques pedagogical methods.

- **(b)** The institutions of higher learning in the country should not be under the control of the Government.

  Misinterpretation: While the passage rejects being a "servant of government policy," this refers to intellectual independence, not administrative control.

- **(c)** Classroom approach to higher education should be done away with.

  Extreme: The passage advocates reinventing teaching, not abolishing classrooms.

But, option d is is correct: Classroom needs to be reimagined and teaching to be re-invented.

Conclusion:
The central idea aligns with **(d)**, stressing the need to **reimagine teaching methodologies and classroom dynamics** to meet modern educational goals.

Q.32) With reference to the above passage, the following assumptions have been made:
I. Higher education is a constantly evolving subject that needs to align towards new developments in all spheres of society.
II. In our country, sufficient funds are not allocated education. for promoting higher
Which of the above assumptions is/are valid ?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) a

Exp) Option a is the correct answer

Assumption I is valid: Higher education is a constantly evolving subject that needs to align towards new developments in all spheres of society.

- **Valid**. The passage emphasizes that higher education must adapt to "new demands of society and the future of work," requiring critical thinking, interdisciplinary approaches, and pedagogical innovation. This aligns with the idea that higher education is "constantly evolving" and must align with societal developments.

Assumption II is invalid: In our country, sufficient funds are not allocated for promoting higher education.

- **Invalid**. The passage critiques the **methodology** (exam-centric teaching, lack of critical thinking) and **purpose** (independence from government policy/public mood) of higher education. It does **not** mention funding shortages or financial constraints.

Conclusion: Only Assumption I is supported by the passage.

Passage-2

If there is inequality in the pattern of population growth, there is greater inequality in food production and utilization. As societies become wealthier, their consumption of animal products increases. This means that a greater proportion of such basic foodstuff as grains and legumes that could feed humans directly is instead being converted into feed for poultry and large farm animals. Yet this conversion of plant-based food into animal food for humans is far from efficient. Only 16% of the calories fed to chickens are recovered by us when we eat them. This conversion rate goes down to five to seven per cent in large animals that are fed grain to add fat and some protein before slaughter.

Q.33) Which one of the following statements best reflects the crux of the passage?
a) There is an urgent need for a public policy to promote the consumption of cereal-based foods in wealthier societies.
b) Animal-based food is far less efficient than grain/plant-based food in terms of production and utilization.
c) Plant-based protein should replace the animal-based protein in our daily diets.
d) Inequality in food production and consumption is inevitable in any fast changing society.

Ans) b

Exp) Option b is the correct answer

The passage emphasizes the **inefficiency** of converting plant-based calories into animal-based food. Key data points—only **16% calorie recovery** from chickens and **5–7% for large animals**—directly highlight this inefficiency. While the passage mentions inequality, its core argument centers on the **comparative inefficiency** of animal-based food systems.

- **(a)** There is an urgent need for a public policy to promote the consumption of cereal-based foods in wealthier societies.

  Incorrect: The passage does not advocate for policy changes but critiques inefficiency.

- **(c)** Plant-based protein should replace the animal-based protein in our daily diets.

  Oversteps: The passage describes inefficiency but does not prescribe dietary shifts.

- **(d)** Inequality in food production and consumption is inevitable in any fast chancing society

Misleading: While inequality is mentioned, it is not framed as "inevitable"; the focus is on systemic inefficiency.

Option b is correct: Animal-based food is far less efficient than grain/plant-based food in terms of production and utilization.
The crux lies in demonstrating that animal-based food production is resource-inefficient compared to plant-based alternatives, making **(b)** the correct choice.

Q.34) With reference to the above passage, the following assumptions have been made:
I. The food manufacturing and processing industries in every country should align their objectives and processes in accordance with the changing needs of the societies.
II. Wealthier societies tend to incur great loss of calories of food materials due to indirect utilization of their agricultural produce.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) b

Exp) Option b is the correct answer

Assumption I is invalid: The food manufacturing and processing industries in every country should align their objectives and processes in accordance with the changing needs of the societies.

- **Invalid**. The passage critiques the **inefficiency of converting plant-based food to animal products** but does **not** address the role or responsibilities of food manufacturing/processing industries. While inefficiency implies systemic issues, the passage focuses on societal consumption patterns, not industry alignment with societal needs.

Assumption II is valid: Wealthier societies tend to incur great loss of calories of food materials due to indirect utilization of their agricultural produce.

- **Valid**. The passage explicitly states that wealthier societies lose calories through indirect utilization (e.g., feeding grains to animals). For example, only 16% of calories fed to chickens are recovered, and even less for large animals. This directly validates Assumption II.

Conclusion: Only Assumption II aligns with the passage's evidence.

Q.35) What is the maximum value of n such that 7 x 343 x 385 x 1000 x 2401 × 77777 divisible by 35^n?

a) 3
b) 4
c) 5
d) 7

Ans) b

Exp) Option b is the correct answer

We are asked:

What is the **maximum value of n** such that $7 \times 343 \times 385 \times 1000 \times 2401 \times 77777$ is divisible by 35^n.

First, factor everything involved.

$35=5\times7 \Rightarrow 35^n=(5\times7)^n$

So, we need to find the **highest power n** such that the full product is divisible by both 5^n **and** 7^n.

That means:

- Count how many times **5** appears in the prime factorization of the product.
- Count how many times **7** appears.
- The **minimum** of those two counts = max n such that 35^n divides the number

To determine the maximum value of n such that the product $7\times343\times385\times1000\times2401\times77777$ is divisible by 35^n, we need to find the exponents of the prime factors 5 and 7 in the product. The value of n will be the minimum of these exponents.

First, we factorize each number in the product:

- 7 is a prime number: 7^1
- $343=7^3$
- $385=5\times7\times11$
- $1000=2^3\times5^3$
- $2401=7^4$
- $77777=7^1\times41^1\times271^1$

Next, we calculate the total exponents of 5 and 7 in the product:

- **Exponent of 5**:
    - 385 contributes 1 (5)
    - 1000 contributes 3 (125)

- Total: 1+3=4

- **Exponent of 7**:
  - 7 contributes 1
  - 343 contributes 3
  - 385 contributes 1
  - 2401 contributes 4
  - 77777 contributes 1
  - Total: 1+3+1+4+1=10

The minimum of the exponents 4 (for 5) and 10 (for 7) is 4. Therefore, the maximum value of n is 4

Q.36) What is X in the sequence
24, X, 12, 18, 36, 90?
a) 18
b) 12
c) 9
d) 6

Ans) b

Exp) Option b is the correct answer

What is X in the sequence 24, X, 12, 18, 36, 90

This sequence follows a certain pattern

24x 0.5 = 12

12 x 1= 12

12 x 1.5= 18

18 x 2 = 36

36 x 2.5= 90

So, the answer is 12.

Q.37) P and Q walk along a circular track. They start at 5:00 am. from the same point in opposite directions. P walks at an average speed of 5 rounds per hour and Q walks at an average speed of 3 rounds per hour. How many times will they cross each other between 5:20 a.m. and 7:00 a.m.?

a) 12
b) 13
c) 14
d) 15

Ans) b

Exp) Option b is the correct answer

We are given:

- Two people, **P** and **Q**, walking on a **circular track** in **opposite directions**, starting at **5:00 a.m.** from the same point.
- P walks at **5 rounds/hour**
- Q walks at **3 rounds/hour**
- We need to find how many **times they cross each other** between **5:20 a.m. and 7:00 a.m.**

In a relative motion

When two people move on a circular track in **opposite directions**, they **cross each other** as often as the **sum of their speeds** (in rounds per hour).

So:

Relative speed=5+3=8 rounds/hour

This means they will cross each other **8 times per hour**.

To Compute the time interval,

From **5:20 a.m. to 7:00 a.m.** is:

- From 5:20 to 6:00 → 40 minutes
- From 6:00 to 7:00 → 60 minutes
  Total = **100 minutes** = 100/60= 5/3 hours

Number of meetings = relative speed × time

=8×5/3=40/3=13.3

So they **cross 13 full times**, and **start the 14th crossing**, but don't complete it before 7:00 a.m.

So, answer is 13.

Q.38) If P = +, Q = − , R = x, S = ÷ , then insert the proper notations between the successive numbers in the equation 60_15_3_20_4 =20 :
a) SPRQ
b) QRPS
c) QRSP
d) SPQR

Ans) b

Exp) Option b is the correct answer

To determine the correct sequence of operations (Q, R, P, S = –, ×, +, ÷) for the equation 60 _ 15 _ 3 _ 20 _ 4=20, we substitute the symbols from option **(b) QRPS**:

$60 - 15 \times 3 + 20 \div 4$

Following the order of operations (BODMAS or PEMDAS):

BODMAS:

o Brackets

o Orders (powers, square roots, etc.)

o Division and Multiplication (from left to right)

o Addition and Subtraction (from left to right)

PEMDAS:

o Parentheses

o Exponents (powers, roots, etc.)

o Multiplication and Division (from left to right)

o Addition and Subtraction (from left to right)

1. **Multiplication/Division**:
   15×3=45 and 20÷4=5.
2. **Subtraction/Addition**:
   60−45+5=20.

This satisfies the equation. Thus, the correct sequence is **QRPS**.

Q.39) A tram overtakes 2 persons X and Y walking at an average speed of 3 km/hr and 4 km/hr in the same direction and completely passes them in 8 seconds and 9 seconds respectively.
What is the length of the tram?
a) 15 m
b) 18 m
c) 20 m
d) 24 m

Ans) c

Exp) Option c is the correct answer

We are given:

. A tram overtakes Person X (walking at 3 km/h) in 8 seconds,

. It overtakes Person Y (walking at 4 km/h) in 9 seconds,

. The tram moves in the same direction as the persons.

We are to find the length of the tram, using this data.

Convert speeds to m/s

1 km/hr = 5/18 m/s

So:

· Speed of Person X = 3 x 5/18 = 5/6 m/s

· Speed of Person Y = 4 × 5/18= 10/9 m/s

Let the speed of the tram be v m/s and its length be L meters.

Since the tram and the persons are moving in the **same direction**, the **relative speed** is:

v−person's speed

Using formula:

Distance = Relative Speed x Time= L= (v - person speed) x time

From first case (Person X):

L=(v-5/6)×8 .....(1)

From second case (Person Y):

L=(v-10/9)×9……..(2)

Equating the above 2 equations, we get,

(v-5/6)×8 =(v-10/9)×9

8v – 40/6= 9v -10

8v- 20/3 = 9v – 10

V= 10 – 20/3= 10/3

Puttin v= 10/3 m/s in equation 2 we get,

L= (10/3 – 10/9) x9

L= (20/9)x9 m

L= 20 m.

Q.40) If N^2 = 12345678987654321, then how many digits does the number N have?
a) 8
b) 9
c) 10
d) 11

Ans) b

Exp) Option b is the correct answer

Recognize the pattern

$11^2 = 121$

$111^2 = 12321$

$1111^2 = 1234321$

$11111^2 = 123454321$ and so on

Look at:

12345678987654321

This is a **palindromic number**, and more importantly:

$12345678987654321=(111111111)^2$

So, N=111111111 ⟶ this has **9 digits**

Directions for the following 4 (four) items:
Read the following **two passages** and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage – 1

Over the next 30 years, many countries are promising to move to net-zero carbon, implying that household emissions will have to be cut to close to nothing. A leading climate scientist reckons that, at best, half the reduction might be achieved through demand-side measures, such as behavioural changes by individuals and households. And even that would require companies and governments to provide more incentives to change through supply-side investments to make low-carbon options cheaper and more widely available.

Q.41) Which one of the following statements best reflects the central idea conveyed by the passage?
a) Moving to net-zero carbon is possible only by the reduction in household emissions.
b) Low-carbon behaviour in people can be brought about by incentivising them.
c) Cheaper goods and services can be made available to people by using low-carbon technologies.
d) Manufacturing industries that use low-carbon technologies should be provided with subsidies.

Ans) b

Exp) Option b is the correct answer

The passage emphasizes that while individual behavioral changes ("demand-side measures") can contribute up to half the required emissions reduction, achieving even this partial success **depends on systemic support** through **supply-side investments** (e.g., making low-carbon technologies affordable and accessible). This directly ties incentivization (via government/company actions) to enabling low-carbon behavior.

Key Reasons for Eliminating Other Options:

- **(a)** Incorrect: The passage states household emissions must be cut, but demand-side measures alone are insufficient.
- **(c)** Misleading: Cheaper goods are a means to incentivize behavior, not the central focus.
- **(d)** Narrow: Subsidies are not explicitly mentioned; the focus is broader (investments to reduce costs/improve access).

The core message is that **incentives (supply-side) are essential to drive low-carbon behavior (demand-side)**, making **(b)** the correct choice.

Q.42) With reference to the above passage, the following assumptions have been made:

I. Supply-side investments in companies can result in low-carbon behaviour in people.
II. People are not capable of adapting low-carbon behaviour without the involvement Government and Companies.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) a

Exp) Option a is the correct answer

Understanding the Passage:

- The passage emphasizes that achieving net-zero carbon requires cutting household emissions to nearly zero.
- Demand-side measures (individual behavioral changes) can achieve **at best half** the required reduction.
- However, even this partial success **depends on supply-side investments** (by governments and companies) to make low-carbon options cheaper and more accessible.

Evaluating Assumptions:

- **Assumption I is valid:** "Supply-side investments in companies can result in low-carbon behaviour in people."
  - **Valid**. The passage explicitly links supply-side investments (e.g., making low-carbon technologies affordable) to incentivizing behavioral changes. It states that demand-side reductions require these investments, implying causation.
- **Assumption II is invalid:** "People are not capable of adapting low-carbon behaviour without the involvement of Government and Companies."
  - **Invalid**. The passage does **not** claim people are inherently incapable. Instead, it argues that achieving the **necessary scale** of behavioral change (half the total reduction) requires systemic support. This is a pragmatic observation about effectiveness, not a statement about individual capability.

Conclusion:

- Assumption I aligns with the passage's reasoning.
- Assumption II overreaches by asserting incapability rather than systemic necessity.

So, Answer should be a I only.

Passage - 2

In only 50 years, the world's consumption of raw materials has nearly quadrupled, to more than 100 billion tons. Less than 9% of this is reused. Batteries of old vehicles contain materials such as lithium, cobalt, manganese and nickel that are pricey and can be hard to obtain. Supply chains are long and complicated. Buyers' risks are being aggravated by their suppliers' poor environmental and labour standards. Reusing materials makes sense. Once batteries reach the ends of their lives, they should go back to a factory where their ingredients can be recovered and put into new batteries.

Q.43) Which one of the following statements best reflects the most logical, rational and pragmatic message conveyed by the passage?
a) Green economy is not possible without reusing critical minerals.
b) Every sector of economy should adapt the reuse of material resources immediately.
c) Circular economy can be beneficial for sustainable growth.
d) Circular use of material resources is the only option for some industries for their survival.

Ans) c

Exp) Option c is the correct answer

The passage highlights the **unsustainable trajectory of raw material consumption** and the **negligible reuse rate** (less than 9%). It emphasizes the **economic and logistical challenges** of sourcing critical minerals (e.g., lithium, cobalt) for industries like battery manufacturing, compounded by ethical and environmental risks in supply chains. The solution proposed—recovering materials from end-of-life products (e.g., recycling batteries)—aligns with the principles of a **circular economy**, which prioritizes reuse and recycling to reduce waste and resource depletion.

Key Analysis of Options:

- **(a)** *Incorrect*: While reusing critical minerals is important, the passage's scope extends beyond minerals to broader material reuse.
- **(b)** *Overstated*: The passage focuses on specific sectors (e.g., battery production) rather than mandating "every sector" act "immediately."
- **(c)** *Correct*: The pragmatic message is that circular practices (reuse/recycling) address resource scarcity, supply-chain risks, and sustainability—core themes of the passage.
- **(d)** *Extreme*: The passage suggests circularity is sensible and beneficial, not the "only option for survival."

The most logical and pragmatic takeaway is that a **circular economy model** offers tangible benefits for sustainable growth, making **(c)** the best choice.

Q.44) With reference to the above passage, the following assumptions have been made:
I. Automobile factories are examples of the circular economy.
II. Economic growth is compatible with circular use of mineral resources.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) b

Exp) Option b is the correct answer

Assumption I is invalid: "Automobile factories are examples of the circular economy."

- **Invalid**. While the passage advocates for recycling batteries into new ones (a circular process), it does **not** explicitly state that automobile factories themselves exemplify a circular economy. The focus is on the **recycling process** (recovering materials from old batteries), not on the factories' overall operations.

Assumption II is valid: "Economic growth is compatible with circular use of mineral resources."

- **Valid**. The passage emphasizes that reusing scarce materials (e.g., lithium, cobalt) reduces reliance on complex, ethically risky supply chains. By framing reuse as a way to mitigate costs and resource scarcity, it implies that circular practices can sustain industrial activities (like battery production) and thus support economic growth.

So, answer should be b- II only.

Q.45) A set (X) of 20 pipes can fill 70% of a tank in 14 minutes. Another set (Y) of 10 pipes fills $3/8^{th}$ of the tank in 6 minutes. A third set (Z) of 16 pipes can empty half of the tank in 20 minutes. If half of the pipes of set X are closed and only half of the pipes of set Y are open, and all pipes of the set (Z) are open, then how long will it take to fill 50% of the tank?
a) 8 minutes
b) 10 minutes
c) 12 minutes
d) 16 minutes

Ans) d

Exp) Option d is the correct answer

We are given:

. Set X: 20 pipes fill 70% of tank in 14 minutes

. Set Y: 10 pipes fill 3/8 of tank in 6 minutes

. Set Z: 16 pipes empty 50% of tank in 20 minutes

Then:

. Only 10 pipes of X are open (half of 20)

. Only 5 pipes of Y are open (half of 10)

. All 16 pipes of Z are open

We are asked:

How long will it take to fill 50% of the tank with this new configuration?

First, we shall find the rate per pipe for each set

Set X: 20 pipes - 70% in 14 minutes

So:

Rate of 20 pipes = 70/14= 5% per minute => Rate per pipe = 5/20 = 0.25% per minute

Set Y: 10 pipes - 3/8 of tank in 6 min

3/8= 37.5%

So: Rate of 10 pipes = 37.5/6 = 6.25% per minute

Rate per pipe = 6.25/10= 0.625 % per minute

Set Z: 16 pipes empty 50% in 20 minutes

Rate of 16 pipes = 50/20 = 2.5% per minute (emptying) =>

Rate per pipe = 2.5/16 = 0.15625% per minute

Use only half of X, half of Y, and all of Z

- X: 10 pipes → 10×0.25=2.5% per min (filling)
- Y: 5 pipes → 5×0.625=3.125% per min (filling)

- Z: 16 pipes → 16×0.15625=2.5% per min (emptying)

Net rate

Net rate=(2.5+3.125−2.5)%=3.125% per minute

Time to fill 50% of tank

Time=50/3.125=16 minutes.

Q.46) If n is a natural number, then what is the number of distinct remainders of (1n + 2n) when divided by 4?
a) 0
b) 1
c) 2
d) 3

Ans) c

Exp) Option c is the correct answer

We are asked to find the number of distinct remainders when the expression ($1^n + 2^n$) is divided by 4, where n is a natural number. A natural number n can take values 1, 2, 3, 4, and so on.

Let's evaluate the expression ($1^n + 2^n$) for the first few natural numbers and find the remainder when each result is divided by 4.

. For n = 1: The expression is $1^1 + 2^1 = 1 + 2 = 3$. When 3 is divided by 4, the remainder is 3.

. For n = 2: The expression is $1^2 + 2^2 = 1 + 4 = 5$. When 5 is divided by 4, the remainder is 1 (5= 4 x 1 + 1).

. For n = 3: The expression is $1^3 + 2^3 = 1 + 8 = 9$. When 9 is divided by 4, the remainder is 1 (9= 4 x 2 + 1).

For n> 2, we find that the remainder comes out to be 1

Let's observe the terms 1^n and 2^n separately when divided by 4.

$1^n = 1$ for all natural numbers n

Lets check for 2^n

Putting 1 we get, $2^1 = 2$

Putting 2, we get $2^2 = 4$

Putting 3, we get $2^3 = 8$

And so on, which would be divisible by 4

Now combining, ($1^1 + 2^1$)= ¾= 3 is the remainder,

So, only two distinct remainders are there- 1 and 3

Q.47) Let P=QQQ be a 3-digit number. What is the HCF of P and 481?
a) 1
b) 13
c) 37
d) 481

Ans) c

Exp) Option c is the correct answer

To determine the HCF of P=QQQ (a three-digit number with identical digits) and 481:

1. **Factorize 481**:
   481=13×37.
2. **Express P in terms of Q**:
   P=111×Q, where Q∈{1,2,…,9}.
   111=3×37, so P=3×37×Q.
3. **Identify common factors**:
   - 481=13×37.
   - P=3×37×Q.
     The only common prime factor is 37.
4. **Verify Q does not introduce additional factors**:
   Since Q is a digit (1–9) and 13 is prime, Q cannot be a multiple of 13. Thus, 37 remains the greatest common factor.

Hence, the HCF of P and 481 is 37.

Q.48) What is the 489th digit in the number 123456789101112...?
a) 0
b) 3
c) 6
d) 9

Ans) d

Exp) Option d is the correct answer

We are given the number formed by concatenating all natural numbers:

123456789101112131415 ...

We need to find the 489th digit in this sequence.

We need to count how many digits are used in different ranges of numbers

We break the sequence into ranges of numbers with the same number of digits.

1-digit numbers: 1 to 9 (9 numbers)

· Each contributes 1 digit:

9 × 1 =9 digits

2-digit numbers: 10 to 99 (90 numbers)

· Each contributes 2 digits:

90 × 2 =180 digits

Total so far:

9 +180 = 189 digits

3-digit numbers: 100 to 999

. Each contributes 3 digits

. How many do we need? Let's see how far the 489th digit lies.

We've used 189 digits so far.

So digits remaining:

489 - 189 = 300 digits left to reach 489th

How many 3-digit numbers contribute 300 digits?

Each 3-digit number contributes 3 digits:

300/3= 100

So we need first 100 three-digit numbers, starting from 100.

. First 3-digit number: 100

. 100th 3-digit number: 100 + 99 = 199

So:

. The 489th digit lies at the end of number 199.

We now compute the full breakdown:

· Digits from 1-9: 9 digits

· Digits from 10-99: 180 digits

· Digits from 100-199: 100 x 3 = 300 digits

Total: 9 + 180 + 300 = 489

So:

. The 489th digit is the last digit of number 199. So, answer should be 9.

Q.49) A mobile phone has been stolen. There are 3suspects P. Q and R. They were questioned knowing that only one of them is guilty. Their responses are as follows :
P : I did not steal. Q stole it.
Q : R did not steal. I did not steal.
R : I did not steal, I do not know who did it.
Who stole the mobile phone?
a) P
b) Q
c) R
d) Cannot be concluded

Ans) a

Exp) Option a is the correct answer

To determine who stole the mobile phone among suspects P, Q, and R, we analyze their statements under the assumption that **innocent individuals tell the truth** and the **guilty person lies entirely**:

1. **P's Statement**:
    - "I did not steal. Q stole it."
    - If **P is innocent**, both parts must be true. This directly implies **Q is guilty**.
    - If **P is guilty**, both parts are lies: P stole it, and Q did not.

2. **Q's Statement**:
    - "R did not steal. I did not steal."
    - If **Q is innocent**, both parts must be true, meaning neither Q nor R stole it, leaving **P as guilty**.
    - If **Q is guilty**, at least one part is false. However, if Q is guilty, "R did not steal" remains true (since Q is guilty), violating the requirement for the guilty person to lie entirely. Thus, **Q cannot be guilty**.
3. **R's Statement**:
    - "I did not steal. I do not know who did it."
    - If **R is innocent**, both parts are true.
    - If **R is guilty**, both parts are lies. However, if R were guilty, P's statement "Q stole it" would be a lie (since R did), contradicting P's innocence.

Consistency Check:

- **If Q were guilty**, P's truthful accusation ("Q stole it") conflicts with Q's partial lie ("R did not steal" is true, violating the guilty person's requirement to lie entirely).
- **If R were guilty**, Q's statement "R did not steal" becomes a lie, but Q is innocent and must tell the truth. This is impossible.
- **If P is guilty**, their lies ("I did not steal" and "Q stole it") align with Q and R being truthful.

Conclusion:
The only scenario where **all innocent parties (Q and R) tell the truth** and the **guilty person (P) lies entirely** is when **P stole the phone**.

Q.50) Three teams P, Q, R participated in a tournament in which the teams play with one another exactly once. A win fetches a team 2 points and a draw 1 point. A team gets no point for a loss. Each team scored exactly one goal in the tournament. The team P got 3 points, Q got 2 points and R got 1 point. Which of the following statements is/are correct?
I. The result of the match between P and Q is a draw with the score 0-0.
II. The number of goals scored by R against Q is 1.
Which of the statements given above is/are correct?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) c

Exp) Option c is the correct answer

We are told:

- Teams P, Q, R play each other exactly once ⟶ 3 matches: P vs Q, Q vs R, R vs P
- Win = 2 points, Draw = 1 point, Loss = 0 points
- Each team scores exactly one goal total (across all matches)
- Points:
    - P: 3 points
    - Q: 2 points
    - R: 1 point

We are to determine the correctness of:

- I: P vs Q is a draw, score 0–0
- II: R scored 1 goal against Q

Use total points and goals to find match results

There are 3 matches:

- P vs Q
- Q vs R
- R vs P

Total of 3 matches ⟶ 6 points are distributed in total.

Check total:

- P = 3, Q = 2, R = 1 ⇒ total = 6

Also, total goals = 1 per team = 3 goals total

Now deduce outcomes.

Figure out match results

Assume:

Match 1: P vs Q

Let's suppose this is a draw ⟶ both get 1 point

Then:

- P: 1 point from draw
- Q: 1 point from draw

P still needs 2 more points → must have beaten R

Q has total of 2 points → already got 1 from P vs Q → remaining 1 point must be from a draw → so Q vs R is draw

So:

- P vs Q → draw
- Q vs R → draw
- P vs R → P wins (2 points)

That gives:

- P: draw + win = 1 + 2 = 3
- Q: draw + draw = 1 + 1 = 2
- R: loss to P, draw vs Q → 0 + 1 = 1

All point totals match

Now check goals.

Each team scores **exactly one goal total**, over 2 matches.

Let's assign possible scorelines that result in:

- P vs Q = 0 – 0 → both score 0
- P vs R = P wins → must be 1 – 0
- Q vs R = draw → must be 1 – 1

Let's tally goals:

- P: 0 (vs Q) + 1 (vs R) = 1
- Q: 0 (vs P) + 1 (vs R) = 1
- R: 0 (vs P) + 1 (vs Q) = 1

Matches both points and goals constraint

Analyze statements

Statement I: "P vs Q is a draw, 0–0"

Correct (as per above solution)

Statement II: "R scored 1 goal against Q"

Also **Correct** (R scored 1 goal in 1–1 draw with Q)

Final Answer: c) Both I and II

Directions for the following 4 (four) items :
Read the following two passages and answer the items that follow the passages. Your answer to these items should be based on the passage only.

Passage -1

It is hard to predict how changes in the climate and the atmosphere's chemistry will affect the prevalence and virulence of agricultural diseases. But there is a risk that such changes will make some plant infections more common in all climatic zones, perhaps catastrophically so. Part of the problem is that centuries of selective breeding have refined the genomes of most high-value crops. They are spectacular at growing in today's conditions bot genetic variations that are not immediately useful to them have been bred out. This is good for yields but bad for coping with changes. A minor disease or even an unknown one could suddenly rampage through a genetically honed crop.

Q.51) Which one of the following statements best reflects the central idea conveyed by the passage?
a) Global climate change adversely affects the productivity of crops.
b) Our total dependence on genetically honed crops entails possible food insecurity.
c) Our food security should not depend on agricultural productivity alone.
d) Genetically honed crops should be replaced with their wild varieties in our present cultivation practices.

Ans) b

Exp) Option b is the correct answer

Option a is incorrect: While the passage acknowledges that global climate change will affect agricultural diseases, leading to potential impacts on productivity, this statement is too broad and doesn't capture the specific problem highlighted – the vulnerability of genetically honed crops. The passage focuses on *why* productivity might be adversely affected under climate change, specifically due to the narrow genetic base of current crops. **Hence option (a) is incorrect.**

Option b is correct: The passage explicitly states that centuries of selective breeding have refined the genomes of most high-value crops, making them good for yields but "bad for coping with changes," and warns that "A minor disease or even an unknown one could suddenly rampage through a genetically honed crop." This directly points to the risk of food insecurity due to our reliance on these crops in the face of unpredictable changes. **Hence option (b) is correct**.

Option c is incorrect: The passage discusses the issue of food security in the context of agricultural productivity and disease, but it doesn't make a general statement that food security

shouldn't *only* depend on agricultural productivity. The focus is more on the vulnerability *within* agricultural productivity due to specific breeding practices. **Hence option (c) is incorrect.**

Option d is incorrect: The passage describes the problem with genetically honed crops but doesn't explicitly advocate for their replacement with wild varieties in "our present cultivation practices." It highlights the lack of genetic variations useful for coping with changes, implying a need for a broader genetic base, but not necessarily a complete replacement. **Hence option (d) is incorrect.**

Therefore Option (b) is the correct answer.

Q.52) With reference to the above passage, the following assumptions have been made
I. Global climate change can result in the migration of several plant diseases to new areas.
II. Scientific understanding of the wild relatives of our present crops would enable us to strengthen food security.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) c

Exp) Option c is the correct answer

Statement I is valid: The passage states, "It is hard to predict how changes in the climate and the atmosphere's chemistry will affect the prevalence and virulence of agricultural diseases. But there is a risk that such changes will make some plant infections more common in all climatic zones, perhaps catastrophically so." The phrase "make some plant infections more common in all climatic zones" implies a potential for diseases to spread or appear in new areas due to climate change. Therefore, assuming that global climate change can result in the migration of several plant diseases to new areas is consistent with the passage's concerns about the widespread impact of climate change on plant infections. **Hence Statement I is correct.**

Statement II is valid: The passage mentions that "centuries of selective breeding have refined the genomes of most high-value crops. They are spectacular at growing in today's conditions but are not immediately useful to them have been bred out. This is good for yields but bad for coping with changes." This implies that the genetic variations needed for coping with changes are missing in the current cultivated crops. Wild relatives are typically the source of such genetic diversity. Therefore, it is a reasonable assumption that understanding and utilizing the genetic

traits of wild relatives would provide the necessary variations to strengthen food security against new diseases and changing conditions. **Hence Statement II is correct.**

Therefore, Both Statement I and Statement II are correct.

Hence option (c) is the correct answer.

Passage -2

" A good statesman, like any other sensible human being, learns more from his opponents than from his fervent supporters. For his supporters will push him to disaster unless his opponents show him where the dangers are. So if he is wise he will often pray to be delivered from his friends, because they will ruin him. But, though it hurts, he ought also to pray never to be left without opponents; for they keep him on the path of reason and good sense. The national unity of free people depends upon a sufficiently even balance of political power to make it impracticable for the administration to be arbitrary and for opposition to be revolutionary and irreconcilable."

Q.53) Which one of the following statements best reflects the critical message conveyed by the author of the passage?
a) Without opposition parties, the administration in a democracy gets to become more responsible.
b) Democracy needs to have revolutionaries in opposition to keep the government alert.
c) Rulers in a democracy need the support of opposition for their political survival.
d) In a democracy, the opposition is indispensable for the balance of political power and good governance.

Ans) d

Exp) Option d is the correct answer

Option a is incorrect: The passage states that "his opponents show him where the dangers are" and "they keep him on the path of reason and good sense." This clearly indicates that opposition *enhances* responsibility, rather than implying that responsibility increases without it. **Hence option (a) is incorrect.**

Option b is incorrect: The passage explicitly states that a sufficient balance of power is needed "to make it impracticable for the administration to be arbitrary and for opposition to be revolutionary and irreconcilable." This indicates a desire for a constructive, not revolutionary, opposition. **Hence option (b) is incorrect.**

Option c is incorrect: The passage emphasizes the role of opposition in keeping a statesman "on the path of reason and good sense" and preventing arbitrary rule. While the balance of power contributes to stability, the primary message isn't about the political survival of rulers through the support of opposition, but rather the essential role of opposition in good governance. **Hence option (c) is incorrect.**

Option d is correct: The passage stresses that a statesman "learns more from his opponents" who "show him where the dangers are" and "keep him on the path of reason and good sense." It concludes by stating that "national unity of free people depends upon a sufficiently even balance of political power to make it impracticable for the administration to be arbitrary and for opposition to be revolutionary and irreconcilable." This comprehensively highlights the indispensable role of opposition in maintaining political balance and fostering good governance. **Hence option (d) is correct.**

Therefore Option (d) is the correct answer.

Q.54) With reference to the above passage, the following assumptions have been made
I. In a democracy, a strong opposition is required only if the Head of Government is indifferent.
II. The more aggressive the opposition, the better is the governance in a democracy.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) d

Exp) Option d is the correct answer

Statement I is invalid: The passage argues that opponents keep a statesman "on the path of reason and good sense" and prevent him from being "ruin[ed]" by his friends, regardless of whether the Head of Government is indifferent. The need for opposition is presented as inherent to good governance and preventing arbitrary rule, not contingent on the leader's temperament. **Hence Statement I is incorrect.**

Statement II is invalid: The passage states that a "sufficiently even balance of political power" is needed "to make it impracticable for the administration to be arbitrary and for opposition to be revolutionary and irreconcilable." This indicates a desire for a constructive and balanced opposition, not one that is "more aggressive." An overly aggressive or revolutionary opposition is presented as undesirable. **Hence Statement II is incorrect.**

Therefore, Both Statement I and Statement II are incorrect.

Hence option (d) is the correct answer.

Q.55) P is the brother of Q and R. S is R's mother. T is P's father. How many of the following statements are definitely true ?

I. S and T are a couple.
II. Q is T's son.
III. T is Q's father
IV.S is P's mother
V.R is T's Daughter.
VI.P is S's son.
Select the correct answer using the code given below:
a) Only two
b) Only three
c) Only Four
d) Only Five

Ans) c

Exp) Option c is the correct answer

Given Information:

1. **P is the brother of Q and R.** This means P, Q, and R are siblings. We don't know their genders yet, except for P being male.
2. **S is R's mother.** This means S is the mother of P, Q, and R.
3. **T is P's father.** This means T is the father of P, Q, and R.

I. S and T are a couple.

- Since S is the mother of R (and thus P and Q), and T is the father of P (and thus Q and R), it's highly implied they are the parents and therefore a couple. This is definitely true.

II. Q is T's son.

- We know Q is the sibling of P, and T is P's father. Therefore, T is also Q's father. However, we don't know Q's gender. Q could be T's son or T's daughter. So, this is not definitely true.

III. T is Q's father.

- As established in II, since P, Q, and R are siblings and T is P's father, T is also Q's father. This is definitely true.

IV. S is P's mother.

- We know S is R's mother. Since P and R are siblings, S is also P's mother. This is definitely true.

V. R is T's daughter.

- We know R is the sibling of P, and T is P's father. Therefore, T is also R's father. However, we don't know R's gender. R could be T's son or T's daughter. So, this is not definitely true.

VI. P is S's son.

- We know P is the brother of Q and R, which means P is male. We also know S is the mother of R (and thus P). Therefore, P is S's son. This is definitely true.

List of Definitely True Statements:

- I. S and T are a couple.
- III. T is Q's father.
- IV. S is P's mother.
- VI. P is S's son.

There are **four** definitely true statements.

Hence Option (c) is the correct answer.

Q.56) If NO is coded as 210, NOT is coded as 4200 and NOTE is coded as 21000, then how is NOTES coded?
a) 399000
b) 420000
c) 440000
d) 630000

Ans) a

Exp) Option a is the correct answer

Let's first determine the numerical value of each letter based on its position in the English alphabet (A=1, B=2, C=3, ..., Z=26).

- N = 14
- O = 15
- T = 20
- E = 5
- S = 19

Now let's analyze the given codes:

1. **NO is coded as 210.**
    - Let's multiply the numerical values of N and O: 14 (N) * 15 (O) = 210.
    - This matches the given code.
2. **NOT is coded as 4200.**
    - Let's multiply the numerical values of N, O, and T: 14 (N) * 15 (O) * 20 (T) = 210 * 20 = 4200.
    - This matches the given code.
3. **NOTE is coded as 21000.**
    - Let's multiply the numerical values of N, O, T, and E: 14 (N) * 15 (O) * 20 (T) * 5 (E) = 4200 * 5 = 21000.
    - This matches the given code.

The pattern established is that the word is coded by multiplying the alphabetical position values of its letters.

Now, let's apply this pattern to find the code for **NOTES**:

- NOTES = N * O * T * E * S
- NOTES = 14 * 15 * 20 * 5 * 19

We already know that 14 * 15 * 20 * 5 = 21000.

So, NOTES = 21000 * 19

21000 * 19 = 399000

Therefore Option (a) is the correct answer.

Q.57) If FRANCE is coded as 654321 and GERMANY is coded as 9158437, then how is YEMEN coded ?
a) 54321
b) 81913
c) 71913
d) 71813

Ans) d

Exp) Option d is the correct answer

We need to identify the pattern in how the letters of "FRANCE" and "GERMANY" are mapped to digits. It appears to be a direct letter-to-digit substitution.

Let's extract the mappings from the given words:

From **FRANCE** is coded as **654321**:

- F = 6
- R = 5
- A = 4
- N = 3
- C = 2
- E = 1

From **GERMANY** is coded as **9158437**:

- G = 9
- E = 1 (Consistent with FRANCE)
- R = 5 (Consistent with FRANCE)
- M = 8
- A = 4 (Consistent with FRANCE)
- N = 3 (Consistent with FRANCE)
- Y = 7

Now we have a complete set of mappings for the letters present:

- A = 4
- C = 2
- E = 1
- F = 6
- G = 9
- M = 8
- N = 3

- R = 5
- Y = 7

Now we can apply these mappings to code the word **YEMEN**:

- Y = 7
- E = 1
- M = 8
- E = 1
- N = 3

So, **YEMEN** is coded as **71813**.

Therefore Option (d) is the correct answer.

Q.58) The 5-digit number PQRST (all distinct digits is such that T = 0 P is thrice T. S is greater than Q by 4, while Q is greater than R by 3. How many such 5-digit numbers are possible?
a) 3
b) 4
c) 5
d) 6

Ans) b

Exp) Option b is the correct answer

Let the 5-digit number be PQRST, where P, Q, R, S, T are distinct digits.

We are given the following conditions:

1. T =! 0
2. P = 3T
3. S = Q + 4
4. Q = R + 3

Let's deduce the possible values for each digit based on these conditions.

Determine possible values for T and P.

Since P is a single digit and P = 3T, and T is a single digit and T =! 0:

- If T = 1, then P = 3 * 1 = 3. (Pair: T=1, P=3)
- If T = 2, then P = 3 * 2 = 6. (Pair: T=2, P=6)
- If T = 3, then P = 3 * 3 = 9. (Pair: T=3, P=9)
- If T = 4, then P = 3 * 4 = 12, which is not a single digit.

  So T cannot be 4 or higher.

So, we have three possible pairs for (T, P): (1, 3), (2, 6), (3, 9).

Determine possible values for R, Q, and S.

We have Q = R + 3 and S = Q + 4.

Substitute Q into the second equation: S = (R + 3) + 4 $\Longrightarrow$ S = R + 7.

Since R, Q, S must be distinct single digits (0-9):

- Q = R + 3 $\Longrightarrow$ R must be at most 6 (because if R=7, Q=10, which is not a single digit).
- S = R + 7 $\Longrightarrow$ R must be at most 2 (because if R=3, S=10, which is not a single digit).

Combining these, R can only be 0, 1, or 2.

Let's list the possible triplets for (R, Q, S):

- If R = 0: Q = 0 + 3 = 3, S = 0 + 7 = 7. Triplet: (0, 3, 7)
- If R = 1: Q = 1 + 3 = 4, S = 1 + 7 = 8. Triplet: (1, 4, 8)
- If R = 2: Q = 2 + 3 = 5, S = 2 + 7 = 9. Triplet: (2, 5, 9)

Combine (T, P) pairs with (R, Q, S) triplets, ensuring all five digits P, Q, R, S, T are distinct.

Case 1: (T, P) = (1, 3)

Digits used: {1, 3}.

We need to find an (R, Q, S) triplet whose digits are distinct from 1 and 3.

- Consider (R, Q, S) = (0, 3, 7).
  - The digit '3' is common (P=3, Q=3). Not allowed as digits must be distinct.
- Consider (R, Q, S) = (1, 4, 8).
  - The digit '1' is common (T=1, R=1). Not allowed.
- Consider (R, Q, S) = (2, 5, 9).

- The digits {2, 5, 9} are all distinct from {1, 3}.
- This forms a valid number: PQRST = 35291. (1st valid number)

Case 2: (T, P) = (2, 6)

Digits used: {2, 6}. We need to find an (R, Q, S) triplet whose digits are distinct from 2 and 6.

- Consider (R, Q, S) = (0, 3, 7).
  - The digits {0, 3, 7} are all distinct from {2, 6}.
  - This forms a valid number: PQRST = 63072. (2nd valid number)
- Consider (R, Q, S) = (1, 4, 8).
  - The digits {1, 4, 8} are all distinct from {2, 6}.
  - This forms a valid number: PQRST = 64182. (3rd valid number)
- Consider (R, Q, S) = (2, 5, 9).
  - The digit '2' is common (T=2, R=2). Not allowed.

Case 3: (T, P) = (3, 9)

Digits used: {3, 9}. We need to find an (R, Q, S) triplet whose digits are distinct from 3 and 9.

- Consider (R, Q, S) = (0, 3, 7).
  - The digit '3' is common (T=3, Q=3). Not allowed.
- Consider (R, Q, S) = (1, 4, 8).
  - The digits {1, 4, 8} are all distinct from {3, 9}.
  - This forms a valid number: PQRST = 94183. (4th valid number)
- Consider (R, Q, S) = (2, 5, 9).
  - The digit '9' is common (P=9, S=9). Not allowed.

Conclusion: We found 4 possible 5-digit numbers that satisfy all the given conditions:

1. 35291
2. 63072
3. 64182
4. 94183

Therefore, there are 4 such 5-digit numbers possible.

Therefore Option (b) is the correct answer.

Q.59) X can complete one-third of a certain work in 6 days, Y can complete one-third of the same work in 8 days and Z can complete three-fourth of the same work in 12 days. All of them work together for n days and then X and Z quit and Y alone finishes the remaining work in in $8\frac{2}{3}$ days. What is n equal to?

a) 3
b) 4
c) 5
d) 6

Ans) b

Exp) Option b is the correct answer

Given that:

1. X can complete one-third of a certain work in 6 days.

   ∴ X requires 18 days to complete entire work alone.

2. Y can complete one-third of the same work in 8 days.

   ∴ Y requires 24 days to complete entire work alone.

3. Z can complete three-fourth of same work in 12 days.

   ∴ Z requires 16 days to complete entire work alone

Given that all of them work together for n days and then X and Z quit and Y alone finishes the remaining work in 8(2/3) days i.e. 26/3 days.

Therefore,

$$\frac{n}{18}+\frac{n}{24}+\frac{n}{16}+\frac{26}{3\times 24}=1$$

$$n\left(\frac{8+6+9}{144}\right) = 1 - \frac{13}{36}$$

$$n\left(\frac{23}{144}\right) = \frac{23}{36}$$

$$n = \frac{144}{36}$$

$$n = 4$$

Therefore Option (b) is the correct answer.

Q.60) What is X in the sequence
1, 3, 6, 11, 18, X, 42?
a) 26
b) 27
c) 29
d) 30

Ans) c

Exp) Option c is the correct answer

To find the value of X in the sequence 1, 3, 6, 11, 18, X, 42, let's examine the differences between consecutive terms:

1. Difference between 3 and 1: 3−1=2
2. Difference between 6 and 3: 6−3=3
3. Difference between 11 and 6: 11−6=5
4. Difference between 18 and 11: 18−11=7

Now, let's look at the sequence of differences: 2, 3, 5, 7. This sequence consists of consecutive prime numbers.

Following this pattern, the next prime number after 7 is 11.

So, the difference between 18 and X should be 11.

X=18+11=29

To confirm this, let's check the next difference. The prime number after 11 is 13.

If X is 29, the difference between 42 and X should be 13. 42−29=13. This confirms the pattern.

Therefore, the sequence of differences is 2, 3, 5, 7, 11, 13.

And the sequence of numbers is:

1

1+2=3

3+3=6

6+5=11

11+7=18

18+11=29 (This is X)

29+13=42

The value of X is 29.

Therefore Option (c) is the correct answer.

Directions for the following 3 (three) items:
Read the following two passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage - 1

There has been no democracy that has grown economically without corporate capitalism. It helps in modernizing the economy and enabling the transition from rural to urban, and agriculture to industry and services, which are inevitable with growth. It generates jobs - and there is no other way to fix a country's unemployment challenge without a further impetus to private business. Big companies can operate on a large scale and become competitive both domestically and externally. A vibrant corporate capitalist base also leads to additional revenues for the State - which in turn, can be used for greater welfare for the marginalized and creating a more level playing field in terms of opportunities.

Q.61) Which one of the following statements best reflects the critical message conveyed by the author of the passage?
a) Corporate capitalism is important for economics growth of a state and also for democracy
b) Corporate capitalism is imperative for a modern state to achieve its political objectives.
c) No state can ensure its economic survival for long without the role of corporate capitalism.
d) Corporate capitalism and democracy have mutual dependence for their continued existence.

Ans) a

Exp) Option a is the correct answer

Option a is correct: The passage states, "There has been no democracy that has grown economically without corporate capitalism," directly linking corporate capitalism to both economic growth and the existence of democracy. It further elaborates on how corporate capitalism contributes to modernizing the economy, generating jobs, and providing state revenues for welfare, all of which are crucial for a functioning state and, by extension, a democracy. **Hence option (a) is correct.**

Option b is incorrect: The passage focuses on the economic benefits of corporate capitalism for a state and its connection to democracy, but it doesn't explicitly discuss "political objectives" in a broad sense or claim that corporate capitalism is *imperative* for achieving all such objectives. **Hence option (b) is incorrect.**

Option c is incorrect: While the passage strongly emphasizes the role of corporate capitalism in economic growth and job creation, it doesn't explicitly state that "No State can ensure its economic survival for long without the role of corporate capitalism." It highlights its importance but doesn't make such an absolute claim about survival. **Hence option (c) is incorrect**.

Option d is incorrect: The passage states that "There has been no democracy that has grown economically without corporate capitalism," implying a strong link for the democracy's *economic growth*. However, it doesn't explicitly state a "mutual dependence for their continued existence" in the sense that democracy *cannot exist* without corporate capitalism, or vice-versa, only that its economic growth is tied to it. The primary emphasis is on the economic benefits corporate capitalism brings to a state and a democracy. **Hence option (d) is incorrect.**

Hence Option (a) is the correct answer.

Q.62) With reference to the above passage, the following assumptions have been made:
I. Corporate capitalism promotes the growth of labour force and provides more employment opportunities.
II. Poor and marginalized sections of population are benefited by corporate capitalism due to trickle-down effect.
Which of the above assumptions is/are valid?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) c

Exp) Option c is the correct answer

Statement I is valid: The passage explicitly states, "It generates jobs — and there is no other way to fix a country's unemployment challenge without a further impetus to private business." This directly supports the assumption that corporate capitalism provides more employment opportunities. The generation of jobs inherently promotes the growth of the labour force by drawing more people into employment. **Hence Statement I is correct.**

Statement II is valid: The passage states that "A vibrant corporate capitalist base also leads to additional revenues for the State — which in turn, can be used for greater welfare for the marginalized and creating a more level playing field in terms of opportunities." While the passage specifically mentions state revenues being used for welfare, the idea of "creating a more level playing field in terms of opportunities" for the marginalized through the general economic prosperity brought by corporate capitalism aligns with the broader concept of a "trickle-down effect," where economic benefits from growth eventually reach wider sections of society, including the poor and marginalized. The mechanism described, even if mediated by the state's use of revenue, stems from the overall economic activity spurred by corporate capitalism. **Hence Statement II is also correct.**

Therefore, Both Statement I and Statement II are correct.

Hence option (c) is the correct answer.

Passage - 2

"A network of voluntary associations stands as a 'buffer' between the relatively powerless individual and the potentially powerful State."

Q.63) Which one of the following statements reflects the best explanation of the above passage?

a) It emphasizes the inability of the State to enforce its will in practice against the opposition of certain groups within it.
b) It is a cooperative organization for the promotion of the well-being and development of the personality of its members.
c) It takes individuals out of a state of isolation and gives them a chance to participate in the common endeavour.
d) It permits citizens to have a variety of loyalties and allegiance.

Ans) c

Exp) Option c is the correct answer

Option a is incorrect: The passage describes voluntary associations as a "buffer" between individuals and the state, implying they protect individuals from potentially arbitrary state power, rather than emphasizing the state's *inability* to enforce its will. The buffer role is about mediation and protection, not outright thwarting of state power. **Hence option (a) is incorrect.**

Option b is incorrect: While cooperative organizations can promote well-being and personality development, the core idea of the passage is about voluntary associations acting as a "buffer" against the "potentially powerful State." This option describes internal benefits for members, but not the external, protective role highlighted in the passage. **Hence option (b) is incorrect.**

Option c is correct: The passage states that voluntary associations act as a "buffer" between the individual and the state. This buffering role inherently involves connecting individuals, taking them out of isolation, and enabling them to collectively engage with the state, which is a form of participating in a common endeavor to protect individual interests against potential state overreach. **Hence option (c) is correct.**

Option d is incorrect: The passage focuses on the function of voluntary associations as a protective buffer between individuals and the state. It does not discuss the concept of citizens having multiple loyalties or allegiances. **Hence option (d) is incorrect.**

Therefore Option (c) is the correct answer.

Q.64) Consider the following statements:
I. There exists a natural number which when increased by 50% can have its number of factors unchanged.
II. There exists a natural number which when increased by 150%can have its number of factors unchanged.
Which of the statements given above is/are correct?
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) c

Exp) Option c is the correct answer

Statement I: There exists a natural number which, when increased by 50%, can have its number of factors unchanged.

- Let's take the natural number 2.
- The number of factors of 2 is 2 (factors are 1 and 2).
- If we increase 2 by 50%, we get: $2+(50/100) * 2=2+1=3$.
- The number of factors of 3 is 2 (factors are 1 and 3).
- Since the number of factors remained the same (2 for both 2 and 3), Statement I is true.

Statement II: There exists a natural number which, when increased by 150%, can have its number of factors unchanged.

- Let's take the natural number 2 again.
- The number of factors of 2 is 2 (factors are 1 and 2).
- If we increase 2 by 150%, we get: 2+(150/100) ∗2=2+3=5.
- The number of factors of 5 is 2 (factors are 1 and 5).
- Since the number of factors remained the same (2 for both 2 and 5), Statement II is true.

Since both Statement I and Statement II are true based on our example, the correct option is (c) i.e. Both I and II are correct.

Therefore Option (c) is the correct answer.

Q.65) There are 7 places A, B, C, D, E, F, and G in a city connected by various roads AB, CD, DE, BF, EG. A is 6 km south of B.A is 10 Km west of C. D is 5 km east of E. C is 6 Km north of D. F is 9 km west of B. F is 12 km north of G. A person travels from D to F through these reads. What is the distance covered by the person?
a) 20 km
b) 25 km
c) 31 km
d) 37 km

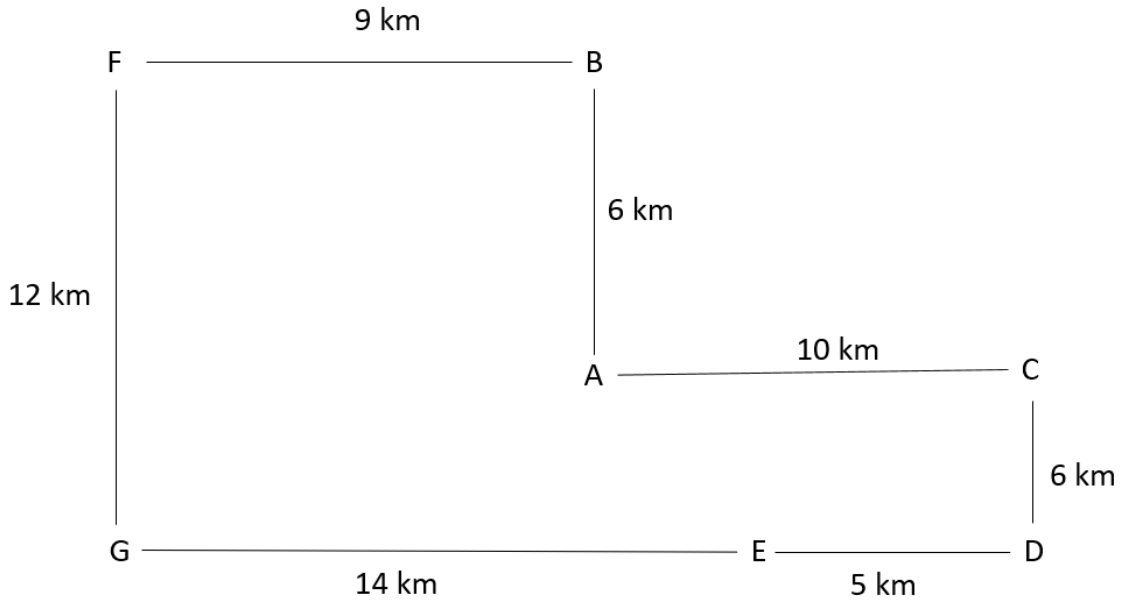
Ans) c

Exp) Option c is the correct answer

Given Data (Relative Positions and Distances):

- A is 6 km south of B.
- A is 10 km west of C.
- D is 5 km east of E.
- C is 6 km north of D.
- F is 9 km west of B.
- F is 12 km north of G.

After arranging the data pictorially, we get the following figure: -



We see that the distance between D to F is 31km regardless of the path taken.

Therefore Option (c) is the correct answer.

Q.66) In a certain code if 64 is written as 343 and 216 is written as 729, then how is 512 written in that code?
a) 1000
b) 1331
c) 1728
d) 2197

Ans) b

Exp) Option b is the correct answer

Given:

64 ? 343

216 ? 729

Let's express each number as a power of integers:

64 = 4^3 and 343 = 7^3

216 = 6^3 and 729 = 9^3

We see a pattern:

If x = a^3, then code(x) = $(a + 3)^3$

So:

64 = 4^3 → $(4 + 3)^3$ = 7^3 = 343

216= 6^3 = $(6 + 3)^3$ = 9^3 = 729

Now:

512=8^3 → $(8+ 3)^3$ = 11^3 = 1331

Correct answer= 1331.

Q.67) What is the remainder when $9^3 + 9^4 + 9^5 + 9^6 + \ldots + 9^{100}$ is divided by 6?
a) 0
b) 1
c) 2
d) 3

Ans) a

Exp) Option a is the correct answer

We are asked to find the remainder when:

$9^3 + 9^4 + 9^5 + \ldots + 9^{100}$ is divided by 6.

Firstly, we shall recognize the pattern of divisibility

We want to know what happens when powers of 9 are divided by 6.

Let's manually divide a few terms by 6:

Try:

· 9^1 = 9, and 9 : 6 = 1 remainder 3

· 9^2 = 81, and 81 : 6 = 13 remainder 3

· 9^3 = 729, and 729 6 = 121 remainder 3

. 9^4 = 6561, and 6561 : 6 = 1093 remainder 3

So clearly, **every power of 9 gives remainder 3 when divided by 6**.

From 9^3 to 9^{100} inclusive:

. Highest exponent: 100

. Lowest exponent: 3

. Number of terms = 100 - 3 + 1 = 98

Each term gives remainder 3 when divided by 6

So the sum will give:

Sum of remainders = 98 x 3=294

Now divide 294 by 6:

294 : 6 = 49 exactly Remainder = 0

Q.68) A question is given followed by two Statements I and II. Consider the Question and the Statements and mark the correct option.
Question: What is the smallest 1-digit number having exactly 4 distinct factors?
Statement I: 2 is one of the factors.
Statement II: 3 is one of the factors.
Which one of the following is correct in respect of the above Question and the Statements?

a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other statement alone.
b) The Question can be answered by using either Statement alone.
c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
d) The Question can be answered even without using any of the Statements.

Ans) d

Exp) Option d is the correct answer

Factors of a number are integers that divide that number without leaving a remainder. For example, the factors of 6 are 1, 2, 3, and 6.

Now, let's list out the 1-digit numbers and count their factors to see which one(s) have exactly 4 distinct factors.

Listing 1-digit numbers and their factors

1. 1: Factors - 1 (only one factor)

2. 2: Factors - 1, 2 (two factors)
3. 3: Factors - 1, 3 (two factors)
4. 4: Factors - 1, 2, 4 (three factors)
5. 5: Factors - 1, 5 (two factors)
6. 6: Factors - 1, 2, 3, 6 (four factors)
7. 7: Factors - 1, 7 (two factors)
8. 8: Factors - 1, 2, 4, 8 (four factors)
9. 9: Factors - 1, 3, 9 (three factors)

From this, the 1-digit numbers with exactly 4 distinct factors are 6 and 8. The smallest among these is 6.

So, the answer to the question is **6**.

So, the question can be answered even without using any statements.

Q.69) A question is given followed by two Statements I and II. Consider the Question and the Statements and mark the correct option.
Question: Let P, Q, R, S be distinct non-zero digits. If PP x PQ = RRSS where $P \leq 3$ and $Q \leq 4$, then what is Q equal to?
Statement I: R = 1.
Statement II: S = 2.
Which one of the following is correct in respect of the above Question and the Statements?

a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other statement alone.
b) The Question can be answered by using either Statement alone.
c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
d) The Question can be answered even without using any of the Statements.

Ans) d

Exp) Option d is the correct answer

- PP is a 2-digit number with same digits $\rightarrow$ PP=11×P
- PQ is a 2-digit number $\rightarrow$ 10P+Q
- RRSS is a 4-digit number

Also, conditions:

- P≤3

- Q≤4

We are to find Q, given one or both of the following statements:

- Statement I: R=1
- Statement II: S=2

Given:

PP x PQ = RRSS (11×P)(10P+Q)=110P^2+11PQ=RRSS

We'll try P = 1, 2, 3 and check values of Q < 4, using this equation and narrowing the possibilities.

Try P = 1:

· PP = 11

· PQ = 10 x 1 + Q = 10 + Q

. Expression: 11 x (10+Q) =110+11Q

Try Q = 1 to 4:

. Q = 1 - 11x11 = 121 not RRSS

. Q = 2 - 11x12 = 132 not 4-digit

. Q= 3 - 11x13 = 143 not 4-digit

. Q= 4 - 11x14 = 154 not 4-digit

All 3-digit numbers, no 4-digit output - So

- Skip P = 1

Try P = 2

· PP = 22

· PQ = 20 + Q

. Total=22x (20+Q)= 440+ 22Q

Try Q = 1 to 4:

. Q= 1 - 462

. Q= 2 - 484

. Q= 3 - 506

. Q= 4 - 528

Still all 3-digit numbers - Skip P = 2

Try P = 3

. PP = 33

· PQ = 30 + Q

. Total= 33x (30+Q) = 990 + 33Q

Try Q = 1 to 4:

. Q= 1 - 33x31 = 1023

. Q= 2 - 33x32 = 1056

. Q= 3 - 33x33 = 1089

. Q= 4 - 33x34 = 1122

Here, we get the desired result = PPXPQ= RRSS (33x34= 1122)

But, we even didn't need any statement.

Without Statements:

By analyzing the equation $PP \times PQ = RRSS$ under the constraints $P \leq 3$ and $Q \leq 4$, we systematically test all valid combinations of P and Q:

- For $P=3$ and $Q=4$, the equation becomes $33 \times 34 = 1122$, which matches $RRSS=1122$. Here, $R=1$ and $S=2$, with all digits distinct and non-zero.
- No other (P,Q)(pairs satisfy the equation while maintaining distinct digits. Thus, $Q=4$ is uniquely determined **without needing the statements**.

Since the question can be answered without the statements, and the statements are additional, option (d) is correct.

Q.70) A question is given followed by two Statements I and II. Consider the Question and the Statements and mark the correct option.
Question:
How is Q related to P?
Statement I: P has two sisters, R and S.
Statement II: R's father is the brother of Q.
Which one of the following is correct in respect of the above Question and the Statements?

a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other statement alone.
b) The Question can be answered by using either Statement alone.
c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
d) The Question cannot be answered even using any of the Statements.

Ans) d

Exp) Option d is the correct answer

Statement I:

P has two sisters, R and S.

This tells us something about P's sisters, but nothing at all about Q.

So this statement alone does not help us determine Q's relationship to P.

Not sufficient

Statement II:

R's father is the brother of Q.

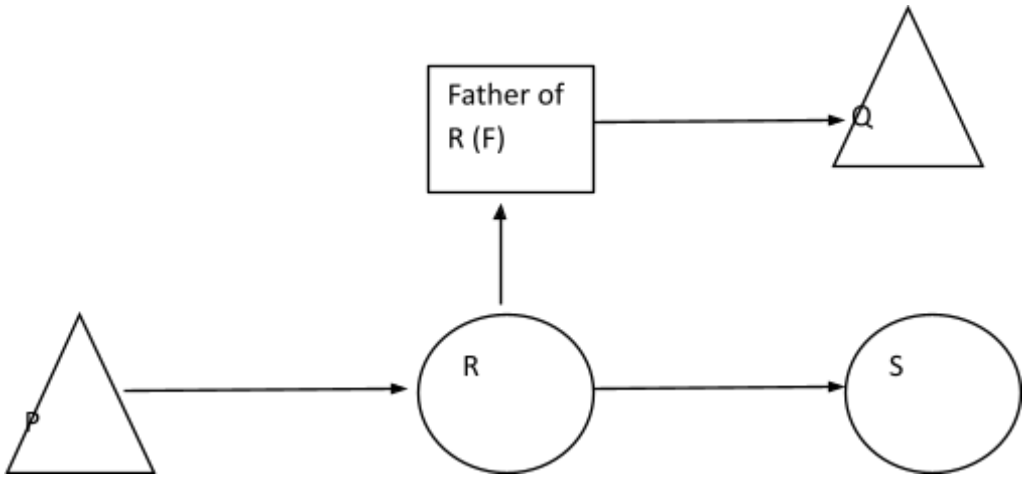
This tells us:

R's father is Q's brother

- So Q is R's uncle or aunt (depending on gender)

But we still don't know how P is related to R, unless we bring in Statement I (which tells us R and P are siblings).

Not sufficient alone



Using both Statements together:

Statement I: P and R are siblings (P has a sister R)

Statement II: R's father is Q's brother - So R's father and Q are siblings

Now:

R's father is also P's father (since P and R are siblings)

So P's father and Q are siblings

But, we don't know gender of both P and Q. Hence, it cannot be answered even using any of the statements.

Directions for the following 2 (two) items:
Read the following two passages and answer the items that follow the passages. Your answers to these items should be based on the passages only.

Passage -1

A single number for inflation is aggregate across different commodities and Services the price rise differs for different items of consumption. So, the single number is arrived at by assigning weights to different commodities and services. For WPI, the weights in production are used; for CPI, the consumption basket is used. But people are not homogeneous.
The consumption basket is vastly different for the poor, the middle classes, and the rich. Hence, the CPI is different for each od these classes and a composite index requires averaging the baskets.

Q.71) Which one of the following statements best reflects the most logical, rational and crucial message conveyed by the passage?
a) We must use WPI exclusively in measuring price rise and CPI should be done away with.

b) The present calculation of inflation rate does not correctly measure price rise of individual item/commodity.
c) Inflation data under-presents services in the consumption basket.
d) Knowledge of inflation rate is not really of any use to anybody in the country.

Ans) b

Exp) Option b is the correct answer

Argument of the Passage:

- Inflation is measured as a single aggregate number, but price rises vary across different goods and services.
- Different indices (WPI, CPI) use different weightings (production vs. consumption baskets).
- People have different consumption patterns (poor vs. middle class vs. rich), so a single CPI may not accurately reflect inflation for all groups.

Why Option (b) is Correct?

Option b- The present calculation of inflation rate does not correctly measure price rise of individual item/commodity.

- The passage emphasizes that averaging different price changes into a single number obscures the real impact on specific goods/services and different income groups.
- It does not claim that CPI is useless (as in (a)), nor does it focus only on services (as in (c)).
- It certainly does not suggest inflation data is useless (as in (d)).

Why Other Options Are Wrong:

- (a) We must use WPI exclusively in measuring price rise and CPI should be done away with

  The passage does not advocate abandoning CPI; it merely highlights its limitations.

- (c) Inflation data under-presents services in the consumption basket

  While services are part of the discussion, the main point is about variations in consumption baskets, not under-representation of services.

- (d) Knowledge of inflation rate is not really of any use to anybody in the country

  The passage does not dismiss inflation data as useless; it critiques its aggregation method.

The core message is that a single inflation number masks disparities in price rises across different items **and income groups**, making **(b)** the best answer.

Passage-2

Trust stands commonly defined as being vulnerable to others. Entrepreneurship implies trust in others and willingness to expose oneself to betrayal. Trust in expert systems is the essence of globalizing behavior; trust itself emerges as a super-commodity in the social market and defines the characteristics of goods and services in a global market. Trusting conduct also means holding others in good esteem, and an optimism that they are, or will be, competent in certain respects.

Q.72) Which one of the following statements best reflects the crux of the passage?
a) Trustworthiness cannot be expected in entrepreneurship.
b) Trustworthy people are the most vulnerable people.
c) No economic activity is possible without being exposed to betrayal.
d) Trust is important though it entails risk.

Ans) d

Exp) Option d is the correct answer

Key Themes in the Passage:

- Trust involves vulnerability (being open to betrayal).
- Entrepreneurship requires trust in others despite risks.
- Trust in expert systems (e.g., institutions, global markets) is crucial for globalization.
- Trust acts as a "super-commodity" shaping economic behavior.
- Trust includes optimism about others' competence.

Why Option (d) is Correct?

Option d- Trust is important though it entails risk.

- The passage emphasizes that trust is essential (for entrepreneurship, globalization, and markets) but comes with risks (exposure to betrayal).
- This aligns perfectly with (d), which balances importance and risk.

Why Other Options Are Incorrect?

- (a) Trustworthiness cannot be expected in entrepreneurship.

  Misleading: The passage does not say trustworthiness is impossible in entrepreneurship—rather, trust is necessary despite risks.
- (b) Trustworthy people are the most vulnerable people.

Distortion: While trust involves vulnerability, the passage does not claim trustworthy people are "the most vulnerable."

- (c) No economic activity is possible without being exposed to betrayal.

  Extreme: The passage does not say all economic activity requires betrayal exposure—just that trust inherently carries risk.

The passage's core idea is that trust is indispensable in economic and social interactions, even though it involves risk—making (d) the best answer.

Q.73) A question is given followed by two Statements I and II. Consider the Question and the Statements and mark the correct option.
Question: In a football match, team P playing against Q was behind by 3 goals with 10 minutes remaining. Does team P win the match?
Statement I: Team P scored 4 goals in the last 10 minutes.
Statement II: Team Q scored a total of 4 goals in the match.
Which one of the following is correct in respect of the above Question and the Statements?

a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other statement alone.
b) The Question can be answered by using either Statement alone.
c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
d) The Question cannot be answered using any of the Statements.

Ans) d

Exp) Option d is the correct answer

Team P was behind by 3 goals with 10 minutes remaining. Did P win?

Statement I: P scored 4 goals in the last 10 minutes.

- P's final score = Initial score + 4.
- However, we don't know how many goals Q scored in the last 10 minutes. If Q scored ≥1 goal, P might not win.
- Conclusion: Statement I alone is insufficient.

Statement II: Q scored a total of 4 goals in the match.

- Q's total = 4 goals.
- But we don't know Q's goals in the last 10 minutes or P's final score.
- Conclusion: Statement II alone is insufficient.

Combining Both Statements:

- Let Q's goals in the last 10 minutes = y.
- Total Q goals: $Q_{initial}+y=4$.
- Initial deficit: $Q_{initial} - P_{initial} =3$.
- P's final score: $P_{initial} +4$.
- Possible scenarios:
  - If y=0: $Q_{initial} =4$, $P_{initial} =1$. Final score: P = 5, Q = 4 ⟶ P wins.
  - If y=1: $Q_{initial} =3$, $P_{initial} =0$. Final score: P = 4, Q = 4 ⟶ Draw.
- **Result**: P could win or draw. We cannot definitively answer "yes" or "no."

The Question cannot be answered even using any of the Statements.

Q.74) A question is given followed by two Statements I and II. Consider the Question and the Statements and mark the correct option.
Question: Is $(p + q)^2 - 4pq$, where p, q are natural numbers, positive ?
Statement I: p < q.
Statement II: p > q.
Which one of the following is correct in respect of the above Question and the Statements?
a) The Question can be answered by using one of the Statements alone, but cannot be answered using the other statement alone.
b) The Question can be answered by using either Statement alone.
c) The Question can be answered by using both the Statements together, but cannot be answered using either Statement alone.
d) The Question can be answered even without using any of the Statements.

Ans) b

Exp) Option b is the correct answer

We are given the expression:

$(p+q)^2-4pq$

We are asked: Is this expression positive?

Also, p and q are natural numbers.

Simplify the expression

$(p+q)^2-4pq=p^2+2pq+q^2-4pq$

$=p^2-2pq+q^2=(p-q)^2$

So, the expression simplifies to:

$(p-q)^2$

And the question becomes:

Is $(p - q)^2$ positive?

$(p - q)^2 \geq 0$ always, since squares are non-negative.

It is positive if p is not equal to q

It is zero p = q

The expression is positive if and only if p is not equal to q.

Statement I: $p < q$

This implies p is not equal to q, so:

. $(p-q)^2>0$

Sufficient - The expression is positive

Statement II: $p > q$

Again, p is not equal to q, so:

. $(p-q)^2>0$

Sufficient - The expression is positive

So, either statement alone is enough to conclude the expression is positive.

Q.75) In a T20 cricket match, three players X, Y and Z scored a total of 37 runs. The ratio of number of runs scored by X to the number of rúns scored by Y is equal to ratio of number of runs scored by Y to number of runs scored by Z.
Value-I = Runs scored by X
Value-II = Runs scored by Y

Value-III = Runs scored by Z
Which one of the following is correct?
a) Value-I < Value-II < Value-III
b) Value-III < Value-II < Value-I
c) Value-I < Value-III < Value-II
d) Cannot be determined due to insufficient data

Ans) d

Exp) Option d is the correct answer

Given: X+Y+Z=37 and X/Y=Y/Z, implying Y^2=XxZ

The ratio X/Y=Y/Z means Y is the geometric mean of X and Z.

Consider possible values for Y.

Let's try Y = 12:

. If Y = 12, then $Y^2 = 12^2 = 144$.

. We need XZ =144 and X + Z = 37 - Y = 37 - 12 = 25.

. We are looking for two positive integers X and Z whose product is 144 and whose sum is 25. These

numbers are the roots of the quadratic equation A^2 - (X + Z)A + XZ = 0, which is A^2 -25A+144=0.

· We can factor 144 and look for pairs that sum to 25: (1, 144), (2, 72), (3, 48), (4, 36), (6, 24), (8, 18), (9, 16).

The pair (9, 16) sums to 25 (9 + 16 = 25).

So, we have found a possible solution:

. X = 9. Y = 12 and Z= 16.

. Value-I (Runs by X) = 9

. Value-II (Runs by Y) = 12

. Value-III (Runs by Z) = 16

Comparing these values, we get: 9 < 12 < 16, which means Value-I < Value-II < Value-III. Thismatches Option 1.

However, the pair (9, 16) could be assigned to (X, Z) in two ways. What if we interchange X and Z. X = 16 and Z = 9

. Let's try X = 16, Y = 12, Z = 9.

X + Y +Z= 16+12+9= 37

Y^2= X x Z= 144= 16X9= 144

In this second solution:

· Value-I (Runs by X) = 16

. Value-II (Runs by Y) = 12

· Value-III (Runs by Z) = 9

Comparing these values, we get: 16 > 12 > 9, which means Value-I > Value-II > Value-III, or equivalently, Value-III < Value-II < Value-I. This matches Option 2.

Since we have found two distinct sets of positive integer runs for X, Y, and Z that satisfy both conditions, and these sets result in different relative orderings of Value-I, Value-II, and Value-III, we cannot uniquely determine the correct ordering based on the given information.

No unique solution exists for X, Y, Z without additional information.
So, Cannot be determined due to insufficient data

Q.76) Let p + q = 10, where p, q are integers.
Value-I = Maximum value of p × q when p, q are positive integers.
Value-II = Maximum value of p × q when p ≥ -6, q ≥ -4.
Which one of the following is correct?
a) Value-I < Value-II
b) Value-II < Value-I
c) Value-I = Value-II
d) Cannot be determined due to insufficient data

Ans) c

Exp) Option c is the correct answer

We are given:

p + q = 10, where p, q are integers.

We need to compare:

Value-I: Maximum of p x q, when p, q are positive integers.

Value-II: Maximum of p x q, when p ≥ -6, q ≥ -4 (still under the condition p + q = 10).

Maximize p x q under p + q = 10

Let's write:

q=10-p=pxq=p(10-p)=10p-p^2

This is a quadratic expression, and its maximum occurs at:

p =10/2 =5⇒q=5

p x q = 5 x 5 = 25

So,

. Value-I = 25, achieved when p = 5, q = 5

Maximize p×q under p+q=10 and

p≥−6,q≥−4

We again use:

q=10−p⇒So q≥−4⇒10−p≥−4⇒p≤14

And:

p≥−6⇒Valid range: p∈[−6,14]

So now we need to find the value of p×q=p(10−p)p for integer values of p∈[−6,14]

But we already know that this quadratic achieves **maximum** at p=5p = 5p=5, and that point lies within the allowed range.

So:

- **Value-II = 25**, same maximum

So, Value I = Value II.

Q.77) Consider a set of 11 numbers:
Value-I = Minimum value of the average of the numbers of the set when they are consecutive integers ≥ -5.
Value-II = Minimum value of the product of the numbers of the set when they are consecutive non-negative integers.
Which one of the following is correct?
a) Value-I < Value-II
b) Value-II < Value-I
c) Value-I = Value-II
d) Cannot be determined due to insufficient data

Ans) c

Exp) Option c is the correct answer

We are given a set of 11 numbers, and asked to compare two values:

Value-I:

Minimum value of the average of the numbers of the set when they are consecutive integers ≥ –5

Value-II:

Minimum value of the product of the numbers of the set when they are consecutive non-negative integers

Let's analyze both values:

Value-I: Average of 11 consecutive integers ≥ –5

Let the 11 consecutive integers be:

$n, n+1, n+2, \ldots, n+10$

The average of 11 consecutive integers is:

$\text{Average} = [n + (n+1) + (n+2) + (n+3) + (n+4) + (n+5) + (n+6) + (n+7) + (n+8) + (n+9) + (n+10)]/11 = (11n + 55)/11 = n+5$

We want the minimum value of the average, with the condition:

$n \geq -5 \Rightarrow$ Minimum average $= -5+5 = 0$

Value-I = 0

Alternatively,

If we take 11 consecutive numbers from -5, then numbers would be -5, -4, -3, -2, -1, 0, 1, 2, 3, 4 and 5. Their average would be 0.

Minimum product of 11 consecutive non-negative integers

Let the 11 consecutive non-negative integers be:

$n, n+1, n+2, \ldots, n+10$

We want to find the minimum value of their product, under the condition that all are non-negative.

To minimize the product, start from the smallest possible non-negative integer: n=0

So the numbers are:

$0, 1, 2, \ldots, 10 \Rightarrow \text{Product} = 0 \times 1 \times 2 \times 3 \times 4 \times \cdots\cdots 10 = 0$

So, Value II would be 0.

So, Value I = Value II.

Q.78) The average of three numbers p, q and r is k. p is as much more than the average as q is less than the average. What is the value of r?
a) k
b) k - 1
c) k + 1
d) k/2

Ans) a

Exp) Option a is the correct answer

We are told:

· The average of three numbers p, q, r is k. So:

(p+q+r)/3 =k= (p+q +r) = 3k……. (1)

p is as much more than the average as q is less than the average:

This means:

p-k=k-q ……(2)

From Equation (2)

p-k=k-q p+q=2k…… (3)

Plug (3) into Equation (1):

From (1):

p+q+r=3k

Substitute p + q = 2k:

2k+r = 3k =r = 3k -2k = k

r=k

Q.79) Let x be a real number between 0 and 1. Which of the following statements is/are correct?
I. $x^2 > x^3$
II. $x > \sqrt{x}$

Select the correct answer using the code given below:
a) I only
b) II only
c) Both I and II
d) Neither I nor II

Ans) a

Exp) Option a is the correct answer

Statement I (x2 > x3):

For 0< x < 1,

X3 < x2 because multiplying x by itself reduces its value.

Example: x = 0.5 => 0.25 > 0.125.

True.

Statement II (x > Vx or x > x1/2):

For 0< x < 1, x1/2 > x because the square root of a fraction is larger than the fraction itself.

Example: x = 0.25 => 0.5 > 0.25.

False.

Conclusion: Only Statement I is correct.

Q.80) The difference between any two natural numbers is 10. What can be said about the natural numbers which are divisible by 5 and lie between these two numbers?
a) There is only one such number.
b) There are only two such numbers.
c) There can be more than one such number.
d) No such number exists.

Ans) c

Exp) Option c is the correct answer

Two natural numbers N and N + 10 differ by 10. We need to determine how many natural numbers divisible by 5 lie strictly between them.

Case-I

If N is a multiple of 5 (e.g., N = 5), there is one multiple of 5 (e.g., 10) between N and N + 10.

The numbers between 5 and 15 are 6, 7, 8, 9, 10, 11, 12, 13, 14. The number divisible by 5 in this list is 10. In this case, there is only one such number.

Case-II

If N is not a multiple of 5 (e.g., N = 1), there are two multiples of 5 (e.g., 5 and 10) between N and N + 10.

Example 1:

Let a = 1,b = 11

Numbers between = 2 to 10

Multiples of 5: 5 and 10 - 2 numbers

Example 2:

Let a = 3, b = 13

Between = 4 to 12

Multiples of 5: 5 and 10 - 2 numbers

Conclusion: The number of multiples of 5 between N and N + 10 depends on N. Since it can be 1 or 2, the correct answer is (c)- There can be more than one such number.