



NSAT

NSAT Exam Guidelines



Exam Protocol

- Arrive at least 15 minutes early ([by 2:45 PM](#)) for exam setup and proctoring checks.
- All three sections are mandatory and include a sectional cutoff that determines passing eligibility
- The exam will be proctored. Unfair means will lead to permanent disqualification.
- For MCQ-type Questions, Positive marking will be (+4) for correct answers, while negative marking (-1) is applicable for incorrect ones.
- There is no negative marking in coding section.



Joining Details & Device Restrictions

- Use a laptop/PC with screen-sharing and microphone access
- [Dual-camera setup required](#):
 - Primary camera (webcam) facing your face
 - Secondary camera (mobile/external) showing your workspace
- Mobile phones are only allowed as a secondary camera (not for taking the test)
- Calculators are prohibited; use pen and paper for rough work
- Access the test portal at: <https://www.newtonschool.co/codingsat>
- Accept the calendar invite sent to you on test day as a reminder
- Maintain a stable internet connection to prevent interruptions during NSAT
- Keep both cameras ON throughout the test
- [Position cameras properly](#):
 - Primary camera: face clearly visible
 - Secondary camera: desk, hands, and screen visible
- Ensure the secondary camera is placed steadily (not handheld)



Preparation

- Visit [NSAT homepage](#) to check compatibility before the exam.
- Use Google Chrome for optimal performance.
- Bring a pen and paper for rough work during the exam.
- Attempt a mock test to understand the exam pattern, for practice, and to confirm your PC compatibility.



Environment Considerations

- Sit in a quiet environment with no background noise to minimize distractions and avoid disqualification.
- Ensure the lighting in the room is appropriate for clear visibility and comfortable reading and writing.



NSAT - Sections

Sr. No.	Section Name		No. of Questions
1	Mathematics	11th & 12th Class Maths	15
		10 th Class Maths	15
2	General Aptitude	Logic & Data Interpretation	20
		Algorithmic Thinking	10
3	English	Reading Comprehension	10
		Language Reasoning	10





Section - 1 Advanced Maths

Question ID	1								
Question Type	MCQ-SC								
Difficulty Level	Medium								
Topic: Subtopic (concept)	Functions								
Question Details/Question Stem	<p>Match each of the equations with the number of solutions.</p> <table border="1"><thead><tr><th>Column I</th><th>Column II</th></tr></thead><tbody><tr><td>I) $3^x = 2^{x+1}$</td><td>P) Has 2 real solutions</td></tr><tr><td>II) $5^x + 2^x = 1$</td><td>Q) Has 1 real solution</td></tr><tr><td>III) $3^{x^2-x} = 9^{1-x}$</td><td>R) Has no real solution</td></tr></tbody></table>	Column I	Column II	I) $3^x = 2^{x+1}$	P) Has 2 real solutions	II) $5^x + 2^x = 1$	Q) Has 1 real solution	III) $3^{x^2-x} = 9^{1-x}$	R) Has no real solution
Column I	Column II								
I) $3^x = 2^{x+1}$	P) Has 2 real solutions								
II) $5^x + 2^x = 1$	Q) Has 1 real solution								
III) $3^{x^2-x} = 9^{1-x}$	R) Has no real solution								
Choices/Choice A	(I) \rightarrow (P),(II) \rightarrow (R),(III) \rightarrow (Q)								
Choices/Choice B	(I) \rightarrow (Q),(II) \rightarrow (P),(III) \rightarrow (R)								
Choices/Choice C	(I) \rightarrow (R),(II) \rightarrow (P),(III) \rightarrow (Q)								
Choices/Choice D	(I) \rightarrow (Q),(II) \rightarrow (R),(III) \rightarrow (P)								
Solution	D								
Explanation	<p>The first equation is $3^x = 2^{x+1}$.</p> <p>Applying natural logarithm on both sides,</p>								



$$x \ln(3) = (x+1) \ln(2)$$

$$x \ln(3) = x \ln(2) + \ln(2)$$

$$x [\ln(3) - \ln(2)] = \ln(2)$$

$$x \ln\left(\frac{3}{2}\right) = \ln(2)$$

$$x = \frac{\ln(2)}{\ln\left(\frac{3}{2}\right)}$$

This equation has 1 real solution.

The second equation is $5^x + 2^x = 1$.

Both 5^x and 2^x are positive for all real x , and their sum cannot equal 1,

This equation has no real solution.

The third equation is $3^{x^2-x} = 9^{1-x}$.

Rewrite $9^{1-x} = (3^2)^{1-x}$

The equation becomes,

$$3^{x^2-x} = 9^{1-x}$$

$$3^{x^2-x} = (3^2)^{1-x}$$

$$3^{x^2-x} = 3^{2(1-x)}$$

Now, equate the exponents:

$$x^2 - x = 2 - 2x$$

$$x^2 - x + 2x - 2 = 0$$

$$x^2 + x - 2 = 0$$

Solve for x :



	$x^2 + x - 2 = 0$ $x^2 + 2x - x - 2 = 0$ $x(x+2) - 1(x+2) = 0$ $(x-1)(x+2) = 0$ $x = 1, -2$ <p>This equation has 2 real solutions.</p>
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Question ID	2
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Functions
Question Details/Question Stem	What is the number of real solutions for the equation $x^{\log(x+3)+\log(x+4)} = 1$?
Choices/Choice A	1
Choices/Choice B	2
Choices/Choice C	3
Choices/Choice D	0
Solution	A
Explanation	<p>The equation can be rewritten as</p> $\log x^{\log(x+3)+\log(x+4)} = \log(1)$ $\log(x)(\log(x+3)+\log(x+4)) = 0$ <p>So, we have</p> $\log(x) = 0 \text{ or } \log(x+3)+\log(x+4) = 0$ <p>For $\log(x) = 0$, $x = 1$.</p> <p>For $\log(x+3)+\log(x+4) = 0$, we have</p>



$$\log((x+3)(x+4)) = 0$$

$$(x+3)(x+4) = e^0$$

$$x^2 + 4x + 3x + 12 = 1$$

$$x^2 + 7x + 11 = 0$$

By using the quadratic formula,

$$x = \frac{-7 \pm \sqrt{7^2 - 4(1)(11)}}{2(1)}$$

$$= \frac{-7 \pm \sqrt{49 - 44}}{2}$$

$$= \frac{-7 \pm \sqrt{5}}{2}$$

When $x = 1$,

$$1^{\log(1+3) + \log(1+4)} = 1$$

Hence $x = 1$ is a solution.

When $x = \frac{-7 + \sqrt{5}}{2}$,

$$\left(\frac{-7 + \sqrt{5}}{2}\right)^{\log\left(\frac{-7 + \sqrt{5}}{2} + 3\right) + \log\left(\frac{-7 + \sqrt{5}}{2} + 4\right)} = \left(\frac{-7 + \sqrt{5}}{2}\right)^{\log\left(\frac{-1 + \sqrt{5}}{2}\right) + \log\left(\frac{1 + \sqrt{5}}{2}\right)}$$

$$= \left(\frac{-7 + \sqrt{5}}{2}\right)^{\log\left(\frac{(-1 + \sqrt{5})(1 + \sqrt{5})}{4}\right)}$$

$$= \left(\frac{-7 + \sqrt{5}}{2}\right)^{\log(-1)}$$

We know that the logarithm of negative numbers is undefined.

Hence $x = \frac{-7 \pm \sqrt{5}}{2}$ is not a real solution to the equation.

Thus, there is only one real solution to the equation.



Question ID	3
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Integration
Question Details/Question Stem	The derivative of $f(x)$ is $f'(x) = 3x^2 - 4x + 1$. The derivative intersects the original function when $x = 2$. What is the value of $f(3)$?
Choices/Choice A	-56
Choices/Choice B	56
Choices/Choice C	15
Choices/Choice D	-15
Solution	C
Explanation	<p>The function $f(x)$ is given by,</p> $f(x) = \int f'(x) dx$ $= \int (3x^2 - 4x + 1) dx$ $= 3\left(\frac{x^3}{3}\right) - 4\left(\frac{x^2}{2}\right) + x + C$ $= x^3 - 2x^2 + x + C$ <p>The value of the derivative when $x = 2$ is:</p> $f'(2) = 3(2)^2 - 4(2) + 1$ $= 12 - 8 + 1$ $= 5$ <p>Since the derivative and the original function intersect at this point,</p>



	$f(2) = 5$ $(2)^3 - 2(2)^2 + 1(2) + C = 5$ $8 - 8 + 2 + C = 5$ $C = 3$ <p>The value of $f(3)$ can be calculated as</p> $f(3) = (3)^3 - 2(3)^2 + 3 + 3$ $= 27 - 18 + 6$ $= 15$
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Question ID	4
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Differentiation
Question Details/Question Stem	A box with a square base and one side open is made from a rectangular sheet having an area of 108 square units. What will be the approximate maximum volume of the box?
Choices/Choice A	102
Choices/Choice B	108
Choices/Choice C	126
Choices/Choice D	145
Solution	B
Explanation	<p>Let x represent the base length and width of the box. Let h represent the height.</p> <p>The surface area of the box consists of square base and four rectangular sides.</p> <p>So, the total surface area equation is</p> $x^2 + 4xh = 108$ <p>The volume of the box is given by</p>



$$\begin{aligned}V &= lbh \\ &= x \times x \times h \\ &= x^2 h\end{aligned}$$

From the surface area equation, solve for h:

$$\begin{aligned}x^2 + 4xh &= 108 \\ 4xh &= 108 - x^2 \\ h &= \frac{108 - x^2}{4x}\end{aligned}$$

The derivative of V is

$$\begin{aligned}V &= x^2 \left(\frac{108 - x^2}{4x} \right) \\ V &= \frac{108x - x^3}{4} \\ \frac{dV}{dx} &= \frac{108 - 3x^2}{4}\end{aligned}$$

To maximize the volume, put the derivative of V equal to zero.

$$\begin{aligned}\frac{108 - 3x^2}{4} &= 0 \\ x^2 &= \frac{108}{3} \\ x^2 &= \sqrt{36} \\ x &= 6\end{aligned}$$

So, the maximum volume is

$$\begin{aligned}V &= \frac{108(6) - (6)^3}{4} \\ &= \frac{648 - 216}{4} \\ &= \frac{432}{4} \\ &= 108\end{aligned}$$



Question ID	5
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Permutations and Combinations
Question Details/Question Stem	There are 8 girls and 12 boys in a class of 20 students. Seven students are to comprise a committee, but at least two girls and at least four boys must be on the committee. How many different ways are there to form the committee?
Choices/Choice A	49889
Choices/Choice B	49886
Choices/Choice C	49888
Choices/Choice D	49896
Solution	D
Explanation	<p>We need to form a committee of 7 students from 20 students, consisting of at least 4 boys and at least 2 girls.</p> <p>The possible cases are:</p> <ul style="list-style-type: none">• Case 1: 4 boys and 3 girls.• Case 2: 5 boys and 2 girls. <p>Case 1:</p> <p>The number of ways to select 4 boys from 12 boys is $C(12,4)$.</p> <p>The number of ways to select 3 girls from 8 girls is $C(8,3)$.</p> <p>The total number of ways for this case is $C(12,4) \times C(8,3)$.</p> <p>Case 2: 5 boys and 2 girls</p> <p>The number of ways to select 5 boys from 12 boys is $C(12,5)$.</p> <p>The number of ways to select 2 girls from 8 girls is $C(8,2)$.</p> <p>The total number of ways for this case is $C(12,5) \times C(8,2)$.</p>



	<p>The formula for $C(n,k)$ is:</p> $C(n,k) = \frac{n!}{k!(n-k)!}$ <p>Now we can calculate the values for each combination, then add the results of the two cases:</p> $\begin{aligned} \text{Total number of ways} &= C(12,4) \times C(8,3) + C(12,5) \times C(8,2) \\ &= 495 \times 56 + 792 \times 28 \\ &= 49896 \end{aligned}$ <p>Hence, the total number of ways to form the committee is 49896.</p>
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Question ID	6
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Probability and Statistics
Question Details/Question Stem	One in 100 students says that they like English. A student randomly selected has scored 100% is 80% if he/she likes English and 30% if he/she does not like English. What is the approximate percentage that a student randomly selected like English given that they scored 100%? Round to two decimal places.
Choices/Choice A	3.83%
Choices/Choice B	3.22%
Choices/Choice C	2.86%
Choices/Choice D	2.93%
Solution	A
Explanation	Let A be the event that the student likes English. Let B be the event that the student scores a 100%. Since one in 100 students say that they like English,



$$P(A) = \frac{1}{100}$$

Since a student who scores 100% is 80% the ones who like English,

$$P(B|A) = 80\% \\ = 0.8$$

Since a student who scores 100% is 30% the ones who does not like English,

$$P(B|A^c) = 20\% \\ = 0.2$$

By using the Baye's theorem,

$$P(A|B) = \frac{P(A)}{P(B)} P(B|A) \\ = \frac{P(A)}{P(A)P(B|A) + P(A^c)P(B|A^c)} P(B|A) \\ = \frac{\frac{1}{100} \cdot 0.8}{\frac{1}{100} \cdot 0.8 + \frac{99}{100} \cdot 0.2} = \frac{0.8}{0.8 + 19.8} = \frac{0.8}{20.6} = 0.03883$$

Solving further, probability is 3.83%

Question ID	7
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Sets, Matrices, Probability
Question Details/Question Stem	Let A be the set of 2×2 matrices with entries from the set $\{x : x^2 - x = 0\}$. Let B be the event given by $B = \{x \in A : \text{sum of entries in } x = 0\}$ The probability of B in A is.



Choices/Choice A	$\frac{3}{16}$
Choices/Choice B	$\frac{1}{8}$
Choices/Choice C	$\frac{1}{4}$
Choices/Choice D	$\frac{1}{16}$
Solution	D
Explanation	<p>The equation $x^2 - x = 0$ can be solved as</p> $x(x-1) = 0$ $x = 0, x-1 = 0$ $x = 0, x = 1$ <p>So, the set is $\{0,1\}$.</p> <p>In a 2×2 matrix, there will be 4 entries.</p> <p>The total number of matrices with entries from the set $\{0,1\}$ are</p> $2^{2 \times 2} = 2^4$ $= 16$ <p>For the matrix to belong to B, the sum of all entries must be 0. This implies that all entries in the matrix must be 0 because $0+0+0+0=0$.</p> <p>Thus, there is only 1 matrix in B (the zero matrix):</p> $\begin{pmatrix} 1 - \frac{1}{a} \\ a \end{pmatrix} = 0$ $-\frac{1}{a} = -1 \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ $a = 1$ <p>The probability is the ratio of favorable outcomes (B) to the total outcomes (A):</p> $P(B \text{ in } A) = \frac{1}{16}$



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Question ID	8
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Differential Equations
Question Details/Question Stem	If $y''y = px^4$ is satisfied by the equation $y = x^3$. Then the value of p is:
Choices/Choice A	3
Choices/Choice B	2
Choices/Choice C	6
Choices/Choice D	7
Solution	C
Explanation	<p>Consider the equation $y = x^3$.</p> <p>The derivatives of the equation are</p> $y' = \frac{d}{dx}[x^3]$ $= 3x^2$ <p>And,</p> $y'' = 6x$ <p>Plugging these in the given differential equation.</p> $6x(x^3) = px^4$ $6x^4 = px^4$ $p = 6$

Question ID	9
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Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Differential Equations
Question Details/Question Stem	Solve the following exact differential equation $(x^2 + y^2)dx + 2xydy = 0$
Choices/Choice A	$x^3 + 3xy^2$
Choices/Choice B	$x^2 + 3xy^2$
Choices/Choice C	$x^3 + 3xy$
Choices/Choice D	$x^3 + 3x^2y$
Solution	A
Explanation	<p>We are given the exact differential equation:</p> $(x^2 + y^2)dx + 2xydy = 0$ <p>To check if the equation is exact, we need to verify if:</p> $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ <p>Where $M(x, y) = x^2 + y^2, N(x, y) = 2xy$</p> <p>Taking the partial derivative with respect to y and x</p> $\frac{\partial M}{\partial y} = 2y, \frac{\partial N}{\partial x} = 2y$ <p>Since, $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$, the equation is exact.</p> <p>Since the equation is exact, we can find the potential function $\Phi(x, y)$ such that</p> $\frac{\partial \Phi}{\partial x} = M(x, y), \frac{\partial \Phi}{\partial y} = N(x, y)$ <p>Integrate $M(x, y)$ with respect to x,</p>


$$\frac{\partial \Phi}{\partial x} = \int (x^2 + y^2) dx$$
$$= \frac{x^3}{3} + y^2 x + h(y)$$

Where $h(y)$ is a function of y , which will be determined later.

Differentiate $\Phi(x, y)$ with respect to y :

$$\frac{\partial \Phi}{\partial y} = 2xy + h'(y)$$
$$\frac{\partial \Phi}{\partial y} = N(x, y) = 2xy$$

We know that

So, we have

$$2xy + h'(y) = 2xy$$
$$h'(y) = 0$$

The potential function $\Phi(x, y)$ is $\Phi(x, y) = \frac{x^3}{3} + y^2 x + C$

The general solution to the exact differential equation is:

$$x^3 + 3xy^2$$

Question ID	10
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Differentiation and Integration
Question Details/Question Stem	$y = f(x)$ is a quadratic polynomial. The area bounded by $y = f(x), y = 0, x = 0, x = 2$ is 26. The relative minimum of $y = f(x)$ is 0 and it occurs at -1. What is the value of $f(3)$.
Choices/Choice A	25
Choices/Choice B	48
Choices/Choice C	56
Choices/Choice D	43



Solution	B
Explanation	<p>Let the polynomial be $f(x) = ax^2 + bx + c$.</p> <p>The derivative of the polynomial is</p> $f'(x) = 2ax + b$ <p>Since the relative minimum is 0 at -1.</p> $f(-1) = 0$ $f'(-1) = 0$ <p>So, we have</p> $2a(-1) + b = 0$ $b = 2a$ <p>And,</p> $a(-1)^2 + b(-1) + c = 0$ $a - b + c = 0$ $a - 2a + c = 0$ $c = a$ <p>The area bounded by the curves can be calculated as</p> $\int_a^b f(x) dx = \int_0^2 (ax^2 + bx + c) dx$ $= \int_0^2 (ax^2 + 2ax + a) dx$ $= a \left[\frac{x^3}{3} + x^2 + x \right]_0^2$ $= a \left[\frac{(2)^3}{3} + (2)^2 + 2 - 0 \right]$ <p>Solving further,</p>



$$A = a \left(\frac{8}{3} + 6 \right)$$
$$= \frac{26a}{3}$$

Since the area bounded by the curves is 26,

$$\frac{26}{3}a = 26$$
$$a = 3$$

So, we have,

$$b = 6$$

$$c = 3$$

The polynomial is

$$f(x) = 3x^2 + 6x + 3$$

The value of $f(3)$ is

$$f(3) = 3(3)^2 + 6(3) + 3$$
$$= 27 + 18 + 3$$
$$= 48$$

Question ID	11
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Differentiation
Question Details/Question Stem	The absolute minimum of a degree 4 polynomial is -253 at $x = -4$, and the relative minimum is -3 at $x = 1$. If the relative minimum of the second derivative of the polynomial is about -56 at $x = -1$, what is the value of the relative maximum of the given polynomial?
Choices/Choice A	-2
Choices/Choice B	0
Choices/Choice C	3
Choices/Choice D	5
Solution	C



Explanation

Let's consider the polynomial be:

$$f(x) = ax^4 + bx^3 + cx^2 + dx + e$$

The derivatives of this polynomial are:

$$f'(x) = 4ax^3 + 3bx^2 + 2cx + d$$

$$f''(x) = 12ax^2 + 6bx + 2c$$

$$f'''(x) = 24ax + 6b$$

It is given that the second derivative of the polynomial has a relative minimum of -56 at $x = -1$, then

$$f'''(0) = 0$$

$$24a(-1) + 6b = 0$$

$$6b = 24a$$

$$b = 4a$$

And,

$$f''(-1) = -56$$

$$12a(-1)^2 + 6b(-1) + 2c = -56$$

$$12a - 6b + 2c = -56$$

$$12a - (24a) + 2c = -56$$

Solving further,

$$-12a + 2c = -56$$

$$-6a + c = -28$$

$$c = -28 + 6a$$

Also, the polynomial has absolute minimums of -253 at $x = -4$. then

$$f'(-4) = 0$$

So, we have,



$$\begin{aligned}4a(-4)^3 + 3b(-4)^2 + 2c(-4) + d &= 0 \\-256a + 48b - 8c + d &= 0 \\-256a + 48(4a) - 8(6a - 28) + d &= 0 \\-256a + 192a - 48a + 224 + d &= 0\end{aligned}$$

Solving further,

$$\begin{aligned}-112a + 224 + d &= 0 \\d &= 112a - 224\end{aligned}$$

And,

$$\begin{aligned}f(-4) &= -253 \\a(-4)^4 + b(-4)^3 + c(-4)^2 + d(-4) + e &= -253 \\256a - 64b + 16c - 4d + e &= -253 \\256a - 64(4a) + 16(6a - 28) - 4(112a - 224) + e &= -253 \\256a - 256a + 96a - 448 - 448a + 896 + e &= -253\end{aligned}$$

Solving further,

$$\begin{aligned}-352a + 448 + e &= -253 \\e &= -253 - 448 + 352a \\e &= 352a - 701\end{aligned}$$

Since the polynomial has a relative minimum of -3 at $x=1$, then

$$\begin{aligned}a(1)^4 + b(1)^3 + c(1)^2 + d(1) + e &= -3 \\a + 4a + (6a - 28) + (112a - 224) + (352a - 701) &= -3 \\475a - 953 &= -3 \\a &= 2\end{aligned}$$

Now, other values of coefficients are:

$$\begin{aligned}b &= 4a = 4(2) = 8 \\c &= 6a - 28 = 6(2) - 28 = -16 \\d &= 112a - 224 = 112(2) - 224 = 0 \\e &= 352a - 701 = 352(2) - 701 = 3\end{aligned}$$



So, the given polynomial is:

$$f(x) = 2x^4 + 8x^3 - 16x^2 + 3$$

The relative extrema of the polynomial occur at $f'(x) = 0$.

$$8x^3 + 24x^2 - 32x = 0$$

$$x^3 + 3x^2 - 4x = 0$$

$$x(x^2 + 3x - 4) = 0$$

Solving further,

$$x = 0 \text{ or } x^2 + 3x - 4 = 0$$

And,

$$x^2 + 4x - x - 4 = 0$$

$$x(x + 4) - 1(x + 4) = 0$$

$$(x - 1)(x + 4) = 0$$

$$x = -4, 1$$

Since at $x = -4, 1$, there are relative minimums, the relative maximum will be at $x = 0$.

So, the value of the polynomial at $x = 0$ is:

$$f(0) = 3$$

Thus, the value of the relative maximum of the given polynomial is 3.

Question ID	12
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Functions
Question Details/Question Stem	If (x_0, y_0) is a solution to the system of equations



	$\left(\frac{4}{x}\right)^{(\ln(4))^2} = (5y)^{(\ln(5))^2}$ $5^{\ln y} = 20^{\ln x}$ <p>Then the value of x_0 is</p>
Choices/Choice A	6
Choices/Choice B	30
Choices/Choice C	$\frac{5}{6}$
Choices/Choice D	$\frac{4}{5}$
Solution	D
Explanation	<p>The equation $5^{\ln y} = 20^{\ln x}$ can be rewritten as</p> $(\ln 5)^{\ln y} = (\ln 20)^{\ln x}$ $(\ln y)(\ln 5) = (\ln x)(\ln 20)$ <p>Let $u = \ln x, v = \ln y$. Then,</p> $v \ln(5) = u \ln(20)$ $v = u \frac{\ln(20)}{\ln(5)}$ <p>The equation $\left(\frac{4}{x}\right)^{(\ln(4))^2} = (5y)^{(\ln(5))^2}$ can be rewritten as</p> $\ln\left(\frac{4}{x}\right)^{(\ln(4))^2} = \ln(5y)^{(\ln(5))^2}$ $(\ln(4))^2 \left(\ln\left(\frac{4}{x}\right)\right) = (\ln(5))^2 (\ln(5y))$ $(\ln(4))^2 (\ln(4) - \ln(x)) = (\ln(5))^2 (\ln(5) + \ln(y))$ $(\ln(4))^3 - (\ln(x))(\ln(4))^2 = (\ln(5))^3 + (\ln(5))^2 (\ln(y))$ <p>This equation can be rewritten as:</p>



$$(\ln(4))^3 - u(\ln(4))^2 = (\ln(5))^3 + (\ln(5))^2 v$$

$$(\ln(4))^3 - u(\ln(4))^2 = (\ln(5))^3 + (\ln(5))^2 \left(\frac{\ln(20)}{\ln(5)} u \right)$$

$$(\ln(4))^3 - u(\ln(4))^2 = (\ln(5))^3 + (\ln(5))(\ln(20))u$$

$$(\ln(4))^3 - (\ln(5))^3 = u(\ln(4))^2 + u(\ln(5))(\ln(20))$$

Since $20 = 5 \times 4$,

$$(\ln(4))^3 - (\ln(5))^3 = u(\ln(4))^2 + u(\ln(5))(\ln(4 \times 5))$$

$$(\ln(4))^3 - (\ln(5))^3 = u \left[(\ln(4))^2 + (\ln(5))(\ln(4) + \ln(5)) \right]$$

$$(\ln(4) - \ln(5)) \left[(\ln(4))^2 + (\ln(5))^2 + (\ln(4))(\ln(5)) \right] = u \left[(\ln(4))^2 + (\ln(5))^2 + (\ln(5))(\ln(4)) \right]$$

$$\ln\left(\frac{4}{5}\right) = u$$

Re-substituting, $u = \ln(x)$, we get,

$$x = \frac{4}{5}$$

Question ID	13
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Differentiation
Question Details/Question Stem	Find the first derivative of the function $f(x) = x^3 \sin(x) + e^{2x} \ln(x)$
Choices/Choice A	$3x^2 \sin(x) + x^3 \cos(x) + \frac{e^{2x}}{x} + 2e^{2x} \ln(x)$
Choices/Choice B	$3x^2 \cos(x) + x^3 \sin(x) + \frac{e^{2x}}{x} + 2e^{2x} \ln(x)$
Choices/Choice C	$3x^2 \sin(x) - x^3 \cos(x) + \frac{e^{2x}}{x} + 2e^{2x} \ln(x)$



Choices/Choice D	$3x^2 \sin(x) + x^3 \cos(x) - \frac{e^{2x}}{x} - 2e^{2x} \ln(x)$
Solution	A
Explanation	<p>We will use the product rule:</p> $\frac{d}{dx} [u(x)v(x)] = u'(x)v(x) + u(x)v'(x)$ <p>Let $u(x) = x^3, v(x) = \sin(x)$</p> <p>The derivative of $u(x)$ is $3x^2$.</p> <p>The derivative of $v(x)$ is $\cos(x)$.</p> <p>Now apply the product rule:</p> $\frac{d}{dx} [x^3 \sin(x)] = 3x^2 \sin(x) + x^3 \cos(x)$ <p>We apply the product rule again:</p> $\frac{d}{dx} [e^{2x} \ln(x)] = e^{2x} \frac{1}{x} + 2e^{2x} \ln(x)$ <p>Combining both terms, the derivative of $f(x)$ is</p> $3x^2 \sin(x) + x^3 \cos(x) + \frac{e^{2x}}{x} + 2e^{2x} \ln(x)$

Question ID	14
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Differentiation
Question Details/Question Stem	A company's revenue function is given by $R(x) = 50x - x^2$ where x is the number of items produced and sold. The cost function is $C(x) = 20x + 200$.



	Find the number of items that should be produced and sold to maximize profit. What is the maximum profit?
Choices/Choice A	Number of items = 15, Maximum profit = \$25
Choices/Choice B	Number of items = 12, Maximum profit = \$27
Choices/Choice C	Number of items = 10, Maximum profit = \$35
Choices/Choice D	Number of items = 13, Maximum profit = \$46
Solution	A
Explanation	<p>The profit $P(x)$ is the difference between revenue $R(x)$ and cost $C(x)$.</p> $P(x) = R(x) - C(x)$ <p>Substitute the given values,</p> $P(x) = R(x) - C(x)$ $= 50x - x^2 - (20x + 200)$ $= -x^2 + 30x - 200$ <p>To maximize the profit, we need to find the critical points of $P(x)$.</p> <p>Take derivative of $P(x)$ and setting it equal to zero.</p> $P(x) = -x^2 + 30x - 200$ $\frac{dP}{dx} = -2x + 30$ <p>Set the derivative equal to zero to find the critical point:</p> $-2x + 30 = 0$ $-2x = -30$ $x = 15$ <p>So, the number of items that should be produced and sold to maximize profit is $x = 15$.</p> <p>To find the maximum profit, substitute $x = 15$ into the profit function:</p> $P(15) = -(15)^2 + 30(15) - 200$ $= -225 + 450 - 200$ $= 25$



	So, the number of items that should be produced and sold to maximize profit is $x = 15$ and the maximum profit is \$25.
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Question ID	15
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Series and sequence
Question Details/Question Stem	The n th term of a sequence is given by $a_n = 2^n + 3^{n-1}$. Find the sum of the first 7 terms of this sequence and the limit of the sequence as n approaches infinity.
Choices/Choice A	Sum = 1246, limit = ∞
Choices/Choice B	Sum = 1345, limit = $-\infty$
Choices/Choice C	Sum = 1347, limit = ∞
Choices/Choice D	Sum = 1289, limit = $-\infty$
Solution	C
Explanation	<p>The nth term of a sequence is given by $a_n = 2^n + 3^{n-1}$</p> <p>We need to find the sum of the first 7 terms.</p> <p>Find the individual terms:</p> $a_1 = 2^1 + 3^0 = 3$ $a_2 = 2^2 + 3^1 = 7$ $a_3 = 2^3 + 3^2 = 17$ $a_4 = 2^4 + 3^3 = 43$ $a_5 = 2^5 + 3^4 = 113$ $a_6 = 2^6 + 3^5 = 307$ $a_7 = 2^7 + 3^6 = 857$ <p>Now, sum these values:</p> $\text{Sum} = 3 + 7 + 17 + 43 + 113 + 307 + 857$ $= 1347$



	<p>To find the limit of the sequence as $n \rightarrow \infty$ we analyze the behavior of the nth term.</p> <p>As n increases, the term 3^{n-1} grows much faster than 2^n, because $3 > 2$</p> <p>Therefore, the sequence grows without bound as $n \rightarrow \infty$ meaning the limit is:</p> $\lim_{n \rightarrow \infty} a_n = \infty$
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Section - 2 Basic Maths

Question ID	16
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	LCM and HCF
Question Details/Question Stem	In the set $\{1, 2, 3, \dots, 300\}$, let b be the elements such that $HCF(b, 20) = 1$, then the number of possible values for b are:
Choices/Choice A	120
Choices/Choice B	118
Choices/Choice C	145
Choices/Choice D	105
Solution	A
Explanation	<p>We are asked to find the number of integers from 1 to 300 that are relatively prime to 20, i.e., the integers b such that $HCF(b, 20) = 1$.</p> <p>First, find the prime factorization of 20:</p> $20 = 2 \times 2 \times 5$ <p>The total number of integers from 1 to 300 is 300.</p> <p>The numbers divisible by 2 are the even numbers in the set. The first multiple of 2 is 2, and the last multiple of 2 is 300. The number of multiples of 2 between 1 and 300 is:</p>



$$\frac{300}{2} = 150$$

So, there are 150 numbers divisible by 2.

The numbers divisible by 5 are those where the last digit is 0 or 5. The first multiple of 5 is 5, and the last multiple of 5 is 300. The number of multiples of 5 between 1 and 300 is:

$$\frac{300}{5} = 60$$

So, there are 60 numbers divisible by 5.

The numbers divisible by both 2 and 5 are the multiples of 10. The first multiple of 10 is 10, and the last multiple of 10 is 300. The number of multiples of 10 between 1 and 300 is:

$$\frac{300}{10} = 30$$

So, there are 30 numbers divisible by 10.

Using the inclusion-exclusion principle, the number of integers divisible by 2 or 5 is:

Divisible by 2 or 5 = (Divisible by 2) + (Divisible by 5) – (Divisible by both 2 and 5)

$$\text{Divisible by 2 or 5} = 150 + 60 - 30 = 180$$

The number of integers that are not divisible by 2 or 5, and thus are relatively prime to 20, is:

Relatively prime to 20 = Total numbers – Divisible by 2 or 5

$$\text{Relatively prime to 20} = 300 - 180 = 120$$



Question ID	17
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Algebra (Inequalities)
Question Details/Question Stem	<p>Solve the inequality:</p> $\log_2(x-4) > \log_4(x-2)$ <p>Find the interval for which the inequality holds.</p>
Choices/Choice A	$(-\infty, 6)$
Choices/Choice B	$(12, \infty)$
Choices/Choice C	$(6, \infty)$
Choices/Choice D	$(3, 6)$
Solution	C
Explanation	<p>We need to solve the inequality:</p> $\log_2(x-4) > \log_4(x-2)$ <p>First, express both logarithms in terms of base 2. Recall that:</p> $\log_4 y = \frac{\log_2 y}{\log_2 4} = \frac{\log_2 y}{2}$ <p>So, the inequality becomes:</p> $\log_2(x-4) > \frac{\log_2(x-2)}{2}$ <p>Multiply both sides of the inequality by 2 to eliminate the fraction:</p> $2 \log_2(x-4) > \log_2(x-2)$ <p>Using the property:</p> $a \log_b(y) = \log_b(y^a)$ <p>So, we can rewrite the left side using the above property:</p>



$$\log_2(x-4)^2 > \log_2(x-2)$$

Since the logarithmic function is increasing, we can remove the logarithms and compare the arguments:

$$(x-4)^2 > (x-2)$$

Expand the left side:

$$(x-4)^2 > (x-2)$$

$$x^2 + 16 - 8x > x - 2$$

Move all terms to one side:

$$x^2 + 16 - 8x > x - 2$$

$$x^2 + 16 - 8x - x + 2 > 0$$

$$x^2 - 9x + 18 > 0$$

Solve the quadratic equation using the quadratic formula

$$x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(1)(18)}}{2(1)}$$

$$x = \frac{9 \pm \sqrt{81 - 72}}{2}$$

$$x = \frac{9 \pm 3}{2}$$

$$x = 6, 3$$

The quadratic inequality is true when $x > 3$ or $x > 6$. Since it opens upwards.

But, we also have domain restrictions based on the logarithms. The expressions $\log_2(x-4)$ and $\log_2(x-2)$ are only valid when $x > 4$. So, the solution must be restricted to $x > 4$.

Thus, the solution interval is:

$$x > 6$$



	The inequality holds for the interval $(6, \infty)$.

Question ID	18
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Algebra (Polynomials)
Question Details/Question Stem	A polynomial $r(x)$ when divided by $(x-1), (x+2), (x-3)$ yield the remainders $3, -2, 5$ respectively. What will be the remainder when the polynomial is divided by $x^3 - x^2 - x + 2$?
Choices/Choice A	$-\frac{2}{15}x^2 + \frac{23}{15}x + \frac{8}{5}$
Choices/Choice B	$\frac{2}{15}x^2 - \frac{17}{15}x + \frac{8}{5}$
Choices/Choice C	$-\frac{2}{15}x^2 - \frac{32}{15}x + \frac{8}{5}$
Choices/Choice D	$\frac{2}{15}x^2 + \frac{23}{15}x - \frac{14}{5}$
Solution	A
Explanation	<p>We are given the polynomial $r(x)$ and the following information: When $r(x)$ is divided by $(x-1)$, the remainder is 3 When $r(x)$ is divided by $(x+2)$, the remainder is -2. When $r(x)$ is divided by $(x-3)$, the remainder is 5.</p> <p>We are asked to find the remainder when $r(x)$ is divided by $x^3 - x^2 - x + 2$</p> <p>By the Remainder Theorem, when a polynomial $r(x)$ is divided by $(x-a)$, the remainder is $r(a)$.</p> <p>Therefore, we know</p> $r(1) = 3$ $r(-2) = -2$ $r(3) = 5$



Since the divisor is $x^3 - x^2 - x + 2$ which is a cubic polynomial, the remainder when dividing by $x^3 - x^2 - x + 2$ must be a polynomial of degree less than 3, i.e., a quadratic polynomial.

So, the remainder can be written as $r(x) = ax^2 + bx + c$

Where a, b and c are constants.

Now, we use the known values of $r(1)$, $r(-2)$ and $r(3)$ to form a system of equations.

$$a(1)^2 + b(1) + c = 3$$

$$a + b + c = 3$$

For $r(-2) = -2$

$$a(-2)^2 + b(-2) + c = -2$$

$$4a - 2b + c = -2$$

For $r(3) = 5$

$$a(3)^2 + b(3) + c = 5$$

$$9a + 3b + c = 5$$

We now solve the system of equations:

$$a + b + c = 3$$

$$4a - 2b + c = -2$$

$$9a + 3b + c = 5$$

From equation 1, we have

$$c = 3 - a - b$$

Substitute c into (2) and (3):

$$4a - 2b + (3 - a - b) = -2$$

$$4a - 2b + 3 - a - b = -2$$

$$3a - 3b = -5$$

$$a - b = \frac{-5}{3} \dots\dots\dots(A)$$

And



$$9a + 3b + (3 - a - b) = 5$$

$$9a + 3b + 3 - a - b = 5$$

$$8a + 2b = 2$$

$$4a + b = 1 \dots\dots\dots(B)$$

Add equation (A) and (B)

$$5400 - 1800 = 3600$$

Now, substitute the value of 'a' in equation (A):

$$a - b = \frac{-5}{3}$$

$$\frac{-2}{15} - b = \frac{-5}{3}$$

$$-b = \frac{-5}{3} + \frac{2}{15}$$

$$-b = \frac{-25 + 2}{15}$$

$$b = \frac{23}{15}$$

Now, we will find the value of 'c' by plugging the value of a and b:

$$c = 3 - \left(\frac{-2}{15}\right) - \frac{23}{15}$$

$$c = 3 + \frac{2}{15} - \frac{23}{15}$$

$$c = \frac{45 + 2 - 23}{15}$$

$$c = \frac{24}{15}$$

$$c = \frac{8}{5}$$

Thus, the remainder when $r(x)$ is divided by $x^3 - x^2 - x + 2$ is

$$-\frac{2}{15}x^2 + \frac{23}{15}x + \frac{8}{5}$$



Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Polynomials
Question Details/Question Stem	The polynomial $q(x) = 2x^2 - 5x + 3$ has zeros at p and q where $p < q$. What is the minimum value of the expression $3x^2 + px + q$?
Choices/Choice A	$\frac{13}{12}$
Choices/Choice B	$\frac{17}{15}$
Choices/Choice C	$\frac{17}{12}$
Choices/Choice D	$\frac{11}{12}$
Solution	C
Explanation	<p>Consider the expression $q(x) = 2x^2 - 5x + 3$.</p> <p>We use the quadratic formula to find the roots of the polynomial $q(x) = 2x^2 - 5x + 3$.</p> <p>The quadratic formula is given by:</p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ <p>For the given polynomial, we have $a = 2, b = -5, c = 3$</p> <p>Now, applying the quadratic formula:</p>



$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(3)}}{2(2)}$$

$$x = \frac{5 \pm \sqrt{25 - 24}}{4}$$

$$x = \frac{5 \pm 1}{4}$$

$$x = \frac{3}{2}, 1$$

So, the roots are $p = 1, q = \frac{3}{2}$.

Now we want to find the minimum value of the expression

$$3x^2 + px + q \quad \text{which is} \quad 3x^2 + px + q = 3x^2 + x + \frac{3}{2}$$

Since this is a quadratic expression in terms of x , it represents a parabola. To find the maximum or minimum value, we need to determine the vertex of this parabola.

The vertex of a parabola $ax^2 + bx + c = 0$ is $x = -\frac{b}{2a}$.

Here, $a = 3, b = 1$

Thus, the vertex occurs at

$$x = -\frac{1}{2(3)}$$

$$x = -\frac{1}{6}$$

Now, substitute $x = -\frac{1}{6}$ into the expression :

$$\begin{aligned} 3\left(\frac{-1}{6}\right)^2 + \left(\frac{-1}{6}\right) + \frac{3}{2} &= \frac{3}{36} - \frac{1}{6} + \frac{3}{2} \\ &= \frac{3 - 6 + 54}{36} \\ &= \frac{51}{36} \\ &= \frac{17}{12} \end{aligned}$$



Thus, the minimum value of the expression $3x^2 + px + q$ is $\frac{17}{12}$.



Question ID	20
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Polynomials (Quadratic function)
Question Details/Question Stem	<p>If for 2 real numbers x, y, $6x - y = 1$, then the maximum possible</p> $\frac{1}{\frac{1}{6x} - \frac{1}{y}}$ <p>value of $\frac{1}{\frac{1}{6x} - \frac{1}{y}}$ is:</p>
Choices/Choice A	0.25
Choices/Choice B	-0.50
Choices/Choice C	1
Choices/Choice D	-1.5
Solution	A
Explanation	<p>The expression can be rewritten as</p> $\begin{aligned}\frac{1}{\frac{1}{6x} - \frac{1}{y}} &= \frac{1}{\frac{y - 6x}{6xy}} \\ &= \frac{6xy}{y - 6x} \\ &= \frac{6xy}{-(6x - y)} \\ &= -\frac{6xy}{6x - y}\end{aligned}$ <p>Since $6x - y = 1$,</p>



$$\frac{1}{\frac{1}{6x} - \frac{1}{y}} = -\frac{6xy}{1}$$
$$= -6xy$$

The expression $6x - y = 1$ can be rewritten as

$$6x - 1 = y$$

Then,

$$\frac{1}{\frac{1}{6x} - \frac{1}{y}} = -6x(6x - 1)$$
$$= -36x^2 + 6x$$

This is a quadratic equation.

The leading coefficient of the quadratic equation is -36.

It is less than 0. So, the parabola is open downwards.

The maximum value of the parabola occurs at the vertex.

The vertex of the parabola occurs at

$$x = \frac{-6}{2(-36)}$$
$$= \frac{1}{12}$$

The maximum value of the expression is

$$-36\left(\frac{1}{12}\right)^2 + 6\left(\frac{1}{12}\right) = -36\left(\frac{1}{144}\right) + \frac{1}{2}$$
$$= -\frac{1}{4} + \frac{1}{2}$$
$$= \frac{-1+2}{4}$$
$$= \frac{1}{4}$$



	Thus, the maximum value is 0.25 .
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Question ID	21
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	HCF and LCM
Question Details/Question Stem	There are 525 boxes of candies, 315 boxes of cookies, and 420 boxes of chocolates in a warehouse. The warehouse wants to package them so that there are an equal number of boxes of chocolates, cookies, and sweets in each package. What is the largest number of identical packages they can make?
Choices/Choice A	525
Choices/Choice B	210
Choices/Choice C	140
Choices/Choice D	105
Solution	D
Explanation	<p>We are asked to find the largest number of identical packages, which is equivalent to finding the HCF of 420, 315, and 525.</p> <p>Prime factorization of 420, 315, and 525 are:</p> $420 = 2^2 \times 3 \times 5 \times 7$ $315 = 3^2 \times 5 \times 7$ $525 = 3 \times 5^2 \times 7$ <p>Now, we will find the HCF of the 420, 315 and 525.</p> <p>HCF = Product of the lowest powers of common prime factors:</p> $\text{HCF}(420, 315, 525) = 3 \times 5 \times 7 = 105$ <p>Thus, the largest number of identical packages they can make is 105.</p>

Question ID	22
Question Type	MCQ-SC
Difficulty Level	Easy

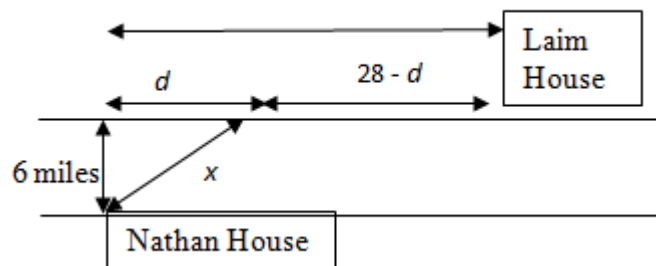


Topic: Subtopic (concept)	Sequence and Series
Question Details/Question Stem	An arithmetic progression (A.P.) consists only of non-negative integers. The sum of the first 5 terms in the A.P. is 50. The first term of the A.P. is 2. The sum of the first n terms in the A.P. is 512. Find the value of n .
Choices/Choice A	21
Choices/Choice B	15
Choices/Choice C	16
Choices/Choice D	23
Solution	C
Explanation	<p>Let the first term of the A.P. be 'a' and the common difference be d.</p> <p>The formula for the sum of the first n terms of an A.P. is:</p> $S_n = \frac{n}{2} [2a + (n-1)d]$ <p>We are given that the sum of the first 5 terms is 50. Using the formula for the sum of the first 5 terms:</p> $S_5 = \frac{5}{2} [2a + (5-1)d]$ $50 = \frac{5}{2} [2a + 4d]$ $10 = a + 2d$ <p>Substitute $a = 2$ in the above equation:</p> $10 = 2 + 2d$ $10 - 2 = 2d$ $8 = 2d$ $d = 4$ <p>We have also given, the sum of the first n terms in the A.P. is 512.</p>



	$S_n = \frac{n}{2}[2a + (n-1)d]$ $512 = \frac{n}{2}[2(2) + (n-1)4]$ $512 = \frac{n}{2}[4 + 4n - 4]$ $512 = \frac{n}{2}(4n)$ <p>Solving further, we have</p> $n^2 = 256$ $n = 16$ <p>Thus, the value of n is 16.</p>
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Question ID	23
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Speed, Inequalities, Quadratic equations
Question Details/Question Stem	<p>Nathan owns a model airplane that he decides to sell to Liam. The model airplane costs Nathan \$60, and he plans to sell it for \$150. Between Nathan's house and Liam's house is a 6-mile-wide river. Liam's house is located 28 miles downstream on the opposite side of the river. To deliver the model airplane, Nathan must cross the river using a boat and then drive the remaining distance in a car. The boat charges \$0.6 per mile and travels at a speed of 12 miles per hour. The car charges \$1.2 per mile and travels at a speed of 25 miles per hour. Liam requires Nathan to deliver the airplane by 7:00 p.m., and for every hour Nathan is late, Liam will reduce the payment by \$5. Nathan begins his journey at 4:30 p.m.</p> <p>How many miles should Nathan travel by boat to maximize his profit? Round to the nearest whole number</p>
Choices/Choice A	30 miles
Choices/Choice B	28 miles
Choices/Choice C	32 miles
Choices/Choice D	31 miles
Solution	D
Explanation	Let x represent the distance Nathan travels by boat (in miles).



Since the river is 6 miles wide, the boat travel distance forms the hypotenuse of a right triangle, where the width of the river is one leg of the triangle. Let d be the distance of the other leg.

By using the Pythagorean theorem,

$$d^2 + 6^2 = x^2$$

$$d^2 + 36 = x^2$$

$$d^2 = x^2 - 36$$

$$d = \sqrt{x^2 - 36}$$

Boat speed is 12 miles per hour.

So, the time = $\frac{x}{12}$

Car speed is 25 miles per hour.

Thus, the time = $\frac{28 - \sqrt{x^2 - 36}}{25}$

Therefore, the total time =

$$\text{Total Time} = \frac{x}{12} + \frac{28 - \sqrt{x^2 - 36}}{25}$$

Nathan must deliver the airplane by 7:00 p.m. He starts at 4:30 p.m., giving him 2.5 hours to complete the trip.

$$\frac{x}{12} + \frac{28 - \sqrt{x^2 - 36}}{25} \leq 2.5$$

Multiply through by the least common denominator, 300



$$\frac{x}{12} \times 300 + \frac{28 - \sqrt{x^2 - 36}}{25} \times 300 = 2.5 \times 300$$

$$25x + 12(28 - \sqrt{x^2 - 36}) = 750$$

$$25x + 336 - 12\sqrt{x^2 - 36} = 750$$

$$25x + 336 - 750 - 12\sqrt{x^2 - 36} = 0$$

$$25x - 414 = 12\sqrt{x^2 - 36}$$

Squaring on both sides,

$$(25x - 414)^2 = (12\sqrt{x^2 - 36})^2$$

$$625x^2 + 1,71,396 - 20,700x = 144(x^2 - 36)$$

$$625x^2 + 1,71,396 - 20,700x = 144x^2 - 5,184$$

$$481x^2 - 20,700x + 176,580 = 0$$

On solving the above equation $x = 31.310526$

Since travelling by boat reduces the total cost of travelling, Richard needs to travel by boat as long as possible and be on time.

So, we need to maximize x with the time constraint.

Thus, the number of miles traveled by boat is 31 miles.

Question ID	24
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Ratio, Profit and loss
Question Details/Question Stem	Ravi buys some bicycles and tricycles from a dealer. The bicycle costs \$320, and the tricycle costs \$420 each. He spends \$150 for polishing one bicycle and one tricycle. The cost ratio of polishing one bicycle and one tricycle is 2:3. He also bought tires costing \$110 each. There are 120 vehicles and 350 tires. A customer buys one bicycle and one tricycle from Ravi for a total of \$2,200. If the profit



	ratio of selling a bicycle and a tricycle is 2:3, what is the total profit Ravi earned?
Choices/Choice A	33,500
Choices/Choice B	35,500
Choices/Choice C	45,500
Choices/Choice D	48,500
Solution	C
Explanation	<p>Cost of one bicycle = \$320 Cost of one tricycle = \$420 Cost for tires = \$110 Cost for polishing one bicycle and one tricycle = \$150 Cost ratio of polishing one bicycle to one tricycle = 2:3 Total vehicles = 120 Total tires = 350 Customer buys one bicycle and one tricycle from Ravi for a total of \$2,200 Profit ratio of selling a bicycle to a tricycle = 2:3</p> <p>Let x represent the bicycles and y represent the tricycles.</p> <p>Then</p> $x + y = 120$ $y = 120 - x$ <p>And,</p> $2x + 3y = 350$ $2x + 3(120 - x) = 350$ $2x + 360 - 3x = 350$ $x = 10$ <p>Substitute in above equation.</p> $y = 120 - 10$ $= 110$ <p>So, number of bicycles is 10 and number of tricycles is 110.</p> <p>The cost of wheels for one bicycle and one tricycle is</p> $(2 + 3) \times 110 = 660$



The cost of one bicycle and one tricycle is

$$320 + 420 + 150 + 660 = 1,550$$

The profit in selling one bicycle and one tricycle is

$$2200 - 1550 = 650$$

Let m be the proportionality constant for the profit ratio.

Then,

$$2m + 3m = 650$$

$$5m = 650$$

$$m = \frac{650}{5}$$

$$m = 130$$

The profit for selling one bicycle is

$$2 \times 130 = 260$$

The profit for selling one tricycle is

$$3 \times 130 = 390$$

The total profit is

$$\begin{aligned} 260x + 390y &= 260(10) + 390(110) \\ &= 2600 + 42900 \\ &= 45500 \end{aligned}$$

Thus, the total profit Ravi earned is \$45500

Question ID	25
Question Type	MCQ-SC
Difficulty Level	Medium



Topic: Subtopic (concept)	Algebra (Inequalities)
Question Details/Question Stem	The inequality $\frac{x^2 + 5x - 6}{x^3 - 4x^2 - 7x + 10} > 0$ is true in the interval(s)
Choices/Choice A	$(-\infty, -6)(6, \infty)$
Choices/Choice B	$(5, \infty)$
Choices/Choice C	$(-6, -2) \cup (5, \infty)$
Choices/Choice D	$(-6, -2) \cup (-2, 5)$
Solution	C
Explanation	<p>The expression $x^2 + 5x - 6$ can be rewritten as</p> $\begin{aligned}x^2 + 5x - 6 &= x^2 - x + 6x - 6 \\&= x(x-1) + 6(x-1) \\&= (x-1)(x+6)\end{aligned}$ <p>So, the numerator is zero at $x = -6, x = 1$.</p> <p>Consider the expression $x^3 - 4x^2 - 7x + 10$.</p> <p>Check if $x = 1$ is a root.</p> $\begin{aligned}(1)^3 - 4(1)^2 - 7(1) + 10 &= 1 - 4 - 7 + 10 \\&= 0\end{aligned}$ <p>Since the expression becomes 0, $x = 1$ is a root.</p> <p>The expression $x^3 - 4x^2 - 7x + 10$ can be rewritten as</p> $x^3 - 4x^2 - 7x + 10 = (x-1)(x^2 - 3x - 10)$ <p>Factoring further,</p>



$$\begin{aligned}x^3 - 4x^2 - 7x + 10 &= (x-1)(x^2 - 3x - 10) \\ &= (x-1)(x^2 - 5x + 2x - 10) \\ &= (x-1)[x(x-5) + 2(x-5)] \\ &= (x-1)(x-5)(x+2)\end{aligned}$$

The given expression becomes,

$$\begin{aligned}\frac{x^2 + 5x - 6}{x^3 - 4x^2 - 7x + 10} &= \frac{(x-1)(x+6)}{(x-1)(x-5)(x+2)} \\ &= \frac{(x+6)}{(x-5)(x+2)}\end{aligned}$$

The critical points are -6, 5 and -2.

Divide the number line into intervals based on the critical points:

$$(-\infty, -6), (-6, -2), (-2, 5), (5, \infty)$$

Test the sign of the expression in each interval.

Consider the point -7 in the first interval.

$$\begin{aligned}\frac{(x+6)}{(x-5)(x+2)} &= \frac{(-7+6)}{(-7-5)(-7+2)} \\ &= \frac{-1}{(-12)(-5)} \\ &< 0\end{aligned}$$

Consider the point -3 in the second interval.

$$\begin{aligned}\frac{(x+6)}{(x-5)(x+2)} &= \frac{(-3+6)}{(-3-5)(-3+2)} \\ &= \frac{3}{(-8)(-1)} \\ &> 0\end{aligned}$$

Consider the point -1 in the third interval



	$\frac{(x+6)}{(x-5)(x+2)} = \frac{(-1+6)}{(-1-5)(-1+2)}$ $= \frac{5}{(-6)(1)}$ < 0 <p>Consider the point 6 in the fourth interval</p> $\frac{(x+6)}{(x-5)(x+2)} = \frac{(6+6)}{(6-5)(6+2)}$ $= \frac{12}{(1)(8)}$ > 0 <p>The inequality is true where the overall sign is positive. This occurs in the intervals</p> $(-6, -2) \cup (5, \infty)$
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Question ID	26
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	LCM and HCF
Question Details/Question Stem	<p>A textile merchant named Vimal keeps rolls of cloth in a large warehouse in a town. The warehouse's length, width, and height are all in the ratio 5:4:3. The warehouse floor needs to be tiled, and</p> <p>Vimal intends to use the square tiles of the $\frac{1}{100}$th of the largest possible size. The warehouse can accommodate 30,720 rolls of cloth, each of which takes up a volume of 8000 ft³. How many of these tiles will he need to cover the warehouse floor?</p>
Choices/Choice A	160,000
Choices/Choice B	200,000
Choices/Choice C	230,000
Choices/Choice D	280,000
Solution	B
Explanation	It is given that the dimensions of warehouse are in the ratio of 5:4:3.



Let the dimensions of cold storage be $5x$, $4x$ and $3x$.

First, determine the volume of the warehouse.

$$\begin{aligned}V &= 5x \times 4x \times 3x \\ &= 60x^3 \quad \dots\dots (1)\end{aligned}$$

Now, the volume of each roll of cloth.

$$V' = 8000 \text{ ft}^3$$

The warehouse can accommodate 30,720 such rolls.

If n be the number of rolls, the volume of all rolls is:

$$\begin{aligned}&: 30720 \times 8000 \text{ ft}^3 \\ = &: 245760000 \text{ ft}^3 \quad \dots\dots (2)\end{aligned}$$

The volume of the warehouse will be equal to the total volume of all rolls. So, we have:

$$\begin{aligned}60x^3 &= 245760000 \text{ ft}^3 \\ x^3 &= 4096000 \text{ ft}^3\end{aligned}$$

$$\begin{aligned}x &= \sqrt[3]{(4096000)} \text{ft} \\ &= 160 \text{ft}\end{aligned}$$

So, the dimensions of the warehouse are:

$$\text{Length} = 5x = 5 \times 160 = 800 \text{ ft}$$

$$\text{Width} = 4x = 4 \times 160 = 640 \text{ ft}$$

$$\text{Height} = 3x = 3 \times 160 = 480 \text{ ft}$$

The side length of the square tiles will be the highest common factor (HCF) of these dimensions. So,

$$\text{HCF}(800, 640, 480) = 160$$

So, the side length of each tile is:

$$\text{Side length} = \frac{1}{100} \times 160 \text{ ft} = 1.60 \text{ ft}$$



	<p>The area of each tile is:</p> $\begin{aligned}\text{Area of each tile} &= 1.60 \times 1.60 \\ &= 2.56 \text{ ft}^2\end{aligned}$ <p>Area of the floor of warehouse is:</p> $\begin{aligned}\text{Area of floor} &= 800 \times 640 \\ &= 512000 \text{ ft}^2\end{aligned}$ <p>Now, the number of tiles needed to cover the warehouse floor is:</p> $\begin{aligned}N &= \frac{512000}{2.56} \\ &= 200000\end{aligned}$ <p>Thus, Vimal needs 20,0000 tiles to cover the warehouse floor.</p>
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Question ID	27
Question Type	MCO-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Linear Equations: Work and Time Problems
Question Details/Question Stem	<p>Sophia runs a dessert shop where she sells mini, regular, and deluxe pies, muffins, and brownies. The production cost and selling prices are as follows: mini pies cost \$30 to make and are sold for \$80, regular pies cost \$45 to make and are sold for \$120, and deluxe pies cost \$65 to make and are sold for \$180. Muffins cost \$15 per dozen to make and are sold for \$40 per dozen, while brownies cost \$20 per dozen to make and are sold for \$35 per dozen. For deliveries, Sophia incurs a scooter rental fee of \$10 per order and a fuel cost of \$1 per kilometer, with each delivery covering an average distance of 5 km. The selling ratio of mini, regular, and deluxe pies is 3:5:2. The ratio of muffins sold to brownies sold is 2:3. Pies make up 50% of the total 500 orders, and the remaining orders are split between muffins and brownies according to the given ratio. The total distance covered for deliveries is 2500 km.</p> <p>If the scooter rental fee increases by \$5 and the average delivery distance increases by 2 km, what is the difference in the profits?</p>



Choices/Choice A	\$3200
Choices/Choice B	\$3500
Choices/Choice C	\$3100
Choices/Choice D	\$3450
Solution	B
Explanation	<p>We have given: The production cost and selling prices are as follows: mini pies cost \$30 to make and are sold for \$80, regular pies cost \$45 to make and are sold for \$120, deluxe pies cost \$65 to make and are sold for \$180. Muffins cost \$15 per dozen to make and are sold for \$40 per dozen, Brownies cost \$20 per dozen to make and are sold for \$35 per dozen. Total Orders: 500 Total Distance Covered: 2500 km</p> <p>40% of the total order is</p> $\frac{50}{100} \times 500 = 250$ <p>The remaining is</p> $500 - 250 = 250$ <p>So, there are 250 pies orders and 250 Muffins and Brownies.</p> <p>The ratio of muffins sold to brownies sold is 2:3 Let k be the proportionality constant.</p> $m = 2k$ $b = 3k$ $m + b = 250$ <p>Plugging in the values of m and b,</p> $2k + 3k = 250$ $5k = 250$ $k = \frac{250}{5}$ $k = 50$ <p>So, we have</p>



$$m = 2 \times 50$$

$$= 100$$

$$b = 3 \times 50$$

$$= 150$$

The profit from each dozen of muffins is

$$40 - 12 = 28$$

Since there are 150 muffins orders, there are $\frac{150}{12} = 12.5$ dozen orders.

$$\text{The profit is } 12.5 \times 28 = 350$$

The profit from each dozen of brownies is

$$35 - 12 = 13$$

Since there are 150 brownies orders, there are $\frac{150}{12} = 12.5$ dozen orders.

$$\text{The profit is } 12.5 \times 13 = 162.5$$

The selling ratio of mini, regular, and deluxe pies is 3:5:2 and the number of cake orders is 250,

Let “n” be the proportionality constant.

Then, we have

$$3n + 5n + 2n = 250$$

$$10n = 250$$

$$n = 25$$

The number of pies sold is

mini:75

regular:125

deluxe:50

The profit earned by selling each of the pies is

$$\text{Mini} = 80 - 30 = 50$$



$$\text{Regular} = 120 - 45 = 75$$

$$\text{Deluxe} = 180 - 65 = 115$$

And

$$\text{Mini} : 50 \times 75 = 3750$$

$$\text{regular} : 75 \times 125 = 9375$$

$$\text{deluxe} : 115 \times 50 = 5750$$

The profit without delivery costs is

$$\$11,987.5 - \$8487.5 = \$3,500$$

Scooter Rental Fee per Order: \$10

Petrol Cost per kilometre: \$1

Average Delivery Distance: 5 km

The old delivery cost per order is

$$10 + 1(5) = 10 + 5 \\ = 15$$

The total delivery cost is

$$500 \times 15 = 7500$$

The old profit is

$$\$19,487.5 - \$7500 = \$11,987.5$$

The new delivery cost per order is

$$15 + 1(7) = 15 + 7 \\ = 22$$

The total new delivery cost is

$$500 \times 22 = 11,000$$

The new profit is

$$\$19,487.5 - \$11000 = \$8,487.5$$



	The difference in the profit is $\$11,987.5 - \$8487.5 = \$3,500$
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Question ID	28
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Profit and Loss
Question Details/Question Stem	A profit made by selling an article for ₹2,400 is equal to the loss incurred when the same article is sold for ₹1,600. What should be the selling price of the article if the profit is 20%?
Choices/Choice A	₹1670
Choices/Choice B	₹2000
Choices/Choice C	₹2400
Choices/Choice D	₹2200
Solution	C
Explanation	<p>The problem states that the profit when the article is sold for ₹2,400 is equal to the loss when the article is sold for ₹1,600. Let the cost price (CP) of the article be x</p> <p>Profit = $2400 - x$ Loss = $x - 1600$</p> <p>Set up the equation based on the given condition that profit = loss</p> $2400 - x = x - 1600$ $2400 + 1600 = x + x$ $4000 = 2x$ $x = 2000$ <p>So, the cost price of the article is ₹2000.</p> <p>Selling price = $x + 0.20x$ $= 1.20x$ $= 1.20 \times 2000$ $= 2,400$</p>



	The selling price of the article when the profit is 20% should be ₹2400.
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Question ID	29
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Word Problems on Ratios
Question Details/Question Stem	The ratio of two numbers is $7:5$. The ratio becomes $3:2$ if each number is subtracted by 4. Find the larger number.
Choices/Choice A	20
Choices/Choice B	28
Choices/Choice C	35
Choices/Choice D	42
Solution	B
Explanation	<p>Let the two numbers be $7x$ and $5x$, where x is the common factor.</p> <p>When 4 is subtracted from each number, the ratio becomes $3:2$.</p> $\frac{7x-4}{5x-4} = \frac{3}{2}$ <p>Cross multiplying and solving for x.</p> $2(7x-4) = 3(5x-4)$ $14x-8 = 15x-12$ $15x-14 = 12-8$ $x = 4$ <p>The larger number is $7x$,</p> $7x = 7 \times 4 = 28$ <p>Thus, the larger number is 28.</p>



Question ID	30
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Probability
Question Details/Question Stem	In a game show, there are two boxes: one red and one blue. The Red Box contains 5 red balls and 7 blue balls, while the Blue Box contains 4 red balls and 6 blue balls. A box is randomly chosen, and a ball is drawn from that box. The ball drawn is red. What is the probability that the ball came from the Red Box, given that it is red?
Choices/Choice A	$\frac{49}{120}$
Choices/Choice B	$\frac{5}{49}$
Choices/Choice C	$\frac{5}{24}$
Choices/Choice D	$\frac{25}{49}$
Solution	D
Explanation	<p>Let R represent choosing the Red Box, B represent choosing the Blue Box and E represent drawing a red ball.</p> <p>We want to find $P(R E)$, the probability the ball came from the Red Box given that it is red.</p> <p>The Bayes' Theorem is given by:</p> $P\left(\frac{R}{E}\right) = \frac{P\left(\frac{E}{R}\right) \times P(R)}{P(E)}$ <p>Since the box is chosen at random:</p> $P(R) = P(B) = \frac{1}{2}$ <p>From the Red Box: There are 5 red balls out of 12 total balls.</p> $P\left(\frac{E}{R}\right) = \frac{5}{12}$



From the Blue Box: There are 4 red balls out of 10 total balls.

$$P(E/B) = \frac{4}{10} = \frac{2}{5}$$

Using the law of total probability:

$$\begin{aligned} P(E) &= P(E/R)P(R) \left(\frac{5}{12} \times \frac{1}{2} \right) + P(E/B)P(B) \\ &= \left(\frac{5}{12} \times \frac{1}{2} \right) + \left(\frac{2}{5} \times \frac{1}{2} \right) \\ &= \left(\frac{5}{24} \right) + \left(\frac{1}{5} \right) \\ &= \frac{25 + 24}{120} \\ &= \frac{49}{120} \end{aligned}$$

Now substitute into Bayes' Theorem:

$$\begin{aligned} P(R/E) &= \frac{\left(\frac{5}{12} \times \frac{1}{2} \right)}{\frac{49}{120}} \\ &= \frac{\left(\frac{5}{24} \right)}{\frac{49}{120}} \\ &= \frac{25}{49} \end{aligned}$$

The probability that the red ball came from the Red Box is $\frac{25}{49}$



Section - 3 General Aptitude

Question ID	31
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	<p>Five friends—Ava, Liam, Emily, Sophie, and Noah—are ranked by age. The oldest is 1, the second oldest is 2, and so on until the youngest, who is 5.</p> <p>When you add Liam and Sophie's ranks, the total equals Emily and Noah's ranks added together.</p> <p>Emily is not the oldest, and Noah is not the youngest.</p> <p>Liam is younger than Ava, and Sophie is younger than Emily.</p> <p>Which of the following statements about Liam and Sophie is true?</p>
Choices/Choice A	Liam is older than Sophie.
Choices/Choice B	Sophie is older than Liam.
Choices/Choice C	Liam and Sophie are the same age.
Choices/Choice D	Not enough information to determine.
Solution	A



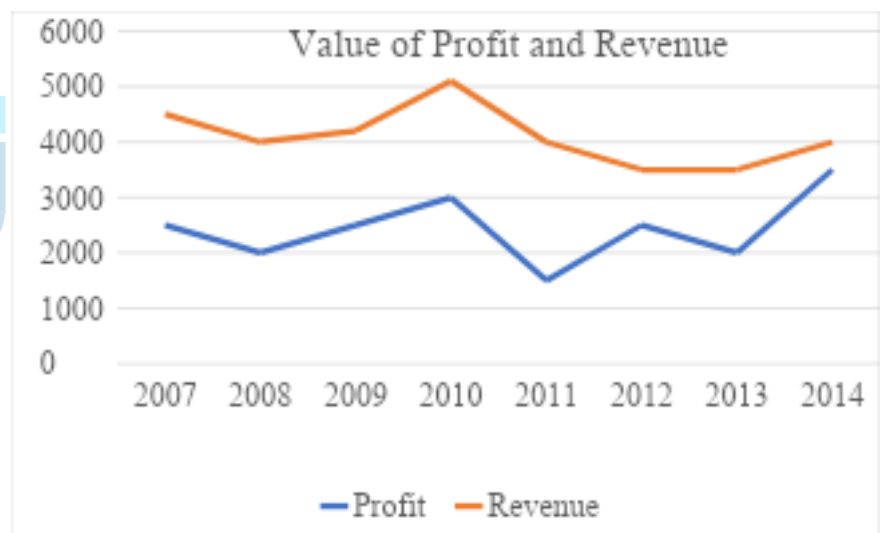
Explanation	<p>Clues Recap:</p> <p>Clue 1: Liam's rank + Sophie's rank = Emily's rank + Noah's rank.</p> <p>Clue 2: Emily is not the oldest (not rank 1), and Noah is not the youngest (not rank 5).</p> <p>Clue 3: Liam is younger than Ava, and Sophie is younger than Emily.</p> <p>Order Constraints:</p> <p>Ava must be older than Liam (from Clue 3).</p> <p>Emily must be older than Sophie (from Clue 3).</p> <p>Noah is not the youngest, so someone else is rank 5.</p> <p>Logical Deductions:</p> <p>Since Emily is not rank 1 (Clue 2) and Sophie is younger than Emily, Emily cannot be rank 5 either.</p> <p>Noah is also not rank 5, which means Sophie is rank 5 (the youngest).</p> <p>Position Assignments:</p> <p>Ava is the oldest (rank 1), since Liam is younger than Ava.</p> <p>Sophie is the youngest (rank 5).</p> <p>Liam is somewhere in the middle, older than Sophie.</p> <p>Clue 1 Validation:</p> <p>If Liam is rank 3 and Sophie is rank 5, their sum is 8. This matches Emily and Noah's positions being rank 2 and rank 4 ($2 + 4 = 8$), satisfying Clue 1.</p> <p>Hence, Liam is older than Sophie.</p> <p>Hence, the correct option is option A.</p>
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Question ID	32
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation



Question Details/Question Stem

The given two-line graphs show the selling price per unit and the profit and revenue generated by that particular item in the years 2007-2014.



For the years 2007 through 2014, what was the average cost?

Choices/Choice A	Rs.1662.5
Choices/Choice B	Rs.1600.5
Choices/Choice C	Rs.1862.5
Choices/Choice D	Rs.1752.5
Solution	A
Explanation	The cost is found by subtracting profit from the revenue



Cost = Revenue - Profit

The cost in 2007 can be found as follows:

$$\begin{aligned}\text{Cost in 2007} &= \text{Rs.4500} - \text{Rs.2500} \\ &= \text{Rs.2000}\end{aligned}$$

The cost in 2008 can be found as follows:

$$\begin{aligned}\text{Cost in 2008} &= \text{Rs.4000} - \text{Rs.2000} \\ &= \text{Rs.2000}\end{aligned}$$

The cost in 2009 can be found as follows:

$$\begin{aligned}\text{Cost in 2009} &= \text{Rs.4200} - \text{Rs.2500} \\ &= \text{Rs.1700}\end{aligned}$$

The cost in 2010 can be found as follows:

$$\begin{aligned}\text{Cost in 2010} &= \text{Rs.5100} - \text{Rs.3000} \\ &= \text{Rs.2100}\end{aligned}$$

The cost in 2011 can be found as follows:

$$\begin{aligned}\text{Cost in 2011} &= \text{Rs.4000} - \text{Rs.1500} \\ &= \text{Rs.2500}\end{aligned}$$

The cost in 2012 can be found as follows:

$$\begin{aligned}\text{Cost in 2012} &= \text{Rs.3500} - \text{Rs.2500} \\ &= \text{Rs.1000}\end{aligned}$$

The cost in 2013 can be found as follows:

$$\begin{aligned}\text{Cost in 2013} &= \text{Rs.3500} - \text{Rs.2000} \\ &= \text{Rs.1500}\end{aligned}$$

The cost in 2014 can be found as follows:



	<p>Cost in 2014=Rs.4000-Rs.3500 =Rs.500</p> <p>The average can be found as follows:</p> $\text{Average} = \frac{\text{Rs.2000}+\text{Rs.2000}+\text{Rs.1700}+\text{Rs.2100}+\text{Rs.2500}+\text{Rs.1000}+\text{Rs.1500}+\text{Rs.500}}{8}$ <p>= Rs.1662.5</p> <p>Hence, the correct option is option A.</p>
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Question ID	33
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	<p>A group of ten people (P, Q, R, S, T, U, V, W, X, and Y) is to be selected for a project team, subject to the following conditions:</p> <ol style="list-style-type: none">1. Out of P, Q, and R, exactly two must be selected, but at least one of them must be selected from P and R.2. T cannot be selected unless S is also selected, and if S is selected, T must be selected immediately after S in the order of selection.3. V and X cannot be chosen together, and if V is selected, X must be in the last position in the team selection list.4. If W is included, U must also be included, and W must be selected at least two positions before U.5. If Y is selected, X cannot be included, but if Y is not selected, then T and R must both be included in the team.6. S cannot be selected unless Q is also selected, and if both S and Q are selected, then Q must be in the first position of the selection list.7. P cannot be selected if V is included, and if P is not selected, R must be selected in the team.8. The total number of people selected must be even, and the team should be selected in such a way that no more than 4 people are from the same group (Tech or Design). <p>What is the maximum possible size of the team, subject to these conditions?</p>
Choices/Choice A	6
Choices/Choice B	7
Choices/Choice C	8
Choices/Choice D	9



Solution	C
Explanation	<p>To approach this problem, we need to follow the conditions systematically while making sure all constraints are respected.</p> <p>Condition 1: Out of P, Q, and R, exactly two must be selected, but at least one of them must be selected from P and R. So, we can either choose P and Q, or P and R, or Q and R, but P and Q cannot both be excluded.</p> <p>Condition 2: T cannot be selected unless S is selected, and if S is selected, T must be immediately after S. This limits the possible positions for T and S. We also know that S cannot be selected unless Q is selected, which further restricts the team configuration.</p> <p>Condition 3: V and X cannot be selected together, and if V is selected, X must be in the last position. This helps us to determine the relative positions of V and X in the selection.</p> <p>Condition 4: If W is included, U must also be included, and W must be selected at least two positions before U. This constraint helps us control the relative positions of W and U.</p> <p>Condition 5: If Y is selected, X cannot be included. However, if Y is not selected, T and R must both be selected. So, if Y is selected, we have to avoid X, and if Y is not selected, T and R must be part of the team.</p> <p>Condition 6: If S and Q are both selected, Q must be in the first position of the selection list. This requires careful attention to the positioning of Q and S.</p> <p>Condition 7: P cannot be selected if V is included. If P is not selected, R must be selected. This forces us to make decisions about P and V that affect R.</p> <p>Condition 8: The total number of people selected must be even, which adds a final constraint on the number of selections. This condition means we can only have 6, 8, or 10 people selected for the team.</p> <p>By analysing all these conditions, we systematically determine that the maximum team size that satisfies all these constraints is 8.</p> <p>Hence, the correct option is option C.</p>

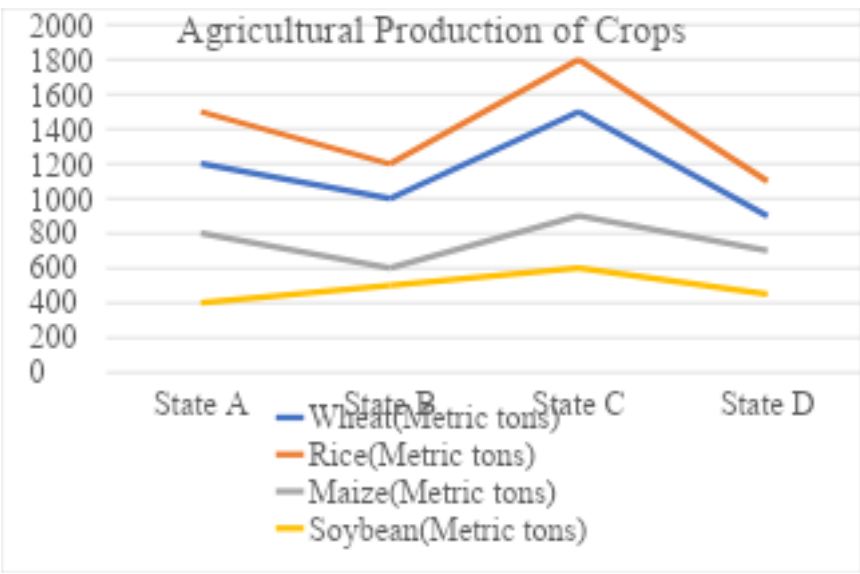
Question ID	34
Question Type	MCQ-SC
Difficulty Level	Easy



Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation														
Question Details/Question Stem	<p>The monthly sales distribution of various book genres at a local bookstore is illustrated in the following statistics. A bar graph depicts the number of books sold across six popular categories: Fiction, Non-Fiction, Mystery, Science Fiction, Romance, and Children's Books.</p> <div><table border="1"><caption>Different types of books sold</caption><thead><tr><th>Genre</th><th>Number of Books Sold</th></tr></thead><tbody><tr><td>Fiction</td><td>120</td></tr><tr><td>Non-fiction</td><td>80</td></tr><tr><td>Mystery</td><td>50</td></tr><tr><td>Science Fiction</td><td>30</td></tr><tr><td>Romance</td><td>70</td></tr><tr><td>Children's books</td><td>50</td></tr></tbody></table></div> <p>What is the probability that a customer will randomly select a book from the sold books at this bookstore, and that the book will be either a fiction or mystery book?</p>	Genre	Number of Books Sold	Fiction	120	Non-fiction	80	Mystery	50	Science Fiction	30	Romance	70	Children's books	50
Genre	Number of Books Sold														
Fiction	120														
Non-fiction	80														
Mystery	50														
Science Fiction	30														
Romance	70														
Children's books	50														
Choices/Choice A	0.335														
Choices/Choice B	0.5														
Choices/Choice C	0.35														
Choices/Choice D	0.425														
Solution	D														
Explanation	<p>Calculate the Total Number of Books Sold:</p> <p>Total number of books sold:</p> $120(\text{Fiction}) + 80(\text{Non-Fiction}) + 50(\text{Mystery}) + 30(\text{Science Fiction}) + 50(\text{Children's Books}) = 400$ <p>Calculate the Total Number of Fiction and Mystery Books Sold:</p> <p>Total number of Fiction and Mystery books sold:</p> $120(\text{Fiction}) + 50(\text{Mystery}) = 170$														



	<p>Calculate the Probability:</p> <p>The probability that the book selected is either Fiction or Mystery:</p> $\text{Probability} = \frac{\text{Number of Fiction and Mystery books}}{\text{Total number of books sold}}$ $= \frac{170}{400}$ $= \frac{17}{40}$ $= 0.425$ <p>Hence, the probability that the customer selects either a Fiction or a Mystery book is 0.425.</p> <p>Hence, the correct option is option D.</p>
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Question ID	35																									
Question Type	MCQ-SC																									
Difficulty Level	Easy																									
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation																									
Question Details/Question Stem	<p>The agricultural output of four major crops—Wheat, Rice, Maize, and Soybean—across four states (States A, B, C, and D) in a particular year is shown in the graph below. This data highlights the agricultural productivity and crop distribution in these states, providing insights into food production trends, regional agricultural strengths, and the impact of soil and climate on different crops.</p>  <table border="1"><caption>Agricultural Production of Crops (Metric tons)</caption><thead><tr><th>Crop</th><th>State A</th><th>State B</th><th>State C</th><th>State D</th></tr></thead><tbody><tr><td>Wheat</td><td>1200</td><td>1000</td><td>1500</td><td>900</td></tr><tr><td>Rice</td><td>1500</td><td>1200</td><td>1800</td><td>1100</td></tr><tr><td>Maize</td><td>800</td><td>600</td><td>900</td><td>700</td></tr><tr><td>Soybean</td><td>400</td><td>500</td><td>600</td><td>450</td></tr></tbody></table>	Crop	State A	State B	State C	State D	Wheat	1200	1000	1500	900	Rice	1500	1200	1800	1100	Maize	800	600	900	700	Soybean	400	500	600	450
Crop	State A	State B	State C	State D																						
Wheat	1200	1000	1500	900																						
Rice	1500	1200	1800	1100																						
Maize	800	600	900	700																						
Soybean	400	500	600	450																						



	What proportion of the total production (Wheat, Rice, Maize, and Soybean) across all four states is contributed by State C's maize?
Choices/Choice A	5.86%
Choices/Choice B	6.56%
Choices/Choice C	5.94%
Choices/Choice D	5.28%
Solution	C
Explanation	<p>First, calculate the total production across all states:</p> <p>Wheat: $1,200+1,000+1,500+900=4,600$ metric tons.</p> <p>Rice: $1,500+1,200+1,800+1,100=5,600$ metric tons.</p> <p>Maize: $800+600+900+700=3,000$ metric tons.</p> <p>Soybean: $400+500+600+450=1,950$ metric tons.</p> <p>Total Production:</p> $4,600+5,600+3,000+1,950=15,150$ metric tons <p>Maize Production in State C:</p> <p>Maize in State C=900 metric tons</p> <p>Percentage Contribution:</p> $\text{Percentage} = \frac{900}{15150} \times 100\%$ $\approx 5.94\%$ <p>Hence, the correct option is option C.</p>

Question ID	36
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation
Question Details/Question Stem	The data provided shows the monthly sales of different types of fertilizer over a certain period. It helps to understand the demand patterns for various fertilizers, allowing us to look at trends, seasonal changes, and overall market behaviour in the agricultural sector.



Month	Fertilizer A	Fertilizer B	Fertilizer C	Fertilizer D
January	40	35	50	45
February	55	45	60	50
March	65	50	70	55
April	50	40	55	60
May	75	60	65	70
June	80	70	75	65

What would be the estimated yearly sales for all fertilizers combined if the sales of all fertilizers combined in April accounted for 15% of the overall sales?

Choices/Choice A 1266.66 tons

Choices/Choice B 1366.66 tons

Choices/Choice C 1300 tons

Choices/Choice D 1350 tons

Solution

B

Explanation

First, the total sales for all fertilizers in April must be calculated.

From the data:

Sales of Fertilizer A in April: 50 tons

Sales of Fertilizer B in April: 40 tons

Sales of Fertilizer C in April: 55 tons

Sales of Fertilizer D in April: 60 tons

Now, sum these values to get the total sales in April:

$$\begin{aligned}\text{Total Sales in April} &= (50 + 40 + 55 + 60) \text{ tons} \\ &= 205 \text{ tons}\end{aligned}$$

The total sales in April represent 15% of the annual sales. We can express this relationship mathematically:

$$\text{Total Sales in April} = \frac{15}{100} \times \text{Annual sales}$$

The total sales in April is 205 tons, so we can set up the equation:

$$205 \text{ tons} = 0.15 \times \text{Annual Sales}$$



	<p>Annual sales can be found as follows:</p> $\text{Annual Sales} = 205/0.15$ $= 1366.66 \text{ tons}$ <p>Hence, the correct option is option B.</p>
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Newton School
of Technology

Question ID	37															
Question Type	MCQ-SC															
Difficulty Level	Medium															
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation															
Question Details/Question Stem	<p>The sales performance of four major technology companies—Apple, Lenovo, HP, and Asus—across three product categories: laptops, desktops, and printers, is analyzed using the data presented in the accompanying tables. The first table has the number of laptops and desktops sold by each company, highlighting their relative strengths in these sectors. Meanwhile, the second table displays the percentage of printer sales for each company.</p>															
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 33%;">Company</th> <th style="width: 33%;">No of Laptops</th> <th style="width: 33%;">No of Desktop</th> </tr> </thead> <tbody> <tr> <td>Apple</td> <td>245</td> <td>135</td> </tr> <tr> <td>Lenovo</td> <td>310</td> <td>225</td> </tr> <tr> <td>HP</td> <td>490</td> <td>250</td> </tr> <tr> <td>Asus</td> <td>345</td> <td>178</td> </tr> </tbody> </table>	Company	No of Laptops	No of Desktop	Apple	245	135	Lenovo	310	225	HP	490	250	Asus	345	178
	Company	No of Laptops	No of Desktop													
Apple	245	135														
Lenovo	310	225														
HP	490	250														
Asus	345	178														
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 40%;">Company</th> <th style="width: 60%;">Printers</th> </tr> </thead> <tbody> <tr> <td>Apple</td> <td>17%</td> </tr> <tr> <td>Lenovo</td> <td>18%</td> </tr> <tr> <td>HP</td> <td>26%</td> </tr> <tr> <td>Asus</td> <td>28%</td> </tr> </tbody> </table> <p>Calculate the percentage of sales that Asus contributed, assuming that 2,000 devices were sold by all four firms combined. Also find the difference between Asus and Lenovo in the percentage of printers sold compared to the total number of devices sold.</p>	Company	Printers	Apple	17%	Lenovo	18%	HP	26%	Asus	28%						
Company	Printers															
Apple	17%															
Lenovo	18%															
HP	26%															
Asus	28%															
Choices/Choice A	Percentage: 36.3%, Difference=10%															



Choices/Choice B	Percentage: 37.3%, Difference=15%
Choices/Choice C	Percentage: 33.3%, Difference=10%
Choices/Choice D	Percentage: 30.3%, Difference=10%
Solution	A
Explanation	<p>To determine the percentage of total sales contributed by Asus, follow these steps:</p> <p>Calculate Total Devices Sold by Asus:</p> <p>From the data given:</p> <p>Laptops sold by Asus: 345</p> <p>Desktops sold by Asus: 178</p> <p>We need to figure out how many printers Asus has sold. As far as we know, 28% of all the devices that Asus sells are printed products. Let T_A be represent the total number of Asus devices sold. Consequently:</p> $\text{Printers sold by Asus} = 0.28 \times T_A$ <p>We can express the total number of devices sold by Asus as:</p> $T_A = 345 (\text{Laptops}) + 178 (\text{Desktops}) + \text{Printers}$ <p>Substituting the number of printers into the equation, we get:</p> $T_A = 345 + 178 + 0.28 \times T_A$ <p>Solve for T_A:</p> <p>Rearrange the equation to solve for T_A:</p> $T_A - 0.28 \times T_A = 345 + 178$ $0.72 \times T_A = 523$ $T_A = \frac{523}{0.72}$ ≈ 726



Therefore, the total number of devices sold by Asus is approximately 726.

Calculate the Percentage Contribution of Asus:

The total number of devices sold by all four companies combined is 2,000.

To find the percentage of total sales contributed by Asus:

$$\begin{aligned}\text{Percentage Contribution} &= \frac{\text{Total devices sold by Asus}}{\text{Total devices sold by all companies}} \times 100 \\ &= \frac{726}{2000} \times 100\% \\ &\approx 36.3\%\end{aligned}$$

Hence, the percentage is 36.3%.

Let T_A represent the total number of devices sold by Asus.

Let T_L represent the total number of devices sold by Lenovo.

The percentage of printers sold by Asus is given as 28%.

The percentage of printers sold by Lenovo is given as 18%.

The question pertains to the variation in the proportion of printer sales compared to the total number of devices supplied by both firms. This difference can be found as follows:

Difference in Percentage = Percentage of Printers Sold by Asus - Percentage of Printers Sold by Lenovo

Substitute the given percentages:

$$\begin{aligned}\text{Difference in Percentage} &= 28\% - 18\% \\ &= 10\%\end{aligned}$$

Hence, the difference in percentage is 10%.

Hence, the correct option is option A.

Question ID	38
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	A family consists of seven members: A, B, C, D, E, F, and G. They belong to three generations. There are two married couples, and



	<p>the rest are unmarried. Every couple has at least one child. Each individual works in a different department among HR, IT, Finance, Marketing, Sales, Operations, and Administration.</p> <ol style="list-style-type: none">1. C and G are siblings.2. E, who is married to F, works in Finance.3. A is the father of C and works in Sales.4. B, who works in IT, is the mother of G.5. D is unmarried and works in Marketing.6. F works in Administration and is in the same generation as E.7. G works in Operations and is a male.8. The individual working in HR is in the same generation as D. <p>Which of the following pairs form a married couple?</p>
Choices/Choice A	B and G, E and A
Choices/Choice B	A and F, E and B
Choices/Choice C	A and B, D and F
Choices/Choice D	A and B, E and F
Solution	D
Explanation	<p>Identifying the family structure and assign generations:</p> <p>From Clue 1: C and G are siblings.</p> <p>From Clue 3: A is the father of C and works in Sales. So, A is in the first generation.</p> <p>From Clue 4: B is the mother of G, meaning B is A's spouse. B works in IT.</p> <p>From Clue 2: E and F are married. Both are in the second generation (Clue 6).</p> <p>G works in Operations and is a male (Clue 7).</p> <p>D is unmarried and works in Marketing (Clue 5).</p> <p>Assigning roles and relationships based on professions:</p> <p>A (father) → Sales.</p> <p>B (mother) → IT.</p> <p>E (married to F) → Finance.</p> <p>F (married to E) → Administration.</p>



G (male sibling of C) → Operations.

D (unmarried) → Marketing.

The individual in HR is in the same generation as D (Clue 8), so D and HR must be in the second generation.

Confirming the married couples:

A and B are married (parents of C and G).

E and F are the other married couple.

Final Assignments:

- A (father): Sales
- B (mother): IT
- C (sibling): HR
- D (unmarried): Marketing
- E (spouse of F): Finance
- F (spouse of E): Administration
- G (male sibling): Operations

The married couples are:

A and B (first generation, parents of C and G).

E and F (second generation, spouses).

Hence, the correct option is option D.

Question ID	39									
Question Type	MCQ-SC									
Difficulty Level	Medium									
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation									
Question Details/Question Stem	<p>The table below provides information about the number of employees in the Tech and Design departments in four companies. It includes the ratio of Tech to Design employees, the total employees in these two departments, and the difference between their counts.</p> <table border="1"> <thead> <tr> <th>Company</th> <th>Ratio of Tech to Design Employees</th> <th>Total Tech and Design Employees</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>5:3</td> <td>960</td> </tr> <tr> <td>B</td> <td>7:5</td> <td>1200</td> </tr> </tbody> </table>	Company	Ratio of Tech to Design Employees	Total Tech and Design Employees	A	5:3	960	B	7:5	1200
Company	Ratio of Tech to Design Employees	Total Tech and Design Employees								
A	5:3	960								
B	7:5	1200								



	<table border="1"><tbody><tr><td>C</td><td>9:7</td><td>800</td></tr><tr><td>D</td><td>4:6</td><td>600</td></tr></tbody></table>	C	9:7	800	D	4:6	600
C	9:7	800					
D	4:6	600					
	<p>In Company E the number of male employees in the Tech department is $\frac{2}{3}$ of the Tech employees in Company C. The total number of employees in Company E is 500. The male-to-female ratio in the Tech department is 5:1.</p> <p>What is the difference between the number of employees in the Tech department and the Design department in Company E?</p>						
Choices/Choice A	360						
Choices/Choice B	140						
Choices/Choice C	220						
Choices/Choice D	120						
Solution	C						
Explanation	<p>Determine the Tech and Design employees for Company C</p> <p>In Company C, the ratio of Tech to Design employees is 9:7, and the total number of Tech and Design employees is 800.</p> <p>Let the number of Tech employees in Company C be $9x$, and the number of Design employees be $7x$.</p> <p>The total number of employees is $9x+7x=800$, so:</p> $16x = 800$ $x = \frac{800}{16}$ $x = 50$ <p>The number of Tech employees in Company C is $9x = 9 \times 50 = 450$ and the number of Design employees in Company C is $7x = 7 \times 50 = 350$</p> <p>Calculate the male employees in the Tech department of Company E</p> <ul style="list-style-type: none">The number of male employees in the Tech department of Company E is $\frac{2}{3}$ of the Tech employees in Company C:						



$$\text{Male Tech employees in company E} = \frac{2}{3} \times 450 = 300$$

Calculate the total number of Tech employees in Company E

- The male-to-female ratio in the Tech department of Company E is 5:1.
- For every 5 male employees, there are 1 female employee.
- Therefore, the total number of Tech employees can be calculated by adding the male and female employees.

Let the number of female employees be F. From the ratio:

$$\frac{\text{Male employees}}{\text{Female employees}} = 5$$

$$\frac{300}{F} = 5$$

$$F = \frac{300}{5}$$
$$= 60$$

Thus, the total number of Tech employees in Company E is:

$$\text{Total Tech employees} = 300 + 60 = 360$$

Calculate the number of Design employees in Company E

- The total number of employees in Company E is 500.
- The number of Design employees is

$$\text{Design employees} = 500 - 360 = 140$$

Calculate the difference between Tech and Design employees in Company E

- The difference between the number of Tech and Design employees in Company E is

$$\text{Difference} = 360 - 140 = 220$$

Hence, the correct option is option C.

Question ID	40
Question Type	MCQ-SC



Difficulty Level	Medium																														
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning																														
Question Details/Question Stem	<p>6 boxes are placed one above the other in a rack. The lowermost to topmost rank is marked as I, II, III, IV, V and VI. Each box has a different number of balls. Box A is placed immediately above Box B. Only one box is placed between the boxes having 125 and 115 balls. Box D has 160 balls. Box C is placed above Box F but neither of the boxes is placed in the topmost rack. Box which has 69 balls is placed immediately above the box which has 140 balls. Three boxes are placed between Box B and the box has 130 balls. Box which has 125 balls is placed immediately above the box, which has 130 balls. Two boxes are placed between the box which has 140 balls and Box E.</p> <p>Determine the total number of balls placed in uppermost and lowermost rack.</p>																														
Choices/Choice A	269																														
Choices/Choice B	200																														
Choices/Choice C	199																														
Choices/Choice D	169																														
Solution	C																														
Explanation	<p>Box A is placed immediately above Box B. Three boxes are placed between Box B and the box has 130 balls. Box which has 125 balls is placed immediately above the box, which has 130 balls. Only one box is placed between the boxes having 125 and 115 balls.</p> <p>We get two possibilities with respect to above statements:</p> <p>Case-1: Box A and Box B is placed in VI th and Vth rack respectively. The box which has 130 balls is placed in the lowermost rack. The box which has 125 balls is placed in rack marked II. The box which has 115 balls is placed in the rack marked IV.</p> <p>Case-2: Box A and Box B is placed in II and I rack respectively. The box which has 130 balls is placed in the Vth rack. The box which has 125 balls is placed in topmost rack. The box which has 115 balls is placed in the rack marked IV.</p> <p>By using above information we get the following table as shown,</p> <table border="1"> <thead> <tr> <th colspan="3">Case 1</th> <th colspan="3">Case 2</th> </tr> <tr> <th>Rack</th> <th>Box</th> <th>No of balls</th> <th>Rack</th> <th>Box</th> <th>No of balls</th> </tr> </thead> <tbody> <tr> <td>VI</td> <td>A</td> <td></td> <td>VI</td> <td></td> <td>125</td> </tr> <tr> <td>V</td> <td>B</td> <td></td> <td>V</td> <td></td> <td>130</td> </tr> <tr> <td>IV</td> <td></td> <td>115</td> <td>IV</td> <td></td> <td>115</td> </tr> </tbody> </table>	Case 1			Case 2			Rack	Box	No of balls	Rack	Box	No of balls	VI	A		VI		125	V	B		V		130	IV		115	IV		115
Case 1			Case 2																												
Rack	Box	No of balls	Rack	Box	No of balls																										
VI	A		VI		125																										
V	B		V		130																										
IV		115	IV		115																										



III			III		
II		125	II	A	
I		130	I	B	

Box D has 160 balls. Box which has 69 balls is placed immediately above the box which has 140 balls. Two boxes are placed between the box which has 140 balls and Box E. Box C is placed above Box F but neither of the boxes is placed in the topmost rack.

From above statements,

Box D has 160 balls and it is placed in rack numbered III (only possibility in both cases)

Case-1: The boxes which have 69 and 140 balls are placed in VIth and Vth rack respectively. Box E is placed in rack II. Finally, Box C and Box F are placed in IVth and Ist rack respectively

Case-2: The boxes which have 69 and 140 balls are placed in VIth and Vth rack respectively. Box E is placed in rack II. Box C or Box F is not placed in the topmost rack. Thus, this case-2 can be eliminated.

Case 1			Case 2		
Rack	Box	No of balls	Rack	Box	No of balls
VI	A	69	VI		125
V	B	140	V		130
IV	C	115	IV	E	115
III	D	160	III	D	160
II	E	125	II	A	69
I	F	130	I	B	140

The total number of balls placed in uppermost and lowermost rack is $69+130=199$

Hence, the correct choice is option C.

Question ID	41
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	Nine friends A, B, C, D, E, F, G, H, and I are at a train station. Only six of them are traveling to six different cities: London, Paris, Rome, Berlin, Madrid, and Vienna. Six of them have specific professions: Architect, Doctor, Engineer, Teacher, Lawyer, and Scientist.



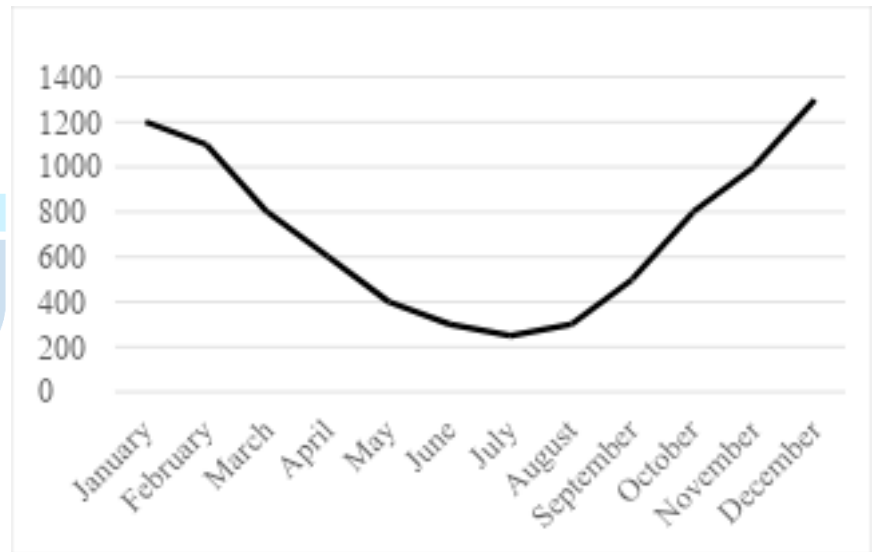
	<ol style="list-style-type: none">1. A, who is an Engineer, is traveling but not to Paris or Rome.2. C, a Lawyer, is going to London.3. G, who is a Teacher, is traveling to Vienna.4. H, a Scientist, is not traveling anywhere.5. F, who is an Architect, is going to Berlin.6. E, a doctor, is traveling, but not to Madrid or Vienna.7. D and I not travelling anywhere.8. B does not travel to Vienna or Rome <p>Which city is B traveling to?</p>
Choices/Choice A	Vienna
Choices/Choice B	Paris
Choices/Choice C	Berlin
Choices/Choice D	Madrid
Solution	B
Explanation	<p>Identifying the travelers and assign cities based on clues:</p> <p>C (Lawyer): It is explicitly stated that C is going to London. So, one city is assigned: London → C.</p> <p>G (Teacher): G is traveling to Vienna. So, another city is assigned: Vienna → G.</p> <p>F (Architect): F is traveling to Berlin. So, another city is assigned: Berlin → F.</p> <p>Determining where E (Doctor) is traveling:</p> <p>Clue 6 specifies that E, the Doctor, is traveling but not to Madrid or Vienna.</p> <p>Vienna is already taken by G, so E cannot go there.</p> <p>Since Madrid is excluded for E, E can go to Paris or Rome.</p> <p>Assigning a city to A (Engineer):</p> <p>Clue 1 states that A, the Engineer, is traveling but not to Paris or Rome. A cannot go to Paris (as per Clue 1), so A must go to Madrid. Therefore: Madrid → A.</p> <p>As “D and I” are not travelling anywhere we can say B is traveling:</p> <p>The cities of London, Vienna, Berlin and Madrid are already assigned.</p>



	<p>The only remaining city is Paris and Rome. According to the given options. As B does not go to Rome so we can say B travels to Paris.</p> <p>Therefore: Paris → B.</p> <p>Hence, the correct option is option B.</p>
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Question ID	42
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation

Question Details/Question Stem	<p>The provided table and figure highlight two key aspects of a city's yearly energy and climate patterns. The first dataset tracks the average monthly temperatures, with January being the coldest and July the warmest. The second dataset measures monthly energy consumption in kilowatt-hours (kWh) for both heating and cooling, demonstrating how temperature fluctuations throughout the year influence energy demands.</p>																										
	<table border="1"><thead><tr><th>Month</th><th>Temperature (in degrees)</th></tr></thead><tbody><tr><td>January</td><td>5</td></tr><tr><td>February</td><td>6</td></tr><tr><td>March</td><td>10</td></tr><tr><td>April</td><td>15</td></tr><tr><td>May</td><td>20</td></tr><tr><td>June</td><td>25</td></tr><tr><td>July</td><td>30</td></tr><tr><td>August</td><td>29</td></tr><tr><td>September</td><td>24</td></tr><tr><td>October</td><td>17</td></tr><tr><td>November</td><td>10</td></tr><tr><td>December</td><td>6</td></tr></tbody></table>	Month	Temperature (in degrees)	January	5	February	6	March	10	April	15	May	20	June	25	July	30	August	29	September	24	October	17	November	10	December	6
	Month	Temperature (in degrees)																									
	January	5																									
	February	6																									
	March	10																									
	April	15																									
	May	20																									
	June	25																									
	July	30																									
	August	29																									
	September	24																									
	October	17																									
	November	10																									
December	6																										



Compute the energy efficiency ratio for summer and winter.

Choices/Choice A	Summer:12Kw/h°C, Winter:213Kw/h°C
Choices/Choice B	Summer:10.12Kw/h°C, Winter:211.29Kw/h°C
Choices/Choice C	Summer:15Kw/h°C, Winter:218Kw/h°C
Choices/Choice D	Summer:16Kw/h°C, Winter:232Kw/h°C
Solution	B
Explanation	<p>Formula for Energy Efficiency Ratio:</p> $\text{Energy Efficiency Ratio} = \frac{\text{Average energy consumption}}{\text{Average temperature}}$ <p>Summer Months (June, July, August):</p> <p>June Temperature: 25°C</p> <p>July Temperature: 30°C</p> <p>August Temperature: 29°C</p> <p>To find the average temperature for summer:</p>



$$\begin{aligned}\text{Average Temperature}_{\text{summer}} &= \frac{(25+30+29)^{\circ}\text{C}}{3} \\ &= \frac{84^{\circ}\text{C}}{3} \\ &= 28^{\circ}\text{C}\end{aligned}$$

Winter Months (December, January, February):

December Temperature: 6°C

January Temperature: 5°C

February Temperature: 6°C

To find the average temperature for winter:

$$\begin{aligned}\text{Average Temperature}_{\text{winter}} &= \frac{(6+5+6)^{\circ}\text{C}}{3} \\ &= \frac{17^{\circ}\text{C}}{3} \\ &\approx 5.67^{\circ}\text{C}\end{aligned}$$

Average Energy Consumption Calculation

Summer Months (June, July, August):

June Energy Consumption: 300 kWh

July Energy Consumption: 250 kWh

August Energy Consumption: 300 kWh

To find the average energy consumption for summer:

$$\begin{aligned}\text{Average energy consumption}_{\text{summer}} &= \frac{(300+250+300)\text{Kwh}}{3} \\ &= \frac{850\text{Kwh}}{3} \\ &\approx 283.33\text{Kwh}\end{aligned}$$

Winter Months (December, January, February):

December Energy Consumption: 1300 kWh



January Energy Consumption: 1200 kWh

February Energy Consumption: 1100 kWh

To find the average energy consumption for winter:

$$\begin{aligned}\text{Average energy consumption}_{\text{winter}} &= \frac{(1300+1200+1100)\text{Kwh}}{3} \\ &= \frac{3600\text{Kwh}}{3} \\ &= 1200\text{Kwh}\end{aligned}$$

Energy Efficiency Ratio Calculation

For Summer:

$$\begin{aligned}\text{Energy efficiency ratio}_{\text{summer}} &= \frac{\text{Average energy consumption}_{\text{summer}}}{\text{Average temperature}_{\text{summer}}} \\ &= \frac{283.33\text{Kwh}}{28^{\circ}\text{C}} \\ &\approx \frac{10.12\text{Kwh}}{^{\circ}\text{C}}\end{aligned}$$

For Winter:

$$\begin{aligned}\text{Energy efficiency ratio}_{\text{winter}} &= \frac{\text{Average energy consumption}_{\text{winter}}}{\text{Average temperature}_{\text{winter}}} \\ &= \frac{1200\text{Kwh}}{5.67^{\circ}\text{C}} \\ &\approx \frac{211.29\text{Kwh}}{^{\circ}\text{C}}\end{aligned}$$

Energy Efficiency Ratio for Summer: 10.12 kWh/°C

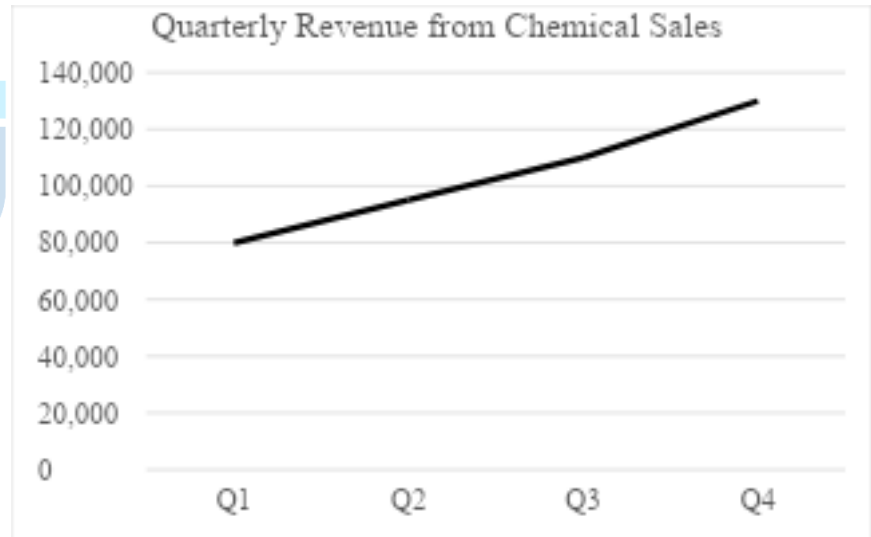
Energy Efficiency Ratio for Winter: 211.29 kWh/°C

Hence, the correct option is option B.

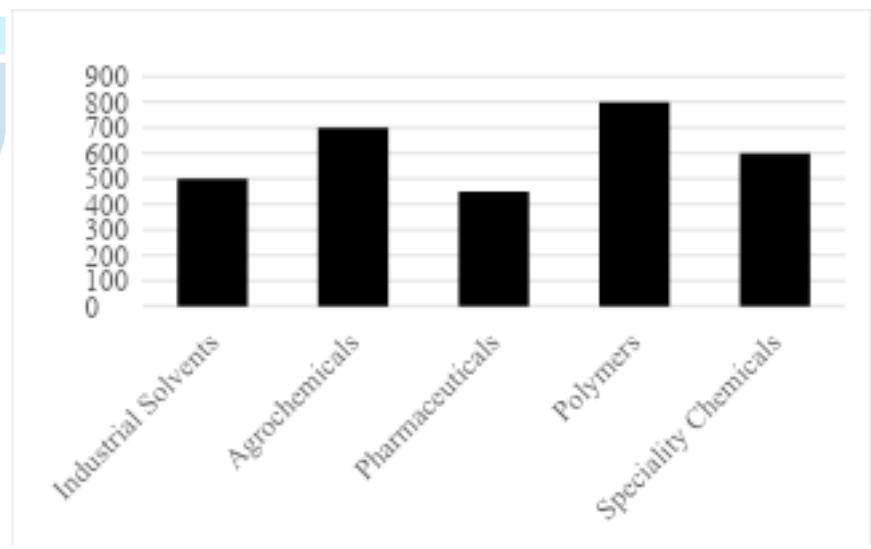
Question ID	43
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation



The line graph illustrates the quarterly revenue trends for chemical sales throughout the year 2023. The bar graph depicts the sales volume of different types of chemicals during the fourth quarter of 2023.



Question Details/Question Stem



Given that the total revenue from Polymers and Agrochemicals in Q4 is \$870,000 and the combined sales volume is 1,300 tons, calculate the average sales price per ton for these two chemicals. Then, determine the average price per ton if each type of chemical had an equal sales volume.

Choices/Choice A	658 dollars per ton
Choices/Choice B	684 dollars per ton
Choices/Choice C	669.23 dollars per ton
Choices/Choice D	674 dollars per ton



Solution	C
Explanation	<p>Revenue from Polymers and Agrochemicals: \$870,000 Combined Sales Volume: 1,300 tons</p> $\frac{\$870,000}{1,300\text{ton}} \approx 669.23 \text{ dollars per ton}$ <p>Average Sales Price per Ton: 1,300ton</p> <p>If each had equal sales volume (650 tons each), average price per ton for each type:</p> $\text{Revenue for each type} = \frac{870,000 \text{ dollars}}{2}$ $= 435,000 \text{ dollars}$ $\text{Average Price per ton} = \frac{435,000 \text{ dollars}}{650 \text{ ton}}$ $\approx 669.23 \text{ dollars per ton}$ <p>Hence, the correct option is option C.</p>

Question ID	44																														
Question Type	MCQ-SC																														
Difficulty Level	Medium																														
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation																														
Question Details/Question Stem	<p>Using the following table that presents the revenue and profit margins of Companies A and B from 2016 to 2020, answer the question below.</p> <table border="1"><thead><tr><th>Year</th><th>Company A Revenue (in crores)</th><th>Company A Profit Margin (%)</th><th>Company B Revenue (in crores)</th><th>Company B Profit Margin (%)</th></tr></thead><tbody><tr><td>2016</td><td>500</td><td>15%</td><td>400</td><td>12%</td></tr><tr><td>2017</td><td>600</td><td>18%</td><td>450</td><td>14%</td></tr><tr><td>2018</td><td>700</td><td>20%</td><td>500</td><td>16%</td></tr><tr><td>2019</td><td>800</td><td>22%</td><td>550</td><td>18%</td></tr><tr><td>2020</td><td>900</td><td>25%</td><td>600</td><td>20%</td></tr></tbody></table> <p>If the combined profit of Companies A and B in 2017 was reinvested equally into both companies in 2018 to increase their revenue (without affecting their profit margins), what would be the new revenue of each company in 2018, and what would be their combined profit for 2018?</p>	Year	Company A Revenue (in crores)	Company A Profit Margin (%)	Company B Revenue (in crores)	Company B Profit Margin (%)	2016	500	15%	400	12%	2017	600	18%	450	14%	2018	700	20%	500	16%	2019	800	22%	550	18%	2020	900	25%	600	20%
Year	Company A Revenue (in crores)	Company A Profit Margin (%)	Company B Revenue (in crores)	Company B Profit Margin (%)																											
2016	500	15%	400	12%																											
2017	600	18%	450	14%																											
2018	700	20%	500	16%																											
2019	800	22%	550	18%																											
2020	900	25%	600	20%																											



Choices/Choice A	Company A: Rs. 800.5 crores, Company B: Rs. 590.5 crores, Combined Profit: Rs. 260.78 crores
Choices/Choice B	Company A: Rs. 790 crores, Company B: Rs. 590.5 crores, Combined Profit: Rs. 270.78 crores
Choices/Choice C	Company A: Rs. 785.5 crores, Company B: Rs. 585.5 crores, Combined Profit: Rs. 250.78 crores
Choices/Choice D	Company A: Rs. 787 crores, Company B: Rs. 550 crores, Combined Profit: Rs. 266.78 crores
Solution	C
Explanation	<p>Calculating the Combined Profit for 2017</p> <p>The profit for each company in 2017 is calculated as follows:</p> <p>For Company A in 2017:</p> <p>Revenue = Rs. 600 crores</p> <p>Profit Margin = 18%</p> $\begin{aligned}\text{Company A Profit} &= \left(\frac{18}{100}\right) \times \text{Rs. } 600 \text{ crores} \\ &= 0.18 \times \text{Rs. } 600 \text{ crores} \\ &= \text{Rs. } 108 \text{ crores}\end{aligned}$ <p>For Company B in 2017:</p> <p>Revenue = Rs. 450 crores</p> <p>Profit Margin = 14%</p> $\begin{aligned}\text{Company B Profit} &= \left(\frac{14}{100}\right) \times \text{Rs. } 450 \text{ crores} \\ &= 0.14 \times \text{Rs. } 450 \text{ crores} \\ &= 63 \text{ crores}\end{aligned}$ <p>Thus, the total combined profit for 2017 is:</p> $\begin{aligned}\text{Combined Profit 2017} &= 108 \text{ crores} + 63 \text{ crores} \\ &= 171 \text{ crores}\end{aligned}$ <p>Reinvestment of the Combined Profit in 2018</p>



The combined profit of Rs. 171 crores is reinvested equally into both companies:

$$\begin{aligned}\text{Reinvestment per company} &= \frac{171\text{crores}}{2} \\ &= 85.5\text{crores}\end{aligned}$$

Calculating the New Revenue for 2018

For **Company A** in 2018:

Original revenue in 2018 = Rs. 700 crores

Reinvestment = Rs. 85.5 crores

$$\begin{aligned}\text{New Revenue for Company A} &= \text{Rs. 700 crores} + \text{Rs. 85.5 crores} \\ &= \text{Rs. 785.5 crores}\end{aligned}$$

For **Company B** in 2018:

Original revenue in 2018 = Rs. 500 crores

Reinvestment = Rs. 85.5 crores

$$\begin{aligned}\text{New Revenue for Company B} &= \text{Rs. 500 crores} + \text{Rs. 85.5 crores} \\ &= \text{Rs. 585.5 crores}\end{aligned}$$

Calculating the New Combined Profit for 2018

The profit for each company in 2018 is recalculated with the new revenue and existing profit margin:

For **Company A** in 2018:

New revenue = Rs. 785.5 crores

Profit Margin = 20%

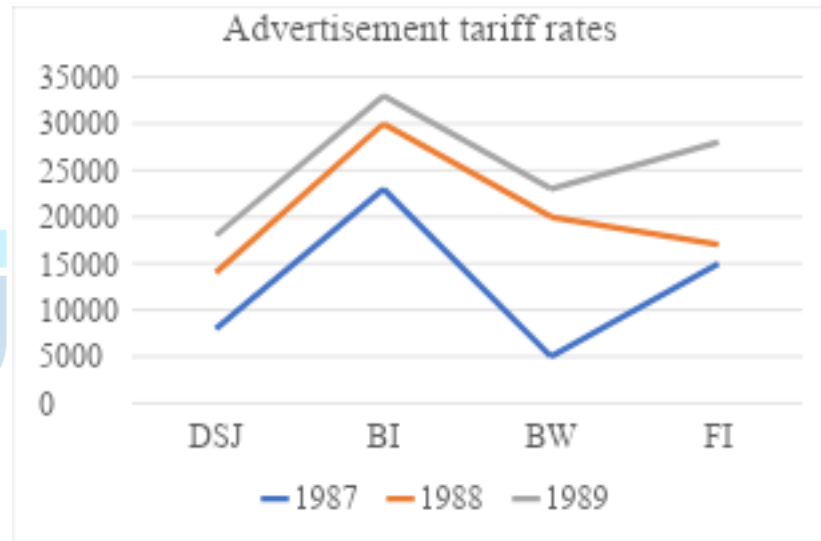
$$\begin{aligned}\text{Company A Profit} &= \left(\frac{20}{100}\right) \times \text{Rs. 785.5 crores} \\ &= 0.20 \times \text{Rs. 785.5 crores} \\ &= \text{Rs. 157.1 crores}\end{aligned}$$

For **Company B** in 2018:



	<p>New revenue = Rs. 585.5 crores</p> <p>Profit Margin = 16%</p> $\text{Company B Profit} = \left(\frac{16}{100}\right) \times \text{Rs. } 585.5 \text{ crores}$ $= 0.16 \times \text{Rs. } 585.5 \text{ crores}$ $= \text{Rs. } 93.68 \text{ crores}$ <p>Thus, the total combined profit for 2018 is:</p> $\text{Combined Profit 2018} = 157.1 \text{ crores} + 93.68 \text{ crores}$ $= 250.78 \text{ crores}$ <p>The combined profit for 2018 is Rs.250.78 crores, with Company A having Rs.785.5 crores and Company B having Rs.585.5 crores in new revenue.</p> <p>Hence, the correct option is option C.</p>
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Question ID	45																				
Question Type	MCQ-SC																				
Difficulty Level	Medium																				
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation																				
Question Details/Question Stem	<p>The bar graph and line graph display the circulation figures of magazines and the advertisement tariff rates for the years 1987, 1988, and 1989 for the journals Dalal Street, Business India, Business World, and Fortune India.</p> <table border="1"><caption>Circulation of Magazines</caption><thead><tr><th>Magazine</th><th>1987</th><th>1988</th><th>1989</th></tr></thead><tbody><tr><td>FI</td><td>20000</td><td>28000</td><td>30000</td></tr><tr><td>BW</td><td>25000</td><td>30000</td><td>32000</td></tr><tr><td>BI</td><td>45000</td><td>60000</td><td>70000</td></tr><tr><td>DSJ</td><td>18000</td><td>40000</td><td>50000</td></tr></tbody></table>	Magazine	1987	1988	1989	FI	20000	28000	30000	BW	25000	30000	32000	BI	45000	60000	70000	DSJ	18000	40000	50000
Magazine	1987	1988	1989																		
FI	20000	28000	30000																		
BW	25000	30000	32000																		
BI	45000	60000	70000																		
DSJ	18000	40000	50000																		



The magazine with the highest percentage rise in circulation during the 1987–1989 period was:

Choices/Choice A	Dalal Street Journal
Choices/Choice B	Business India
Choices/Choice C	Fortune India
Choices/Choice D	Business World
Solution	A
Explanation	<p>Percentage growth for Business India during 1987-89 can be found as follows:</p> $\text{Percentage Growth} = \frac{\text{Magazines circulated in 1989} - \text{Magazines circulated in 1987}}{\text{Magazines circulated in 1987}} \times 100\%$ $= \frac{69000 - 45000}{45000} \times 100\%$ $= \frac{69-45}{45} \times 100\%$ $= 53.3\%$ <p>Percentage growth for Dalal Street during 1987-89 can be found as follows:</p>



	<p>Percentage Growth</p> $= \frac{\text{Magazines circulated in 1989} - \text{Magazines circulated in 1987}}{\text{Magazines circulated in 1987}} \times 100\%$ $= \frac{49000 - 18000}{18000} \times 100\%$ $= \frac{49 - 18}{18} \times 100\%$ $= 172\%$ <p>Percentage growth for Business World during 1987-89 can be found as follows:</p> <p>Percentage Growth</p> $= \frac{\text{Magazines circulated in 1989} - \text{Magazines circulated in 1987}}{\text{Magazines circulated in 1987}} \times 100\%$ $= \frac{32000 - 25000}{25000} \times 100\%$ $= \frac{32 - 25}{25} \times 100\%$ $= 28\%$ <p>Percentage growth for Fortune during 1987-89 can be found as follows:</p> <p>Percentage Growth</p> $= \frac{\text{Magazines circulated in 1989} - \text{Magazines circulated in 1987}}{\text{Magazines circulated in 1987}} \times 100\%$ $= \frac{31000 - 20000}{20000} \times 100\%$ $= \frac{31 - 20}{20} \times 100\%$ $= 55\%$ <p>Hence, the magazine with the highest percentage rise is Dalal Street Journal. Hence, the correct option is option A.</p>
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Question ID	46
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	Seven friends namely Riya, Rima, Rina, Rita, Radhika, Reba and Rubina like seven different fruits namely Mango, Grape, Banana, Pineapple, Litchi, Orange and Watermelon but not necessarily in the same order. Each person also works in different designations of the same office on the basis of experience. The designations are-IT



	<p>coordinator, Computer Programmer, Data Analyst, Application Analyst, Web Developer, System Analyst and IT Analyst. Each person has been allocated the designation as per increasing order of their experience. The one with IT coordinator designation being the least experienced while the one with IT Analyst designation being the most experienced person respectively from the given statement. Only one person has less experience than Reba. The one has less experience than Reba likes Pineapple. Only one person has more experience than Riya. The one with System Analyst designation likes Litchi. Only two people have more experience than the one who likes Mango. Rubina likes Watermelon and has more experience than the one who likes Mango. Rita has less experience than the one with Application Analyst designation, but has more experience than the one who likes Banana. Radhika neither has the least experience nor does he work as a Web Developer. Rima is not a Web Developer. The one who like Grape is not an Application Analyst.</p> <p>Who among the following is an Application Analyst?</p>
Choices/Choice A	Rina
Choices/Choice B	Rita
Choices/Choice C	Radhika
Choices/Choice D	Reba
Solution	C
Explanation	<ol style="list-style-type: none">1. Only one person has less experience than Reba.2. The one has less experience than Reba likes Pineapple.3. Only one person has more experience than Riya.4. Only two people have more experience than the one who likes Mango.5. Radhika neither has the least experience nor does he work with the Web Developer.6. Each person has been allocated to a designation as per increasing order of experience with the one in IT coordinator designation being the least experienced while the one in IT Analyst designation being the most experienced person respectively from the given statement. <p>From above statements, let us consider the most experienced person at 7th spot and the least experienced person at 1st spot & based on this, we form an initial table. So, as per given statement, the one who is IT coordinator is in 1st position, Computer Programmer in 2nd position & up to the one who is IT Analyst is in 7th position. Reba is at 2nd position (Computer Programmer) and the person in 1st position (IT coordinator) likes Pineapple as per given statement (refer point 1 & 2) Riya is at 6th position</p>



(System Analyst) (Refer point-3). The one who likes Mango (Web Developer) is in 5th position (Refer point-4). Radhika is not IT coordinator (Refer point-5). Based on the above information, we get the initial table as follows,

Position	Name	Designation	Film
7		IT Analyst	
6	Riya	System Analyst	
5	Radhika	Web Developer	Mango
4		Application Analyst	
3		Data analyst	
2	Reba	Computer Programmer	
1	Radhika	IT coordinator	Pineapple

1. Rubina likes Watermelon and has more experience than the one who likes Mango.

2. The one with System Analyst designation likes Litchi.

3. Rita has less experience than the one with Application Analyst designation, but has more experience than the one who likes Banana.

4. The one who like Grape is not an Application Analyst.

5. Radhika is not the person having the least experience

6. Rima is not a Web Developer.

From above statements, Rubina likes Watermelon and is at 7th position i.e. the most experienced person. Rubina in IT Analyst. Riya is a System Analyst and likes Litchi. Rita must be a Data Analyst (3rd position) & Reba likes Dark Knight. Finally, we can say Radhika is an Application Analyst.

Position	Name	Designation	Film
7	Rubina	IT Analyst	Watermelon
6	Riya	System Analyst	Litchi
5	Radhika/Rima	Web Developer	Mango
4	Radhika	Application Analyst	Grape
3	Rita	Data analyst	
2	Reba	Computer Programmer	Banana
1	Radhika	IT coordinator	Pineapple

Radhika likes Orange & Rita likes Grape. Rima is IT coordinator (1st position). Finally, Rina is a Web Developer (5th position). Based on the above information, we get the final completed table as shown below,



Position	Name	Designation	Film
7	Rubina	IT Analyst	Watermelon
6	Riya	System Analyst	Litchi
5	Rina	Web Developer	Mango
4	Radhika	Application Analyst	Grape
3	Rita	Data analyst	Orange
2	Reba	Computer Programmer	Banana
1	Rima	IT coordinator	Pineapple

Radhika is an application Analyst.
Hence, the correct choice is option C.

Question ID	47																										
Question Type	MCQ-SC																										
Difficulty Level	Hard																										
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning																										
Question Details/Question Stem	<p>In a certain code the letters can be coded as follows:</p> <table border="1"> <tbody> <tr> <td>a</td><td>c</td><td>e</td><td>f</td><td>i</td><td>l</td><td>n</td><td>o</td><td>r</td><td>s</td><td>t</td><td>u</td><td>v</td> </tr> <tr> <td>*</td><td>3</td><td>%</td><td>#</td><td>5</td><td>~</td><td>^</td><td>&</td><td>+</td><td>2</td><td>\$</td><td>!</td><td>@</td> </tr> </tbody> </table> <p>Conditions:</p> <ol style="list-style-type: none"> If the first letter is a consonant and the last letter is a vowel then interchange the codes of first letter and last letter. If the number of letters (in alphabet series) between the second and fourth letter is even, then the code of the last letter will be equal to ~. If the first letter is a vowel and the second last letter is a consonant then code both the letters as per the code of vowel. If more than one condition is applicable then apply them in the ascending order of their condition number. If only one condition is applicable then first apply that condition and then skip the code for the third letter of the word. If there are less than three letters skip condition 5. <p>Then what will be the code for “Learn to use virtual interface.”</p>	a	c	e	f	i	l	n	o	r	s	t	u	v	*	3	%	#	5	~	^	&	+	2	\$!	@
a	c	e	f	i	l	n	o	r	s	t	u	v															
*	3	%	#	5	~	^	&	+	2	\$!	@															
Choices/Choice A	“~%*+~ &\$!!% @5\$!*~ 5^\$%+##*5~”																										
Choices/Choice B	“~%*+~ &\$!! @5\$!*~ 5^\$%+##*5~”																										
Choices/Choice C	“~%+~ &\$!! @5\$!*~ 5^\$%+##*5~”																										
Choices/Choice D	“~%+~ &\$!!% @5\$!*~ 5^\$%+##*3~”																										
Solution	C																										
Explanation	<p>First, we need to determine the code for each word using the given conditions:</p> <table border="1"> <tbody> <tr> <td>Normal Code for Learn ~%*+^</td> </tr> </tbody> </table>	Normal Code for Learn ~%*+^																									
Normal Code for Learn ~%*+^																											



Code after 1 st Condition	Not applicable	~%*+^
Code after 2 nd Condition	Applicable	~%*+~
Code after 3 rd Condition	Not applicable	~%*+~
Code after 4 th Condition	Not applicable	~%*+~
Code after 5 th Condition	Applicable	~%+~
Normal Code for to \$&		
Code after 1 st Condition	Applicable	&\$
Code after 2 nd Condition	Not Applicable	&\$
Code after 3 rd Condition	Not applicable	&\$
Code after 4 th Condition	Not applicable	&\$
Code after 5 th Condition	Not Applicable	&\$
Normal Code for use !2%		
Code after 1 st Condition	Not Applicable	!2%
Code after 2 nd Condition	Not Applicable	!2%
Code after 3 rd Condition	Applicable	!!%
Code after 4 th Condition	Not applicable	!!%
Code after 5 th Condition	Applicable	!!
Normal Code for virtual @5+\$! *~		
Code after 1 st Condition	Not Applicable	@5+\$! *~
Code after 2 nd Condition	Applicable	@5+\$! *~
Code after 3 rd Condition	Not Applicable	@5+\$! *~
Code after 4 th Condition	Not applicable	@5+\$! *~
Code after 5 th Condition	Applicable	@5\$!*~
Normal Code for interface 5^\$%+##*3%		
Code after 1 st Condition	Not Applicable	5^\$%+##*3%
Code after 2 nd Condition	Applicable	5^\$%+##*3~
Code after 3 rd Condition	Applicable	5^\$%+##*5~
Code after 4 th Condition	Applicable	5^\$%+##*5~
Code after 5 th Condition	Not Applicable	5^\$%+##*5~
<p>So, code for “Learn to use virtual interface” should be “~%+~ &\$!! @5\$!*~ 5^\$%+##*5~” Hence, choice C is correct.</p>		

Question ID	48
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning
Question Details/Question Stem	While transporting seven cartons of different chocolate companies - Nestle, Mars, Ferrero, Cadbury, KitKat, Hershey and Oreo are kept one above the other, but not necessarily in the same order.



	<p>Each carton is marked with the number of chocolate packets present in it which are 300,320,350,400,420,440 and 450, but not necessarily in the same order. Only three cartons are kept between Oreo carton and carton number 440. Only two cartons are kept between Oreo carton and Mars carton. Mars carton is kept somewhere below carton number 440. Only one carton is kept between Mars carton and the carton number 320. KitKat carton is kept immediately below the carton number 450. Also, KitKat carton is kept at one of the positions above carton number 440. There is only one carton between KitKat carton and the carton the number given to which is less than that given to KitKat carton. The number given to KitKat carton is neither 400 nor 420. Only two cartons are kept between carton number 350 and Hershey carton. The difference in number of chocolate packets between Hershey carton and the carton immediately below it is 80. Ferrero carton is not the topmost carton. The number of chocolate packets in Ferrero carton is not 320. Only two cartons are kept between Ferrero carton and Nestle carton. Determine the carton between Nestle and Mars</p> <p>Which of the following is not true?</p>																					
Choices/Choice A	7-450-Cadbery																					
Choices/Choice B	5-440-Kitkat																					
Choices/Choice C	3-400-Cadbery																					
Choices/Choice D	7-450-Kitkat																					
Solution	A																					
Explanation	<p>From above statements, we have</p> <p>Only three cartons are kept between Oreo carton and carton number 440.</p> <p>Only two cartons are kept between Oreo carton and Mars carton.</p> <p>Mars carton is kept somewhere below carton number 440</p> <p>KitKat carton is kept immediately below the carton number 450</p> <p>KitKat carton is kept at one of the positions above carton number 440</p> <p>The probable conditions are</p> <p>Case I</p> <table border="1"> <tr> <td>7</td> <td>450</td> <td></td> </tr> <tr> <td>6</td> <td></td> <td>KitKat</td> </tr> <tr> <td>5</td> <td>440</td> <td></td> </tr> <tr> <td>4</td> <td></td> <td>Mars</td> </tr> <tr> <td>3</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> </tr> <tr> <td>1</td> <td></td> <td>Oreo</td> </tr> </table>	7	450		6		KitKat	5	440		4		Mars	3			2			1		Oreo
7	450																					
6		KitKat																				
5	440																					
4		Mars																				
3																						
2																						
1		Oreo																				



Case II

7	450	
6		KitKat
5	440	
4		
3		Mars
2		
1		Oreo

Case III

7	450	
6		KitKat
5	440	
4		
3		
2		Mars
1		Oreo

Only two cartons are kept between carton number 350 and Hershey carton.

Ferrero carton is not the topmost carton.

Ferrero carton number is not 320.

Only two cartons are kept between Ferrero carton and Nestle carton.

Only one carton is kept between Mars carton and the carton number 320.

7	450	
6	350	KitKat
5	440	Ferrero
4		Mars
3		Hershey
2	320	Nestle
1		Oreo

Case II

7	450	
6		KitKat
5	440	
4		



3		Mars
2		
1		Oreo

Case III

7	450	
6		KitKat
5	440	
4		
3		
2		Mars
1		Oreo

Case II and case III are rejected as they failed to meet the required criteria.

There is only one carton between KitKat carton and the carton the number given to which is less than that given to KitKat carton.

The difference between Hershey carton and the carton immediately below is 80. Here we can see only 320 and 400 has the difference 80. So, we can say that Hershey's carton contains 400 number of chocolate packets.

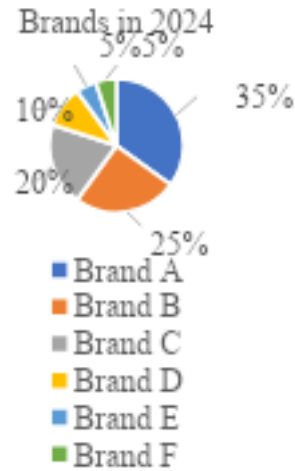
7	450	Cadbury
6	350	KitKat
5	440	Ferrero
4	300	Mars
3	400	Hershey
2	320	Nestle
1	420	Oreo

Hence, the correct choice is option A.

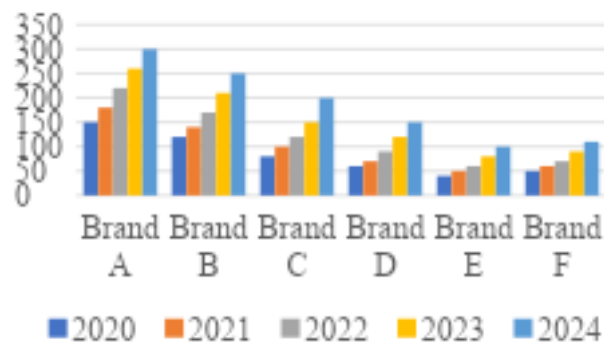
Question ID	49
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Logic and Data Interpretation: Data Interpretation
Question Details/Question Stem	The data presented provides an insightful analysis of the smartphone market and revenue trends over the past five years, focusing on market share distribution and yearly revenue growth for six prominent smartphone brands.



Market Share Distribution of Smartphone Brands in 2024



Yearly Revenue Growth (in Million USD) of 6 Smartphone Brands from 2020 to 2024



Customer Satisfaction Ratings of Smartphone Brands in 2024 (Out of 10)

Brand	Customer satisfaction Rating
Brand A	8.5
Brand B	7.9
Brand C	7.5
Brand D	6.8
Brand E	7.2
Brand F	7.0

If the total market share increases by 12% in 2025, calculate the projected market share for each brand based on their revenue growth rate from 2020 to 2024. Which brand is expected to see the largest increase in its market share in 2024? Which brand has the highest Revenue-to-Market Share ratio? Which brand has shown the most significant growth in revenue from 2020 to 2024?



Choices/Choice A	Part I: Brand A, Part II: Brand F, Part III: Brand E
Choices/Choice B	Part I: Brand E, Part II: Brand A, Part III: Brand F
Choices/Choice C	Part I: Brand D, Part II: Brand E, Part III: Brand C
Choices/Choice D	Part I: Brand A, Part II: Brand B, Part III: Brand C
Solution	A
Explanation	<p>Part I:</p> <p>Projected Revenue Growth for Each Brand:</p> <p>Brand A:</p> $= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$ $= 300 \text{ million USD} \times \frac{300}{150}$ $= 600 \text{ million USD}$ <p>Brand B</p> $= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$ $= 250 \text{ million USD} \times \frac{250}{120}$ $= 520.83 \text{ million USD}$ <p>Brand C</p> $= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$ $= 200 \text{ million USD} \times \frac{200}{80}$ $= 500 \text{ million USD}$ <p>Brand D</p> $= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$ $= 150 \text{ million USD} \times \frac{150}{60}$ $= 375 \text{ million USD}$ <p>Brand E</p>



$$= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$$

$$= 100 \text{ million USD} \times \frac{100}{40}$$

$$= 250 \text{ million USD}$$

Brand F

$$= \text{Current Revenue}(2024) \times \text{Growth Factor}(2020 \text{ to } 2024)$$

$$= 110 \text{ million USD} \times \frac{110}{50}$$

$$= 242 \text{ million USD}$$

Total Projected Market Revenue in 2025:

Total Revenue in 2024

$$= (300 + 250 + 200 + 150 + 100 + 110) \text{ million USD}$$

$$= 1110 \text{ million USD}$$

$$\text{Projected Total Market Revenue in 2025} = 1110 \text{ million USD} \times 1.12$$

$$= 1243.2 \text{ million USD}$$

Projected Market Share for Each Brand:

Brand A:

$$= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\%$$

$$= \frac{600}{1243.2} \times 100\%$$

$$= 48.2\%$$

Brand B:

$$= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\%$$

$$= \frac{520.83}{1243.2} \times 100\%$$

$$= 41.9\%$$



Brand C:

$$\begin{aligned} &= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\% \\ &= \frac{500}{1243.2} \times 100\% \\ &= 40.2\% \end{aligned}$$

Brand D:

$$\begin{aligned} &= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\% \\ &= \frac{375}{1243.2} \times 100\% \\ &= 30.1\% \end{aligned}$$

Brand E:

$$\begin{aligned} &= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\% \\ &= \frac{250}{1243.2} \times 100\% \\ &= 20.1\% \end{aligned}$$

Brand F:

$$\begin{aligned} &= \frac{\text{Brand's Total Revenue (or Sales)}}{\text{Total Revenue (or Sales) of All Brands}} \times 100\% \\ &= \frac{242}{1243.2} \times 100\% \\ &= 19.5\% \end{aligned}$$

Brand A sees the largest increase in market share, from 35% to 48.2%.

Part II:



Brand A: Revenue = 300 million, Market Share = 35%

$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{300\text{million USD}}{35\%} \\ &= 8.57\text{million USD per percent market share} \end{aligned}$$

Brand B: Revenue = 250 million, Market Share = 25%

$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{250\text{million USD}}{25\%} \\ &= 10\text{million USD per percent market share} \end{aligned}$$

Brand C: Revenue = 200 million, Market Share = 20%

$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{200\text{million USD}}{20\%} \\ &= 10\text{million USD per percent market share} \end{aligned}$$

Brand D: Revenue = 150 million, Market Share = 10%

$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{150\text{million USD}}{10\%} \\ &= 15\text{million USD per percent market share} \end{aligned}$$

Brand E: Revenue = 100 million, Market Share = 5%

$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{100\text{million USD}}{5\%} \\ &= 20\text{million USD per percent market share} \end{aligned}$$

Brand F: Revenue = 110 million, Market Share = 5%



$$\begin{aligned} &= \frac{\text{Revenue}}{\text{Market Share Percentage}} \\ &= \frac{110 \text{million USD}}{5\%} \\ &= 22 \text{million USD per percent market share} \end{aligned}$$

Part III:

Revenue Growth:

In 2020, Brand A had a revenue of 150 million USD.

In 2024, Brand A's revenue increased to 300 million USD.

This is an increase of 150 million USD over 5 years, which represents a growth of 100% in revenue.

Customer Satisfaction Rating:

Brand A has a customer satisfaction rating of 8.5/10 in 2024.

Correlation Between Revenue Growth and Customer Satisfaction:

The significant revenue growth of Brand A can be directly correlated with its high customer satisfaction rating of 8.5. This suggests that satisfied customers are likely a key factor in the brand's market success.

A higher customer satisfaction score typically indicates that customers are happy with the product quality, features, performance, and overall experience. This leads to repeat purchases, customer loyalty, and positive word-of-mouth recommendations, all of which drive higher sales and, ultimately, revenue growth.

Since Brand A's revenue doubled over the period from 2020 to 2024 and it has a high satisfaction rating, it suggests that the brand's product improvements or innovations were well received, leading to both increased sales and enhanced customer loyalty.

Hence, the correct option is option A.

Question ID	50
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Logic and Data Interpretation: Logical Reasoning



Question Details/Question Stem	<p>A row of persons facing north direction consist of equal number of boys and girls such that boys are sitting at the extreme ends. All the boys except one sit at even positions and all the girls except one sit at odd positions. Extreme left end of the row is positioned as 1 and the place immediate next to it as 2 and so on.</p> <ul style="list-style-type: none">• There is no one to the left of C who is fourth to the left of H who is immediate left of I.• Q sits at an extreme end and is third to the right of M who is a girl.• Only three boys are there to the right of K, who is a girl.• Y and N are immediate neighbours and Y is to the immediate left of Q with Y being a girl.• Only two persons are between I and M.• D who is not a boy is sitting adjacent to C and E.• L is fourth to the right of G who is on immediate right of E. <p>Who is the only girl sitting on an even-numbered position?</p>
Choices/Choice A	M
Choices/Choice B	D
Choices/Choice C	E
Choices/Choice D	H
Solution	B
Explanation	<p>A row of persons facing north direction consist of equal number of boys and girls such that boys are sitting at the extreme ends. All the boys except one sit at even positions and all the girls except one sit at odd positions.</p> <p>Extreme left end of the row is positioned as 1 and the place immediate next to it as 2 and so on.</p> <p>Given that</p> <p>There is no one to the left of C who is fourth to the left of H who is on immediate left of I.</p> <p>D who is not a boy is sitting adjacent to C and E.</p> <p>Q sits at an extreme end and is third to the right of M who is a girl.</p> <p>Only two persons are between I and M.</p> <p>Y is to the immediate left of Q with Y being a girl</p> <p>From the above we can write:</p> <p>With the hint that No one is to the left of C, it is clear that C sits at position no. 1 i.e. extreme left end and is the boy that sits at odd number position. Rest of the boys will sit at even numbered places.</p> <p>The second hint thus confirms Q to be sitting at extreme right end and he is also a boy. Thus, the position at extreme left end must be an even number.</p> <p>Using all the hints we can identify that there are 12 persons in the row, out of which 6 must be boys and 6 must be girls.</p> <p>With the hint that D is a girl and is adjacent to E, position of D can be fixed as between C and E. Thus, D sits at 2nd number and E at 3rd number.</p>



	<p>Now we have assigned all the odd numbered places to girls except one and thus occupied six places for girls and 6 for boys. Only three boys are there to the right of K, who is a girl. L is fourth to the right of G who is on immediate right of E. Thus, position of G can be fixed as between E and H and K is thus seated as in between K and M. Numbering the positions as 1 to 12 from left to right we get the following sequence</p> <p>C_{Boy} D_{Girl} E_{Girl} G_{Boy} H_{Girl} I_{Boy} K_{Girl} L_{Boy} M_{Girl} N_{Boy} Y_{Girl} Q_{Boy}</p> <p>1 2 3 4 5 6 7 8 9 10 11 12</p> <p>From the following explanation it is clear that D is the only girl that sits on an even numbered position Hence, the correct choice is option B.</p>
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Question ID	51
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Algorithmic Thinking (Distance and speed)
Question Details/Question Stem	<p>The Indrayani Express leaves Pune for Bombay at 17:30 hrs and reaches Bombay at 21:30 hrs, maintaining a constant speed. The Shatabdi Express leaves Bombay for Pune at 17:00 hrs and reaches Pune at 20:00 hrs, also maintaining a constant speed. Assume the distance between Pune and Bombay is 180 km.</p> <p>If both trains travel along the same straight track and maintain their constant speeds, at what distance from Pune will they pass each other?</p>
Choices/Choice A	63 km
Choices/Choice B	64.3 km
Choices/Choice C	65 km
Choices/Choice D	66.3 km
Solution	B
Explanation	<p>Calculating the speeds of both trains:</p> <p>Indrayani Express Departure: 17:30 hrs</p>



Arrival: 21:30 hrs

Total time: $21:30 - 17:30 = 4$ hours

Distance: 180 km

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{180\text{km}}{4\text{hr}} \\ &= 45\text{km/hr}\end{aligned}$$

Shatabdi Express

Departure: 17:00 hrs

Arrival: 20:00 hrs

Total time: $20:00 - 17:00 = 3$ hours

Distance: 180 km

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= \frac{180\text{km}}{3\text{hr}} \\ &= 60\text{km/hr}\end{aligned}$$

Determining their relative positions as functions of time:

Let t be the time elapsed after Indrayani departs (in hours) and meets with Shatabdi express.

Position of Indrayani Express (from Pune):

$$\text{Distance}_{\text{Indrayani}} = 45t$$

Position of Shatabdi Express (from Pune):

Shatabdi starts 30 minutes earlier, so when $t=0$, Shatabdi has already travelled

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 60\text{km/hr} \times 0.5\text{hr} \\ &= 30\text{km}\end{aligned}$$

$$\text{Distance}_{\text{Shatabdi}} = 180 - 60(t + 0.5)$$



	<p>Solving for when they meet:</p> <p>At the point where they meet,</p> $\text{Distance}_{\text{Indrayani}} = \text{Distance}_{\text{Shatabdi}}$ $45t = 180 - 60(t + 0.5)$ $45t = 180 - 60t - 30$ $45t + 60t = 180 - 30$ $105t = 150$ $t = \frac{150}{105}$ <p>Finding the distance from Pune:</p> <p>Substitute t into $\text{Distance}_{\text{Indrayani}}$</p> $\text{Distance}_{\text{Indrayani}} = 45\text{km/hr} \times \frac{150}{105}\text{hr}$ $\approx 64.3\text{km}$ <p>Hence, the correct option is option B.</p>
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Question ID	52
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Algorithmic Thinking (Ratio of Investments and Profit Sharing in a Business Partnership)
Question Details/Question Stem	Three partners, A, B, and C, invested in a business venture. They agreed to share the profits in the ratio 3: 5: 7. The durations for which each partner invested their capital were different. A invested for 6 months, B for 4 months, and C for 9 months. If the total profit earned was Rs. 28,000, how much profit did each partner receive, and what was the total investment made by each partner?
Choices/Choice A	A: Rs. 7,600, B: Rs. 10,333.35, C: Rs. 14,066.69.
Choices/Choice B	A: Rs. 5,600, B: Rs. 11,333.35, C: Rs. 10,066.69.
Choices/Choice C	A: Rs. 5,600, B: Rs. 9,333.35, C: Rs. 13,066.69.
Choices/Choice D	A: Rs. 6,600, B: Rs. 10,333.35, C: Rs. 13,066.69.
Solution	C
Explanation	The partners agreed to share the profit in the ratio 3:5:7, where:



A's share = 3 parts,

B's share = 5 parts,

C's share = 7 parts.

Determining the effective investment ratio

The total profit is divided according to the product of the capital invested and the duration of investment. Therefore, we need to calculate the "effective investment" for each partner, which is the product of the amount of capital and the number of months each partner invested.

Let the investments of A, B, and C be I_A , I_B , and I_C respectively, and their respective durations were 6, 4, and 9 months.

The effective investment ratio will be the product of the amounts invested and the number of months:

A's effective investment: $I_A \times 6$,

B's effective investment: $I_B \times 4$,

C's effective investment: $I_C \times 9$.

This effective investment ratio should be proportional to the profit-sharing ratio, which is 3:5:7. So, we have the proportion:

$$\frac{I_A \times 6}{3} = \frac{I_B \times 4}{5} = \frac{I_C \times 9}{7}$$

Let's use a common variable k to represent the proportion.

Solving for the investments:

From the equation, $\frac{I_A \times 6}{3} = k$, we get:

$$I_A = \frac{k}{2}$$

From the equation, $\frac{I_B \times 4}{5} = k$, we get:



$$I_B = \frac{5k}{4}$$

From the equation, $\frac{I_C \times 9}{7} = k$, we get:

$$I_C = \frac{7k}{9}$$

Finding the total profit distribution

Now, we know that the total profit is Rs. 28,000, and the ratio of profit sharing is 3:5:7. This means the total number of parts is:

$$3 + 5 + 7 = 15 \text{ parts}$$

Each part of the profit is worth:

$$\frac{28,000}{15} = \text{Rs. } 1,866.67$$

Calculating each partner's profit:

Now, calculate the profit each partner receives by multiplying the number of parts they are entitled to by the value of each part:

$$\text{A's profit: } 3 \times \text{Rs. } 1,866.67 = \text{Rs. } 5,600$$

$$\text{B's profit: } 5 \times \text{Rs. } 1,866.67 = \text{Rs. } 9,333.35$$

$$\text{C's profit: } 7 \times 1,866.67 = \text{Rs. } 13,066.69$$

The total profit distribution is:

A receives Rs. 5,600,

B receives Rs. 9,333.35,

C receives Rs. 13,066.69.

Hence, the correct option is option C.

Question ID	53
Question Type	MCQ-SC



Difficulty Level	Easy
Topic: Subtopic (concept)	Algorithmic Thinking (Ratio and Proportion)
Question Details/Question Stem	<p>Three friends, Sarah, Tom, and Emily, run a charity event to raise funds. They decide to divide the total money collected in the ratio 2:3:4 based on the number of hours they worked and the amount of effort they put in. However, they each worked for different durations and at different productivity levels:</p> <p>Sarah worked for 8 hours a day for 5 days and managed to collect Rs. 2,000 per day.</p> <p>Tom worked for 6 hours a day for 7 days and managed to collect Rs. 2,500 per day.</p> <p>Emily worked for 10 hours a day for 4 days and managed to collect Rs. 3,000 per day.</p> <p>What is the ratio of their total contributions to the charity funds, and how much money did each friend contribute if the total funds raised were Rs. 45,000?</p>
Choices/Choice A	Ratio: 5:6:6, Contributions: Sarah: Rs. 12,588.24, Tom: Rs. 14,529.41, Emily: Rs. 15,882.36
Choices/Choice B	Ratio: 3:5:6, Contributions: Sarah: Rs. 12,588.24, Tom: Rs. 20,529.41, Emily: Rs. 19,882.36
Choices/Choice C	Ratio: 4:7:6, Contributions: Sarah: Rs. 10,588.24, Tom: Rs. 18,529.41, Emily: Rs. 15,882.36
Choices/Choice D	Ratio: 5:8:6, Contributions: Sarah: Rs. 10,788.24, Tom: Rs. 18,829.41, Emily: Rs. 17,882.36
Solution	C
Explanation	<p>Sarah's Contribution</p> <p>Sarah worked 8 hours per day for 5 days.</p> <p>She collected Rs. 2,000 per day.</p> <p>Total funds collected by Sarah:</p> <p>Sarah's Contribution = $2,000 \times 5 = \text{Rs. } 10,000$</p> <p>Tom's Contribution</p> <p>Tom worked 6 hours per day for 7 days.</p> <p>He collected Rs. 2,500 per day.</p> <p>Total funds collected by Tom:</p>



Tom's Contribution = $2,500 \times 7 = \text{Rs. } 17,500$

Emily's Contribution

Emily worked 10 hours per day for 4 days.

She collected Rs. 3,000 per day.

Total funds collected by Emily:

Emily's Contribution = $\text{Rs. } 3,000 \times 4 = \text{Rs. } 12,000$

The total funds raised by the charity event are:

Total Funds

= Sarah's Contribution + Tom's Contribution + Emily's Contribution

= $\text{Rs. } 10,000 + \text{Rs. } 17,500 + \text{Rs. } 12,000$

= $\text{Rs. } 39,500$

The ratio of their contributions is:

Sarah : Tom : Emily = $10,000 : 17,500 : 12,000$

Simplify this ratio:

Divide through by 500: $20 : 35 : 24$

Calculating individual shares if total funds raised were Rs. 45,000

Total parts in the ratio = $20 + 35 + 24 = 79$

Value of one part = $\text{Rs. } 45000 / 79$

= $\text{Rs. } 569.62$

Sarah's Share:

Sarah's Share = $20 \times \text{Rs. } 569.62$

= $\text{Rs. } 11392.4$

Tom's Share:

Tom's Share = $35 \times \text{Rs. } 569.62$



	<p style="text-align: center;">= Rs. 19936.7</p> <p>Emily's Share:</p> <p style="text-align: center;">Emily's Share = $6 \times \text{Rs.}2,647.06$ = Rs.15,882.36</p> <p>Hence, the ratio is 4:7:6.</p> <p>The contribution by each person is:</p> <p>Sarah: Rs. 10,588.24</p> <p>Tom: Rs. 18,529.41</p> <p>Emily: Rs. 15,882.36</p> <p>Hence, the correct option is option C.</p>
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Question ID	54
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Algorithmic Thinking (Problem-solving using balance scales)
Question Details/Question Stem	<p>A chemist has a balance scale and four weights: 1 g, 3 g, 9 g, and 27 g.</p> <p>Using these weights, the chemist needs to measure any whole number weight from 1 g to 40 g.</p> <p>However, the chemist can use each weight only once in a measurement and must always achieve balance.</p> <p>How many unique measurements can the chemist make?</p>
Choices/Choice A	20
Choices/Choice B	40
Choices/Choice C	30
Choices/Choice D	81
Solution	B
Explanation	<p>Using the weights 1 g, 3 g, 9 g, and 27 g, the chemist can place weights on either side of the balance scale or not use them at all. This ability to place weights on either pan creates a ternary system (-1, 0, +1) for each weight.</p> <p>Each weight contributes three possible states:</p> <p>+1: Placed on the pan with the object.</p>



	<p>0: Not used.</p> <p>-1: Placed on the opposite pan.</p> <p>Total Combinations: With 4 weights and 3 states (-1,0, +1), the total number of combinations is:</p> $3^4 = 81$ <p>Range of Measurable Weights: While there are 81 combinations, not all result in unique measurements. The possible range of measurable weights is determined by the maximum sum of the weights:</p> $1 + 3 + 9 + 27 = 40$ <p>This means the chemist can measure every integer weight from -40 to +40, excluding 0. To measure any whole number weight from 1 g to 40 g, the chemist can achieve exactly 40 unique positive weights. Hence, the correct option is option B.</p>
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Question ID	55
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Algorithmic Thinking (Combination)
Question Details/Question Stem	<p>A company is organizing a conference with 7 speakers, each with a unique presentation topic. The conference will take place over a 3-day period, and each day can have a maximum of 3 speakers. The conference organizers need to assign the speakers to different days, ensuring that:</p> <ol style="list-style-type: none">1. Each day has at least one speaker.2. Speaker 1, who is a key speaker, must speak on the first day.3. Speaker 2 and Speaker 3 must not speak on the same day.4. Speakers 4, 5, 6, and 7 can be freely assigned to any of the three days, but no day can have more than 3 speakers. <p>If Speaker 1 must speak first, and there are additional restrictions on the number of speakers allowed per day (i.e., the total number of speakers per day must be 2, 2, and 3), how many different ways can the remaining speakers (2, 3, 4, 5, 6, 7) be assigned to the remaining available slots?</p>
Choices/Choice A	300
Choices/Choice B	720



Choices/Choice C	510
Choices/Choice D	830
Solution	B
Explanation	<p>Understanding the New Constraint</p> <p>In this version of the problem, we have an additional constraint:</p> <ul style="list-style-type: none">• There must be exactly 2 speakers on two days and exactly 3 speakers on one day. <p>Assigning 2 Speakers to Each of Two Days and 3 Speakers to One Day</p> <p>We must divide the 6 remaining speakers into 2 groups of 2 speakers and 1 group of 3 speakers. This can be done in the following way:</p> <ol style="list-style-type: none">1. Choose 3 speakers out of the 6 to place on one of the days. This can be done in $\binom{6}{3}$ ways and arranging them would be in $3!$ ways.2. The remaining 3 speakers are automatically divided into two groups of 2 speakers each, which will be placed on the other two days. <p>Assigning the Groups to the Days</p> <p>We need to assign:</p> <ul style="list-style-type: none">• The group of 3 speakers to one day.• The two groups of 2 speakers to the other two days. <p>The number of ways to assign the 3-speaker group to one of the days is 3 (since there are 3 days left).</p> <p>For the two groups of 2 speakers, once the 3-speaker group is placed on a day, the two groups of 2 speakers must be assigned to the remaining two days. The two groups of 2 can be swapped, so there are 2 ways to assign the remaining groups.</p> <p>Calculating the Number of Assignments:</p> <p>Thus, the total number of ways to assign the remaining 6 speakers to the 3 days is:</p>



$$\binom{6}{3} \times 3 \times 2 \times 3! = 720$$

So, there are 120 different ways to assign the remaining 6 speakers to the available slots, satisfying all the given constraints.

Hence, the correct option is option B.

Question ID	56
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Algorithmic Thinking (Planning and Optimization)
Question Details/Question Stem	<p>A textile company has two sewing machines: Machine A and Machine B.</p> <p>Machine A can stitch 250 shirts in 5 hours.</p> <p>Machine B can stitch 180 pants in 6 hours.</p> <p>The company operates both machines simultaneously for 10 hours each day. How many shirts and pants can the company produce in 10 days?</p> <p>After successfully completing the production of shirts and pants, the textile company receives a new order for 6,000 shirts to be completed in 12 days. The company will still operate both machines, Machine A and Machine B, for 10 hours each day. However, this time, the company will only use Machine A for shirt production. If Machine A can stitch 50 shirts per hour, how many hours per day will Machine A need to operate in order to meet the target of 6,000 shirts in 12 days?</p>
Choices/Choice A	2,500 shirts and 2,000 pants, 8 hours/day
Choices/Choice B	2,000 shirts and 3,000 pants, 12 hours/day
Choices/Choice C	5,000 shirts and 3,000 pants, 10 hours/day
Choices/Choice D	3,400 shirts and 2,000 pants, 14 hours/day
Solution	C
Explanation	<p>Calculating the rate of production for each machine:</p> $\text{Machine A's rate (shirts per hour)} = \frac{250}{5}$ $= \frac{50 \text{ shirts}}{\text{hour}}$



Machine B's rate (pants per hour) = $\frac{180}{6}$
= 30pants / hour

Calculating the total production per day:

Machine A can produce $50 \times 10 = \frac{500\text{shirts}}{\text{day}}$

Machine B can produce $30 \times 10 = \frac{300\text{pants}}{\text{day}}$

Calculating the total production for 10 days:

Total shirts produced in 10 days = 500×10
= 5,000 shirts

Total pants produced in 10 days = 300×10
= 3,000 pants

Hence, 5000 shirts and 3000 pants are produced in 10 days.

Calculating the total number of shirts required per day:

The company needs to produce 6,000 shirts in 12 days, so the required number of shirts per day is:

$$\frac{6000}{12} = 500\text{shirts / day.}$$

Determine the number of shirts Machine A can produce per hour:
Machine A can stitch 50 shirts per hour.

Calculate the number of hours Machine A needs to operate each day:
To produce 500 shirts/day, Machine A needs to operate for:

$$\frac{500}{50} = \frac{10\text{hours}}{\text{day}}$$

Machine A need to operate 10 hours in order to meet the target of 6,000 shirts in 12 days.
Hence, the correct option is option C.

Question ID	57
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: (concept)	Subtopic Algorithmic Thinking (Percentage and Inclusion Exclusion)



Question Details/Question Stem	<p>In a school, students participated in three competitive exams: Math, Science, and English. Of the 200 students: 120 scored in Math, 150 scored in Science, and 140 scored in English.</p> <p>The average scores for these exams were:</p> <p>Math: 75, Science: 80, English: 85.</p> <p>Additional data:</p> <p>60 students scored in both Math and Science, 50 students scored in both Science and English, 40 students scored in both Math and English, 20 students scored in all three exams.</p> <p>How many students scored in at least one of the three exams? If the students scoring in all three exams had an average score of 90, what is the overall average score of students who participated in at least one exam?</p>
Choices/Choice A	Question 1:280 students, Question 2:81.2
Choices/Choice B	Question 1:480 students, Question 2:88
Choices/Choice C	Question 1:340 students, Question 2:85
Choices/Choice D	Question 1:560 students, Question 2:91
Solution	A
Explanation	<p>We use the principle of inclusion-exclusion to calculate the total number of students who scored in at least one of the three exams.</p> <p>Let:</p> <p>$M=120$ (students scoring in Math), $S=150$ (students scoring in Science), $E=140$ (students scoring in English), $M \cap S=60$ (students scoring in both Math and Science), $S \cap E=50$ (students scoring in both Science and English), $M \cap E=40$ (students scoring in both Math and English), $M \cap S \cap E=20$ (students scoring in all three exams).</p>



Using the inclusion-exclusion formula:

$$M \cup S \cup E = M + S + E - M \cap S - S \cap E - M \cap E + M \cap S \cap E$$

Substituting the values:

$$M \cup S \cup E = 120 + 150 + 140 - 60 - 50 - 40 + 20 = 280$$

So, 280 students scored in at least one exam.

To calculate the overall average, we need the total scores contributed by each group of students and then divide by the total number of students scoring in at least one exam.

Calculate the contributions from individual exams

Math:

Students = 120, Average Score = 75.

$$\text{Contribution} = 120 \times 75 = 9,000$$

Science:

Students = 150, Average Score = 80.

$$\text{Contribution} = 150 \times 80 = 12,000$$

English:

Students = 140, Average Score = 85.

$$\text{Contribution} = 140 \times 85 = 11,900$$

The overlapping students were counted multiple times in the groups above. Their contributions have to be subtracted.

Math and Science ($M \cap S$):

$$\text{Average Score} = \frac{(75+80)}{2} = 77.5$$

Students = 60,

$$\text{Contribution} = 60 \times 77.5 = 4,650$$

Science and English ($S \cap E$):

$$\text{Average Score} = \frac{(80+85)}{2} = 82.5$$

Students = 50,

$$\text{Contribution} = 50 \times 82.5 = 4,125$$

Math and English ($M \cap E$):

$$\text{Average Score} = \frac{(75+85)}{2} = 80$$

Students = 40,

$$\text{Contribution} = 40 \times 80 = 3,200$$



	<p>All Three Exams ($M \cap S \cap E$): Students = 20, Average Score = 90. Contribution = $20 \times 90 = 1,800$</p> <p>Calculate the net total score</p> <p>Using inclusion-exclusion to adjust for overlaps:</p> $\begin{aligned} \text{Total Score} &= 9,000 + 12,000 + 11,900 - 4,650 - 4,125 - 3,200 + 1,800 \\ &= 22,725 \end{aligned}$ <p>Calculating the overall average score:</p> $\begin{aligned} \text{Overall Average} &= \frac{\text{Total Score}}{\text{Total Students}} \\ &= \frac{22,725}{280} \\ &= 81.2 \end{aligned}$ <p>Hence, the correct option is option A.</p>
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Question ID	58
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: (concept)	Subtopic Algorithmic Thinking (Linear Programming)
Question Details/Question Stem	<p>A charity group is organizing a bake sale to raise funds. They plan to sell three types of baked goods: muffins, cookies, and brownies. Each item will be sold in packs, with specific pack sizes and prices:</p> <p>Muffins: Sold in packs of 5 for \$7.</p> <p>Cookies: Sold in packs of 10 for \$9.</p> <p>Brownies: Sold in packs of 8 for \$11.</p> <p>The group has a budget of \$180 for ingredients, and the cost to produce each pack is as follows:</p> <p>Muffins: \$3 per pack</p> <p>Cookies: \$5 per pack</p> <p>Brownies: \$6 per pack</p>



	<p>The group wants to maximize their earnings while staying within the budget.</p> <p>How many packs of each item should they produce to maximize their earnings? If they decide to donate 25% of their total earnings to charity, how much will they donate?</p>
Choices/Choice A	Packs of items: 15 packs of muffins, 6 packs of cookies, 7 packs of brownies, Amount donated: \$59
Choices/Choice B	Packs of items: 12 packs of muffins, 8 packs of cookies, 6 packs of brownies, Amount donated: \$46
Choices/Choice C	Packs of items: 10 packs of muffins, 10 packs of cookies, 5 packs of brownies, Amount donated: \$75
Choices/Choice D	Packs of items: 8 packs of muffins, 12 packs of cookies, 6 packs of brownies, Amount donated: \$65
Solution	A
Explanation	<p>Maximizing the Packs (Question 1)</p> <p>Budget Constraint: Total cost to produce packs:</p> $3x + 5y + 6z \leq 180$ <p>where x, y, z are the number of packs of muffins, cookies, and brownies, respectively.</p> <p>Maximizing Earnings: Total earnings from sales: $7x + 9y + 11z$</p> <p>Observing the options to evaluate the answer:</p> <p>Option A: $x=15, y=6, z=7$: Cost = $3(15) + 5(6) + 6(7)$ $= 45 + 30 + 42$ $= 117$</p> <p>Earnings = $7(15) + 9(6) + 11(7)$ $= 105 + 54 + 77$ $= 236$</p> <p>Option B: $x=12, y=8, z=6$: Cost = $3(12) + 5(8) + 6(6)$ $= 36 + 40 + 36$ $= 112$</p>



	<p>Earnings = $7(12) + 9(8) + 11(6)$ = $84 + 72 + 66$ = 222</p> <p>Option C: $x=10, y=10, z=5$: Cost = $3(10) + 5(10) + 6(5)$ = $30 + 50 + 30$ = 110</p> <p>Earnings = $7(10) + 9(10) + 11(5)$ = $70 + 90 + 55$ = 215</p> <p>Option D: $x=8, y=12, z=6$: Cost = $3(8) + 5(12) + 6(6)$ = $24 + 60 + 36$ = 120</p> <p>Earnings = $7(8) + 9(12) + 11(6)$ = $56 + 108 + 66$ = 230</p> <p>Hence, Option 1 (15 packs of muffins, 6 packs of cookies, 7 packs of brownies) is correct.</p> <p>Donation to Charity:</p> <p>From Option 1, total earnings = \$236</p> <p>Donation = 25% of \$236 $\\$236 \times 0.25 = \\59</p> <p>If they decide to donate 25% of their total earnings to charity, they will donate \$59.</p> <p>Hence, the correct option is option D.</p>
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Question ID	59
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Algorithmic Thinking (Optimization and Network Design)
Question Details/Question Stem	A logistics company is planning to build a transportation network to connect five warehouses in different cities. The company aims



	<p>to minimize the total construction cost of roads while considering the distances between the cities and the terrain type.</p> <p>The distances between the cities are as follows:</p> <ul style="list-style-type: none">● City A to City B: 200 km● City A to City C: 150 km● City A to City D: 300 km● City A to City E: 250 km● City B to City C: 100 km● City B to City D: 350 km● City B to City E: 400 km● City C to City D: 150 km● City C to City E: 200 km● City D to City E: 250 km <p>Terrain Types and Cost per Kilometer:</p> <ul style="list-style-type: none">● Flat terrain: \$4 per kilometer● Hilly terrain: \$6 per kilometer● Mountainous terrain: \$8 per kilometer <p>Choose the correct option regarding connecting the cities in the most cost-effective way by minimizing the total cost of constructing the roads while considering the distances and terrain types.</p>
Choices/Choice A	Connect City A to City B via flat terrain, City B to City C via mountainous terrain, City C to City D via flat terrain, and City D to City E via hilly terrain.
Choices/Choice B	Connect City A to City B via hilly terrain, City B to City C via flat terrain, City C to City D via mountainous terrain, and City D to City E via flat terrain.
Choices/Choice C	Connect City A to City B via mountainous terrain, City B to City C via flat terrain, City C to City D via hilly terrain, and City D to City E via flat terrain.
Choices/Choice D	Connect City A to City B via flat terrain, City B to City C via hilly terrain, City C to City D via flat terrain, and City D to City E via mountainous terrain.
Solution	A
Explanation	<p>Total cost calculation for option A:</p> <p>City A to City B (200 km, flat): $200 \times \\$4 = \\800</p> <p>City B to City C (100 km, mountainous): $100 \times \\$8 = \\800</p>



City C to City D (150 km, flat): $\$150 \times \$4 = \$600$

City D to City E (250 km, hilly): $\$250 \times \$6 = \$1500$

Total cost = $\$800 + \$800 + \$600 + \$1500 = \$3700$

Total cost calculation for option B:

City A to City B (200 km, hilly): $\$200 \times \$6 = \$1200$

City B to City C (100 km, flat): $\$100 \times \$4 = \$400$

City C to City D (150 km, mountainous): $\$150 \times \$8 = \$1200$

City D to City E (250 km, flat): $\$250 \times \$4 = \$1000$

Total cost = $\$1200 + \$400 + \$1200 + \$1000 = \$3800$

Total cost calculation for option C

City A to City B (200 km, mountainous): $\$200 \times \$8 = \$1600$

City B to City C (100 km, flat): $\$100 \times \$4 = \$400$

City C to City D (150 km, hilly): $\$150 \times \$6 = \$900$

City D to City E (250 km, flat): $\$250 \times \$4 = \$1000$

Total cost = $\$1600 + \$400 + \$900 + \$1000 = \$3900$

Total cost calculation of option D:

City A to City B (200 km, flat): $\$200 \times \$4 = \$800$

City B to City C (100 km, hilly): $\$100 \times \$6 = \$600$

City C to City D (150 km, flat): $\$150 \times \$4 = \$600$



	<p>City D to City E (250 km, mountainous): $\\$250 \times \\$8 = \\$2000$</p> <p>Total cost = $\\$800 + \\$600 + \\$600 + \\$2000 = \\$4000$</p> <p>To minimize the total construction cost while considering the terrain types and distances, we compare the total costs from each option.</p> <ul style="list-style-type: none">• Option A results in a total cost of \$3700.• Option B results in a total cost of \$3800.• Option C results in a total cost of \$3900.• Option D results in a total cost of \$4000. <p>Clearly, Option A provides the most cost-effective route for connecting the cities, as it yields the lowest total construction cost of \$3700.</p> <p>City A to City B: Connecting via flat terrain is the most cost-effective choice, as the cost is \$4 per kilometer.</p> <p>City B to City C: Connecting via mountainous terrain is the least costly option among the available choices, even though mountainous terrain typically costs more. In this case, it costs \$8 per kilometer but still results in a lower overall total cost due to the shorter distance.</p> <p>City C to City D: Connecting via flat terrain is the optimal choice, as it costs \$4 per kilometer, making it the most cost-efficient option for this segment.</p> <p>City D to City E: Connecting via hilly terrain is chosen, despite the higher cost per kilometer (\$6), because the distance is long (250 km), and the overall cost still remains lower than other terrain combinations.</p> <p>Hence, the correct option is option A.</p>
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Question ID	60
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Algorithmic Thinking (Pipes and Cisterns)
Question Details/Question Stem	A large water tank (cistern) is connected to two different water pipes, Pipe A and Pipe B. Both pipes are used to fill the tank, but their efficiencies vary. The cistern has a capacity of 12,000 liters and is initially empty. The pipes have the following characteristics:



	<p>Pipe A can fill the tank in 12 hours when operating at 100% efficiency. However, it operates at 75% efficiency due to wear and tear.</p> <p>Pipe B can fill the tank in 15 hours when operating at 100% efficiency. It operates at 90% efficiency due to higher quality maintenance and better performance.</p> <p>If both pipes (Pipe A and Pipe B) are used together to fill the cistern, how long will it take to fill the entire tank, considering their respective efficiencies? If the efficiency of Pipe A improves to 85% and Pipe B's efficiency drops to 80%, how does this change the time required to fill the tank when both pipes are used together?</p>
Choices/Choice A	Original time=5.16 hours, New time=10.07 hours
Choices/Choice B	Original time=4.16 hours, New time=6.07 hours
Choices/Choice C	Original time=8.16 hours, New time=8.05 hours
Choices/Choice D	Original time=7.16 hours, New time=9.07 hours
Solution	C
Explanation	<p>Capacity of the cistern = 12,000 liters.</p> <p>Pipe A (100% efficiency): $\frac{12000\text{liters}}{12\text{hours}} = 1000\text{liters / hour}$ Fills in 12 hours:</p> <p>Pipe A (75% efficiency): Fills at $1000 \times 0.75 = 750\text{liters / hour}$</p> <p>Pipe B (100% efficiency): Fills in 15 hours: $\frac{12000\text{litres}}{15\text{hours}} = 800\text{liters / hour}$</p> <p>Pipe B (90% efficiency): Fills at $800 \times 0.9 = 720\text{liters / hour}$</p> <p>Time to Fill the Tank with Both Pipes Working Together</p> <p>Combined rate of filling = Rate of Pipe A (at 75% efficiency) + Rate of Pipe B (at 90% efficiency)</p> <p>$750\text{liters/hour} + 720\text{liters/hour} = 1470\text{liters/hour}$</p> <p>Now, to calculate the time to fill the entire cistern:</p> $\begin{aligned}\text{Time to fill tank} &= \frac{\text{Cistern Capacity}}{\text{Combined Rate}} \\ &= \frac{12000\text{liters}}{1470\text{liters / hour}} \\ &= 8.16\text{hours}\end{aligned}$



So, the time to fill the tank with both pipes working together at their current efficiency levels is approximately 8.16 hours.

Effect of Efficiency Changes

- New efficiency of Pipe A = 85%, so the new rate of Pipe A is $1000 \times 0.85 = 850$ liters / hour
- New efficiency of Pipe B = 80%, so the new rate of Pipe B is $800 \times 0.8 = 640$ liters/hour

Now, the combined rate of both pipes working together at the new efficiency levels:

$$\begin{aligned}\text{Combined Rate (new)} &= 850 \text{ liters / hour} + 640 \text{ liters / hour} \\ &= 1490 \text{ liters / hour}\end{aligned}$$

The new time to fill the tank is:

$$\begin{aligned}\text{New Time} &= \frac{12000 \text{ liters}}{1490 \text{ liters / hour}} \\ &\approx 8.05 \text{ hours}\end{aligned}$$

Thus, the time to fill the tank with both pipes working together at the new efficiency levels is approximately 8.05 hours.

Hence, the correct option is option C.



Section - 4 English

Question ID	61
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Summary and Tone of the Passage
Question Details/Question Stem	<p>DNA, or deoxyribonucleic acid, is the molecular foundation of all living organisms, serving as the instruction manual for growth, development, functioning, and reproduction. It is found in nearly every cell, and it carries the genetic information that defines an organism's traits, from eye colour to susceptibility to certain diseases. This intricate molecule is often termed the "blueprint of life" due to its critical role in heredity and biological diversity.</p> <p>Structurally, DNA is a double helix, resembling a twisted ladder. The sides of the ladder are composed of sugar and phosphate molecules, while the rungs consist of nitrogenous base pairs. These bases—adenine (A), thymine (T), cytosine (C), and guanine (G)—form specific pairings: A pairs with T, and C pairs with G. This complementary base-pairing is fundamental to DNA's ability to replicate and transmit genetic information accurately.</p> <p>Replication is one of DNA's most vital functions, ensuring that genetic material is copied and passed on during cell division. This process begins when the double helix unwinds, and enzymes synthesise two identical DNA strands by pairing complementary bases. This mechanism enables organisms to grow, repair damaged tissues, and reproduce, ensuring the continuity of life.</p> <p>DNA also directs the synthesis of proteins, which are essential for cell structure and function. Through transcription, a segment of DNA is converted into messenger RNA (mRNA), which serves as a template. During translation, the mRNA is read by ribosomes to assemble amino acids into proteins, guided by the sequence of the original DNA.</p> <p>Beyond its biological role, DNA has become a cornerstone of modern science and technology. Fields like genetic engineering, forensic science, and personalised medicine have harnessed DNA's power to revolutionise how we address challenges in healthcare, agriculture, and crime-solving. Breakthroughs such as CRISPR gene editing allow scientists to modify specific genes, offering promising treatments for genetic disorders and the potential to enhance crop yields.</p>



	<p>Despite its vast potential, DNA research raises ethical and societal questions, particularly concerning genetic privacy, cloning, and genetic modification. Balancing innovation with ethical responsibility is crucial as we unlock DNA's mysteries.</p> <p>In summary, DNA is far more than a molecular structure; it is a masterful code that shapes the essence of life, driving scientific discovery and innovation while challenging us to navigate its profound implications responsibly.</p> <p>What is the primary tone of the passage about DNA, and which sentence best summarises its main idea?</p>
Choices/Choice A	Informative; DNA is the foundation of life and plays a critical role in heredity and scientific advancements.
Choices/Choice B	Persuasive; DNA research should be prioritised over all other scientific fields.
Choices/Choice C	Critical; DNA raises more ethical concerns than scientific benefits.
Choices/Choice D	Reflective; DNA helps us understand the mysteries of life but has limited practical applications.
Solution	A
Explanation	<p>The passage's tone is informative, providing detailed knowledge about DNA's structure, functions, and significance in biology and modern science. It highlights how DNA serves as the blueprint of life, explaining its role in heredity, protein synthesis, and technological advancements like genetic engineering and CRISPR. The passage does not argue, criticise, or reflect emotionally but aims to educate readers. Option A summarises the key idea that DNA is fundamental to life and drives biological understanding and scientific innovation. Other options misinterpret the passage's intent or tone, making A the most accurate choice. Hence, the correct option is A.</p>



Question ID	62
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Supporting and Opposing Arguments
Question Details/Question Stem	DNA, or deoxyribonucleic acid, is the molecular foundation of all living organisms, serving as the instruction manual for growth, development, functioning, and reproduction. It is found in nearly



every cell, and it carries the genetic information that defines an organism's traits, from eye colour to susceptibility to certain diseases. This intricate molecule is often termed the "blueprint of life" due to its critical role in heredity and biological diversity.

Structurally, DNA is a double helix, resembling a twisted ladder. The sides of the ladder are composed of sugar and phosphate molecules, while the rungs consist of nitrogenous base pairs. These bases—adenine (A), thymine (T), cytosine (C), and guanine (G)—form specific pairings: A pairs with T, and C pairs with G. This complementary base-pairing is fundamental to DNA's ability to replicate and transmit genetic information accurately.

Replication is one of DNA's most vital functions, ensuring that genetic material is copied and passed on during cell division. This process begins when the double helix unwinds, and enzymes synthesise two identical DNA strands by pairing complementary bases. This mechanism enables organisms to grow, repair damaged tissues, and reproduce, ensuring the continuity of life.

DNA also directs the synthesis of proteins, which are essential for cell structure and function. Through transcription, a segment of DNA is converted into messenger RNA (mRNA), which serves as a template. During translation, the mRNA is read by ribosomes to assemble amino acids into proteins, guided by the sequence of the original DNA.

Beyond its biological role, DNA has become a cornerstone of modern science and technology. Fields like genetic engineering, forensic science, and personalised medicine have harnessed DNA's power to revolutionise how we address challenges in healthcare, agriculture, and crime-solving. Breakthroughs such as CRISPR gene editing allow scientists to modify specific genes, offering promising treatments for genetic disorders and the potential to enhance crop yields.

Despite its vast potential, DNA research raises ethical and societal questions, particularly concerning genetic privacy, cloning, and genetic modification. Balancing innovation with ethical responsibility is crucial as we unlock DNA's mysteries.

In summary, DNA is far more than a molecular structure; it is a masterful code that shapes the essence of life, driving scientific discovery and innovation while challenging us to navigate its profound implications responsibly.

Which statement from the passage supports the argument that DNA research has practical benefits?



Choices/Choice A	“DNA, or deoxyribonucleic acid, is the molecular foundation of all living organisms, serving as the instruction manual for growth, development, functioning, and reproduction.”
Choices/Choice B	“Fields like genetic engineering, forensic science, and personalised medicine have harnessed DNA's power to revolutionise how we address challenges in healthcare, agriculture, and crime-solving.”
Choices/Choice C	“DNA research raises ethical and societal questions, particularly concerning genetic privacy, cloning, and genetic modification.”
Choices/Choice D	“Balancing innovation with ethical responsibility is crucial as we unlock DNA's mysteries.”
Solution	B
Explanation	The correct answer is B because it directly supports the argument that DNA research has practical benefits. It highlights how DNA is used in fields like genetic engineering, forensic science, and personalised medicine to solve real-world challenges in healthcare, agriculture, and crime-solving. These are clear examples of how DNA research translates into tangible outcomes. Options A and D describe DNA's functions and ethical considerations but do not directly support its practical applications. Option C discusses concerns about DNA research, offering an opposing view regarding ethical issues, rather than supporting its benefits. Hence, the correct option is B.

Question ID	63
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Error and Correct Usage Identification
Question Details/Question Stem	<p>DNA, or deoxyribonucleic acid, is the molecular foundation of all living organisms, serving as the instruction manual for growth, development, functioning, and reproduction. It is found in nearly every cell, and it carries the genetic information that defines an organism's traits, from eye colour to susceptibility to certain diseases. This intricate molecule is often termed the "blueprint of life" due to its critical role in heredity and biological diversity.</p> <p>Structurally, DNA is a double helix, resembling a twisted ladder. The sides of the ladder are composed of sugar and phosphate molecules, while the rungs consist of nitrogenous base pairs. These bases—adenine (A), thymine (T), cytosine (C), and guanine (G)—form specific pairings: A pairs with T, and C pairs with G.</p>



	<p>This complementary base-pairing is fundamental to DNA's ability to replicate and transmit genetic information accurately.</p> <p>Replication is one of DNA's most vital functions, ensuring that genetic material is copied and passed on during cell division. This process begins when the double helix unwinds, and enzymes synthesise two identical DNA strands by pairing complementary bases. This mechanism enables organisms to grow, repair damaged tissues, and reproduce, ensuring the continuity of life.</p> <p>DNA also directs the synthesis of proteins, which are essential for cell structure and function. Through transcription, a segment of DNA is converted into messenger RNA (mRNA), which serves as a template. During translation, the mRNA is read by ribosomes to assembling amino acids into proteins, guided by the sequence of the original DNA.</p> <p>Beyond its biological role, DNA has become a cornerstone of modern science and technology. Fields like genetic engineering, forensic science, and personalised medicine have harnessed DNA's power to revolutionise how we address challenges in healthcare, agriculture, and crime-solving. Breakthroughs such as CRISPR gene editing allow scientists to modify specific genes, offering promising treatments for genetic disorders and the potential to enhance crop yields.</p> <p>Despite its vast potential, DNA research raises ethical and societal questions, particularly concerning genetic privacy, cloning, and genetic modification. Balancing innovation with ethical responsibility is crucial as we unlock DNA's mysteries.</p> <p>In summary, DNA is far more than a molecular structure; it is a masterful code that shapes the essence of life, driving scientific discovery and innovation while challenging us to navigate its profound implications responsibly.</p> <p>Identify the sentence with the incorrect usage of a word or phrase:</p>
Choices/Choice A	During translation, the mRNA is read by ribosomes to assembling amino acids into proteins, guided by the sequence of the original DNA.
Choices/Choice B	Through transcription, a segment of DNA is converted into messenger RNA (mRNA), which serves as a template.
Choices/Choice C	Despite its vast potential, DNA research raises ethical and societal questions, particularly concerning genetic privacy, cloning, and genetic modification.



Choices/Choice D	This mechanism enables organisms to grow, repair damaged tissues, and reproduce, ensuring the continuity of life.
Solution	A
Explanation	The sentence contains the phrase "to assembling," which is incorrect because the preposition "to" should be followed by the base (infinitive) form of the verb, not the gerund. The correct phrase is "to assemble," which accurately indicates the purpose or intended action performed by ribosomes during translation. In this context, the ribosomes' role is to "assemble" amino acids into proteins, as guided by the mRNA sequence. Hence, the incorrect usage is option A.

Question ID	64
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Cause and Effect Relationship
Question Details/Question Stem	<p>Ancient Egypt, one of the earliest and most enduring civilisations, flourished along the Nile River for over three millennia. Its remarkable achievements in architecture, art, science, and governance have left a lasting imprint on history, influencing cultures and societies across the world.</p> <p>Emerging around 3100 BCE with the unification of Upper and Lower Egypt under the first pharaoh, King Narmer, the civilisation was defined by its centralised governance. The pharaohs were not only political leaders but also considered divine, serving as intermediaries between the gods and the people. This belief in divine rulership underscored many aspects of Egyptian society, including their monumental architectural endeavours.</p> <p>The construction of the iconic pyramids, such as the Great Pyramid of Giza, demonstrated the Egyptians' advanced knowledge of engineering and mathematics. These grand structures served as tombs for pharaohs, ensuring their safe journey to the afterlife, a core tenet of Egyptian religion. Alongside the pyramids, the Sphinx and the temples of Karnak and Luxor stand as testaments to their architectural ingenuity.</p> <p>The Nile River played a central role in shaping the economy and culture of Ancient Egypt. Its annual flooding provided fertile soil for agriculture, sustaining the population and enabling the civilisation to thrive. The surplus of crops allowed for trade with</p>



	<p>neighbouring regions, spreading Egyptian influence and facilitating the exchange of goods, ideas, and innovations.</p> <p>Ancient Egyptians were also pioneers in various fields of knowledge. They developed one of the earliest writing systems, hieroglyphics, which preserved their history, religious texts, and administrative records. In medicine, they practised advanced techniques and documented treatments that influenced later civilisations. Their calendar system, based on the solar year, laid the groundwork for the modern calendar.</p> <p>Despite its strength, Ancient Egypt faced periods of decline due to invasions, internal strife, and resource depletion. By 332 BCE, Egypt fell under the rule of Alexander the Great, marking the end of its independent pharaonic era. However, the cultural and intellectual contributions of Ancient Egypt continued to influence the Greek, Roman, and Islamic worlds, ensuring its legacy endured.</p> <p>Today, the wonders of Ancient Egypt, from the pyramids to its artefacts, captivate historians and tourists alike. Its achievements are a symbol of human creativity, resilience, and the quest for understanding the mysteries of life and the universe.</p> <p>According to the passage, how did the annual flooding of the Nile River affect the development of Ancient Egypt's economy and culture?</p>
Choices/Choice A	It made the region prone to frequent natural disasters, hindering agricultural productivity.
Choices/Choice B	It caused instability in the food supply, leading to frequent conflicts among the population.
Choices/Choice C	It provided fertile soil for farming, which sustained the population and enabled trade with neighbouring regions.
Choices/Choice D	It limited the expansion of the civilisation due to the unpredictable nature of the flooding.
Solution	C
Explanation	<p>The correct answer is C because the annual flooding of the Nile River was crucial to Ancient Egypt's development. It deposited nutrient-rich silt on the land, making the soil fertile for agriculture. This ensured a stable food supply, supporting a growing population, and allowed the civilisation to thrive. The agricultural surplus enabled trade with neighbouring regions, spreading Egyptian influence and fostering cultural and economic growth. Other options misrepresent the effects of the Nile flooding; it was not a natural disaster or cause of instability but a predictable and</p>



	vital phenomenon that sustained Egypt's economy and shaped its culture. Hence, the correct option is C.
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Question ID	65
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Summary and Tone of the Passage
Question Details/Question Stem	<p>Ancient Egypt, one of the earliest and most enduring civilisations, flourished along the Nile River for over three millennia. Its remarkable achievements in architecture, art, science, and governance have left a lasting imprint on history, influencing cultures and societies across the world.</p> <p>Emerging around 3100 BCE with the unification of Upper and Lower Egypt under the first pharaoh, King Narmer, the civilisation was defined by its centralised governance. The pharaohs were not only political leaders but also considered divine, serving as intermediaries between the gods and the people. This belief in divine rulership underscored many aspects of Egyptian society, including their monumental architectural endeavours.</p> <p>The construction of the iconic pyramids, such as the Great Pyramid of Giza, demonstrated the Egyptians' advanced knowledge of engineering and mathematics. These grand structures served as tombs for pharaohs, ensuring their safe journey to the afterlife, a core tenet of Egyptian religion. Alongside the pyramids, the Sphinx and the temples of Karnak and Luxor stand as testaments to their architectural ingenuity.</p> <p>The Nile River played a central role in shaping the economy and culture of Ancient Egypt. Its annual flooding provided fertile soil for agriculture, sustaining the population and enabling the civilisation to thrive. The surplus of crops allowed for trade with neighbouring regions, spreading Egyptian influence and facilitating the exchange of goods, ideas, and innovations.</p> <p>Ancient Egyptians were also pioneers in various fields of knowledge. They developed one of the earliest writing systems, hieroglyphics, which preserved their history, religious texts, and administrative records. In medicine, they practised advanced techniques and documented treatments that influenced later civilisations. Their calendar system, based on the solar year, laid the groundwork for the modern calendar.</p>



	<p>Despite its strength, Ancient Egypt faced periods of decline due to invasions, internal strife, and resource depletion. By 332 BCE, Egypt fell under the rule of Alexander the Great, marking the end of its independent pharaonic era. However, the cultural and intellectual contributions of Ancient Egypt continued to influence the Greek, Roman, and Islamic worlds, ensuring its legacy endured.</p> <p>Today, the wonders of Ancient Egypt, from the pyramids to its artefacts, captivate historians and tourists alike. Its achievements are a symbol of human creativity, resilience, and the quest for understanding the mysteries of life and the universe.</p> <p>Which of the following best summarises the passage, and what is the tone used by the author?</p>
Choices/Choice A	Ancient Egypt's achievements in architecture, art, and governance have been overstated, and the tone is sceptical.
Choices/Choice B	Invasions and internal strife caused Ancient Egypt's decline, and the tone of the passage is lamenting.
Choices/Choice C	Ancient Egypt's reliance on the Nile River limited its growth, and the tone of the passage is critical.
Choices/Choice D	Ancient Egypt's cultural, technological, and political advancements continue to influence the modern world, and the tone is reverent.
Solution	D
Explanation	<p>The correct answer is D because the passage highlights Ancient Egypt's remarkable contributions to architecture, governance, and science, emphasising their lasting influence on the modern world. It portrays the civilisation's achievements, such as the construction of the pyramids, the development of hieroglyphics, and advanced agricultural practices, with respect and admiration. The tone is reverent, celebrating Egypt's ingenuity and offering detailed insights into its cultural and historical impact. Other options misrepresent the passage's focus or tone, as it does not criticise Egypt's reliance on the Nile or lament its decline but instead celebrates its accomplishments and legacy. Hence, the correct option is D.</p>

Question ID	66
Question Type	MCQ-SC
Difficulty Level	Medium



Topic: Subtopic (concept)	Supporting and Opposing Arguments
Question Details/Question Stem	<p>Existentialism is a prominent philosophical movement focusing on individual freedom, choice, and responsibility. It challenges the notion that human beings are defined by predetermined purposes or external influences, arguing instead that individuals create their identities through their decisions and actions. Jean-Paul Sartre, one of the most influential existentialists, famously stated that "existence precedes essence." This idea implies that people are not born with inherent meaning or purpose; rather, they define themselves by how they live and their choices throughout life.</p> <p>A central theme in existentialism is the concept of absurdity, which refers to the tension between humanity's intrinsic search for meaning and the universe's apparent indifference. This conflict raises profound questions about navigating a life without predetermined meaning. Different existentialist thinkers offer various approaches to addressing this challenge. For instance, Albert Camus explores the idea of embracing life passionately despite its inherent lack of meaning. He describes "the absurd hero" as someone who confronts the absurd with defiance and chooses to live fully and authentically, finding value in the experience of living itself rather than in any external or absolute purpose. Camus encourages individuals to accept life's uncertainties and contradictions without succumbing to despair.</p> <p>In contrast, Søren Kierkegaard presents a different perspective by turning to faith as a source of meaning. He introduces the idea of a "leap of faith," suggesting that individuals can find solace and purpose by embracing religious belief, even in the absence of concrete proof. For Kierkegaard, faith represents a deeply personal commitment that transcends reason and provides a foundation for living meaningfully in an uncertain world.</p> <p>Existentialism does not offer a one-size-fits-all solution to the question of meaning. Instead, it invites individuals to confront the profound responsibility that comes with their freedom. This philosophy encourages people to recognize that their lives are defined by their choices and actions, emphasising the need to live authentically in aligning of their values. By rejecting the notion of predetermined meaning, existentialism empowers individuals to take ownership of their existence and create their purpose in a world that does not inherently provide one.</p>



	<p>Ultimately, existentialism serves as both a challenge and a guide, urging individuals to face the weight of their freedom and embrace the possibilities for crafting a meaningful life.</p> <p>What are the supporting or opposing arguments for the existentialist claim that individuals must create their own meaning in life, considering perspectives from existentialist thinkers such as Sartre, Camus, and Kierkegaard, as well as critiques from other philosophical traditions?</p>
Choices/Choice A	Existentialist thinkers unanimously support the idea that meaning is entirely self-created.
Choices/Choice B	Kierkegaard opposes Sartre and Camus, arguing for faith as a source of predetermined meaning.
Choices/Choice C	Critics argue existentialism's focus on individual meaning neglects community and tradition.
Choices/Choice D	Existentialism emphasises self-created meaning but accommodates varied responses like faith or defiance.
Solution	D
Explanation	Existentialism promotes the idea that individuals are responsible for creating their meaning but allows for different interpretations. Sartre and Camus focus on authenticity and personal choice, highlighting defiance in the face of absurdity. Kierkegaard offers an alternative, suggesting faith as a personal path to meaning, rooted in a commitment beyond reason. While existentialism values freedom and personal agency, critics argue that it underestimates the importance of community, shared traditions, and external influences in shaping a meaningful life. Thus, the philosophy emphasises self-created meaning while recognising varied approaches to confronting life's uncertainties. Hence, the correct option is D.

Question ID	67
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Error and Correct Usage Identification
Question Details/Question Stem	Existentialism is a prominent philosophical movement focusing on individual freedom, choice, and responsibility. It challenges the notion that human beings are defined by predetermined purposes or external influences, arguing instead that individuals create their identities through their decisions and actions. Jean-Paul Sartre, one



	<p>of the most influential existentialists, famously stated that "existence precedes essence." This idea implies that people are not born with inherent meaning or purpose; rather, they define themselves by how they live and their choices throughout life.</p> <p>A central theme in existentialism is the concept of absurdity, which refers to the tension between humanity's intrinsic search for meaning and the universe's apparent indifference. This conflict raises profound questions about navigating a life without predetermined meaning. Different existentialist thinkers offer various approaches to addressing this challenge. For instance, Albert Camus explores the idea of embracing life passionately despite its inherent lack of meaning. He describes "the absurd hero" as someone who confronts the absurd with defiance and chooses to live fully and authentically, finding value in the experience of living itself rather than in any external or absolute purpose. Camus encourages individuals to accept life's uncertainties and contradictions without succumbing to despair.</p> <p>In contrast, Søren Kierkegaard presents a different perspective by turning to faith as a source of meaning. He introduces the idea of a "leap of faith," suggesting that individuals can find solace and purpose by embracing religious belief, even in the absence of concrete proof. For Kierkegaard, faith represents a deeply personal commitment that transcends reason and provides a foundation for living meaningfully in an uncertain world.</p> <p>Existentialism does not offer a one-size-fits-all solution to the question of meaning. Instead, it invites individuals to confront the profound responsibility that comes with their freedom. This philosophy encourages people to recognise that their lives are defined by their choices and actions, emphasising the need to live authentically in aligning of their values. By rejecting the notion of predetermined meaning, existentialism empowers individuals to take ownership of their existence and create their purpose in a world that does not inherently provide one.</p> <p>Ultimately, existentialism serves as both a challenge and a guide, urging individuals to face the weight of their freedom and embrace the possibilities for crafting a meaningful life.</p> <p>Identify the error in the following sentence from the passage and provide the correct usage: "This philosophy encourages people to recognise that their lives are defined by their choices and actions, emphasising the need to live authentically in aligning of their values."</p>
Choices/Choice A	Replace "aligning of" with "alignment to"



Choices/Choice B	Replace "aligning of" with "aligning with"
Choices/Choice C	Replace "in aligning of" with "to align to"
Choices/Choice D	Replace "in aligning of" with "for aligning towards"
Solution	B
Explanation	“Aligning with” is the standard usage in English for expressing agreement or harmony. The structure “in aligning with” fits the grammatical flow of the sentence, maintaining clarity and precision. “Alignment to” changes the sentence’s meaning and does not flow naturally in this context. “To align to” alters the sentence structure and introduces a different grammatical construction. The phrase “For aligning towards” is redundant and, therefore, grammatically incorrect. Hence, the correct option is B.

Question ID	68
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Cause and Effect Relationship
Question Details/Question Stem	<p>Existentialism is a prominent philosophical movement focusing on individual freedom, choice, and responsibility. It challenges the notion that human beings are defined by predetermined purposes or external influences, arguing instead that individuals create their identities through their decisions and actions. Jean-Paul Sartre, one of the most influential existentialists, famously stated that "existence precedes essence." This idea implies that people are not born with inherent meaning or purpose; rather, they define themselves by how they live and their choices throughout life.</p> <p>A central theme in existentialism is the concept of absurdity, which refers to the tension between humanity’s intrinsic search for meaning and the universe's apparent indifference. This conflict raises profound questions about navigating a life without predetermined meaning. Different existentialist thinkers offer various approaches to addressing this challenge. For instance, Albert Camus explores the idea of embracing life passionately despite its inherent lack of meaning. He describes "the absurd hero" as someone who confronts the absurd with defiance and chooses to live fully and authentically, finding value in the experience of living itself rather than in any external or absolute purpose. Camus encourages individuals to accept life's uncertainties and contradictions without succumbing to despair.</p>



	<p>In contrast, Søren Kierkegaard presents a different perspective by turning to faith as a source of meaning. He introduces the idea of a "leap of faith," suggesting that individuals can find solace and purpose by embracing religious belief, even in the absence of concrete proof. For Kierkegaard, faith represents a deeply personal commitment that transcends reason and provides a foundation for living meaningfully in an uncertain world.</p> <p>Existentialism does not offer a one-size-fits-all solution to the question of meaning. Instead, it invites individuals to confront the profound responsibility that comes with their freedom. This philosophy encourages people to recognise that their lives are defined by their choices and actions, emphasising the need to live authentically in aligning of their values. By rejecting the notion of predetermined meaning, existentialism empowers individuals to take ownership of their existence and create their purpose in a world that does not inherently provide one.</p> <p>Ultimately, existentialism serves as both a challenge and a guide, urging individuals to face the weight of their freedom and embrace the possibilities for crafting a meaningful life.</p> <p>How does the concept of absurdity in existentialism influence the existentialist approach to finding meaning in life, as demonstrated by the ideas of Camus and Kierkegaard?</p>
Choices/Choice A	The absurdity of life leads Camus to advocate for rejecting all efforts to find meaning.
Choices/Choice B	Absurdity inspires Kierkegaard to embrace faith as a source of personal meaning.
Choices/Choice C	The tension caused by absurdity motivates Camus to propose living passionately despite life's lack of inherent purpose.
Choices/Choice D	Both B and C are correct.
Solution	D
Explanation	The existentialist idea of absurdity emphasises the conflict between humanity's desire for meaning and the universe's indifference. In response, Kierkegaard proposes a leap of faith, where individuals turn to religious belief as a personal source of meaning despite life's uncertainties. Camus, on the other hand, encourages embracing the absurd by living passionately and authentically, finding value in the act of living itself rather than seeking external meaning. Both perspectives stem from the recognition of life's absurdity but offer different approaches: one rooted in faith and the other in defiance and engagement with life's experiences. Hence, the correct option is D.



Question ID	69
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Higher Order Inferences from Texts
Question Details/Question Stem	<p>Cognitive dissonance is a psychological concept that explains the discomfort people experience when their beliefs, attitudes, or values conflict with each other. Introduced by psychologist Leon Festinger in 1957, the theory suggests that individuals feel psychological tension when their actions contradict their beliefs, leading them to seek a way to reduce this inconsistency. This drive to alleviate the discomfort often results in individuals changing their beliefs, acquiring new information that justifies their behaviour, or minimising the importance of the inconsistency. Cognitive dissonance can be observed in everyday life, where individuals make efforts to maintain consistency between their beliefs and behaviours.</p> <p>A classic example of cognitive dissonance is when people continue smoking despite being aware of its harmful health effects. In this case, the knowledge of the risks clashes with the action of smoking. To reduce the dissonance, individuals may rationalise their behaviour by convincing themselves that they enjoy smoking, that it helps them relax, or that they will quit in the future. By doing so, they alleviate the discomfort caused by the conflict between their beliefs and actions. This process of rationalisation or justification is a common response to cognitive dissonance.</p> <p>Cognitive dissonance plays a significant role in understanding how people make decisions, change their attitudes, and justify their actions. It helps explain why individuals often continue behaviours, such as smoking, overeating, or procrastination, even when they know they are detrimental to their well-being. When people engage in such behaviours, they experience tension, which motivates them to find ways to justify or explain their actions in a way that reduces the discomfort.</p> <p>This psychological theory is also widely applied in various areas, including marketing and social behaviour. Advertisers often create situations where consumers experience cognitive dissonance by highlighting inconsistencies between their attitudes and behaviours. For example, a marketing campaign may make individuals feel that their lifestyle is incomplete without a certain</p>



	<p>product, pushing them to reconcile the inconsistency between their beliefs and the desire to purchase. In therapy, cognitive dissonance is sometimes used to help individuals confront contradictions in their thoughts and behaviours, encouraging them to align their actions with their values.</p> <p>In conclusion, cognitive dissonance is a powerful psychological force that drives individuals to reduce inconsistencies between their beliefs and behaviours. This concept is essential in understanding decision-making, attitude change, and how people justify their actions. By recognising the effects of cognitive dissonance, we gain valuable insight into human behaviour, both on an individual level and in broader social contexts.</p> <p>How does the concept of cognitive dissonance explain the persistence of harmful behaviours, such as smoking or overeating, despite the awareness of their negative consequences, and what strategies do individuals typically employ to manage this psychological discomfort?</p>
Choices/Choice A	Cognitive dissonance leads individuals to avoid information that contradicts their behaviours, reinforcing their harmful habits.
Choices/Choice B	People modify their behaviour immediately to align with their beliefs, resulting in the cessation of harmful behaviours.
Choices/Choice C	Individuals often rationalise their actions, changing their beliefs or minimising the importance of the inconsistency to reduce discomfort.
Choices/Choice D	Cognitive dissonance causes individuals to become paralysed by the tension, causing confusion and preventing changes in behaviour.
Solution	C
Explanation	Cognitive dissonance explains why harmful behaviours, such as smoking or overeating, persist despite knowledge of their negative effects. Individuals often feel discomfort when their actions conflict with their beliefs, so they resolve this tension by rationalising their behaviour. They may convince themselves that the behaviour is not as harmful as it seems or downplay its importance, rather than changing their actions. This allows them to continue the behaviour without facing the discomfort of inconsistency. Such rationalisation helps reduce the psychological tension while maintaining the harmful habits. Hence, the correct option is C.



Question ID	70
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Higher Order Inferences from Texts
Question Details/Question Stem	<p>Cognitive dissonance is a psychological concept that explains the discomfort people experience when their beliefs, attitudes, or values conflict with each other. Introduced by psychologist Leon Festinger in 1957, the theory suggests that individuals feel psychological tension when their actions contradict their beliefs, leading them to seek a way to reduce this inconsistency. This drive to alleviate the discomfort often results in individuals changing their beliefs, acquiring new information that justifies their behaviour, or minimising the importance of the inconsistency. Cognitive dissonance can be observed in everyday life, where individuals make efforts to maintain consistency between their beliefs and behaviours.</p> <p>A classic example of cognitive dissonance is when people continue smoking despite being aware of its harmful health effects. In this case, the knowledge of the risks clashes with the action of smoking. To reduce the dissonance, individuals may rationalise their behaviour by convincing themselves that they enjoy smoking, that it helps them relax, or that they will quit in the future. By doing so, they alleviate the discomfort caused by the conflict between their beliefs and actions. This process of rationalisation or justification is a common response to cognitive dissonance.</p> <p>Cognitive dissonance plays a significant role in understanding how people make decisions, change their attitudes, and justify their actions. It helps explain why individuals often continue behaviours, such as smoking, overeating, or procrastination, even when they know they are detrimental to their well-being. When people engage in such behaviours, they experience tension, which motivates them to find ways to justify or explain their actions in a way that reduces the discomfort.</p> <p>This psychological theory is also widely applied in various areas, including marketing and social behaviour. Advertisers often create situations where consumers experience cognitive dissonance by highlighting inconsistencies between their attitudes and behaviours. For example, a marketing campaign may make individuals feel that their lifestyle is incomplete without a certain product, pushing them to reconcile the inconsistency between their beliefs and the desire to purchase. In therapy, cognitive dissonance is sometimes used to help individuals confront contradictions in</p>



	<p>their thoughts and behaviours, encouraging them to align their actions with their values.</p> <p>In conclusion, cognitive dissonance is a powerful psychological force that drives individuals to reduce inconsistencies between their beliefs and behaviours. This concept is essential in understanding decision-making, attitude change, and how people justify their actions. By recognising the effects of cognitive dissonance, we gain valuable insight into human behaviour, both on an individual level and in broader social contexts.</p> <p>In what ways can cognitive dissonance be strategically utilised in marketing to influence consumer behaviour or facilitate personal change?</p>
Choices/Choice A	Marketing campaigns can create cognitive dissonance by emphasising lifestyle gaps, prompting consumers to align their beliefs with purchasing decisions.
Choices/Choice B	Marketing campaigns can reduce cognitive dissonance by reassuring consumers that their choices align with societal norms and values.
Choices/Choice C	Cognitive dissonance has a noticeable but limited role in marketing because it does not influence consumer behaviour deeply.
Choices/Choice D	Marketers use cognitive dissonance to confuse consumers, making it harder for them to make rational choices.
Solution	A
Explanation	Option A aligns with the concept described in the passage: marketing campaigns often create cognitive dissonance by highlighting inconsistencies between consumers' beliefs and their current lifestyles or behaviours. This discomfort motivates consumers to resolve the conflict by aligning their actions, such as purchasing a product, with their desired self-concept. Option B is incorrect because marketing typically creates dissonance to prompt action rather than reduce it initially. C is wrong because cognitive dissonance significantly influences consumer decisions. D is misleading, as marketers aim to guide consumer behaviour through targeted strategies, not create confusion. Hence, the correct option is A.



Question ID	71
Question Type	MCQ-SC
Difficulty Level	Easy
Topic: Subtopic (concept)	Cause and Effect Relationship
Question Details/Question Stem	<p>Plastic pollution in oceans has become one of the most pressing environmental issues of our time. Marine ecosystems face severe disruptions due to the accumulation of plastic debris, which harms marine life. Many sea creatures ingest small plastic particles, mistaking them for food, leading to blockages in their digestive systems or toxic chemical exposure. Additionally, larger pieces of plastic can entangle marine animals, restricting their movement and causing injury or death. Human activities such as improper waste disposal and the excessive use of single-use plastics are the primary causes of this crisis. Without immediate global action, the long-term effects of plastic pollution may include a decline in marine biodiversity, disruptions to food chains, and negative impacts on human livelihoods dependent on the ocean.</p> <p>Which of the following statements best explains the major cause-and-effect relationship mentioned in the passage?</p>
Choices/Choice A	Improper waste disposal methods may lead to an increase in marine biodiversity.
Choices/Choice B	Excessive use of single-use plastics leads to reduced industrial production of sustainable materials.
Choices/Choice C	Accumulation of plastic debris in oceans results in major disruptions to ecosystems.
Choices/Choice D	Global action against plastic pollution can cause a rise in the use of non-renewable resources.
Solution	C: Accumulation of plastic debris in oceans results in major disruptions to ecosystems.
Explanation	The cause is the accumulation of plastic debris in oceans, which stems from improper waste disposal and excessive use of single-use plastics. The effect includes harm to marine life, such as ingestion of plastic or entanglement, leading to injuries, death, and disruptions in marine ecosystems. The passage also highlights further consequences, like declining marine biodiversity and negative impacts on food chains, reinforcing this relationship. Hence, choice C is the correct answer.

Question ID	72
Question Type	MCQ-SC



Difficulty Level	Easy
Topic: Subtopic (concept)	Summary and Tone of passage
Question Details/Question Stem	<p>The Partition of Bengal in 1905, planned by the British under Lord Curzon, was a pivotal moment in the history of Indian nationalism. This event, officially justified as an administrative measure, was widely perceived as a deliberate attempt to divide Bengal along religious lines, weakening the unity of the growing nationalist movement. The move sparked widespread protests across India, with leaders and citizens alike condemning it as an act of colonial manipulation. The Swadeshi Movement emerged in response, urging Indians to boycott British goods and promote indigenous industries. This period marked a significant shift in the tone of Indian nationalism, moving from moderate petitions to more assertive resistance. Despite the eventual reversal of the partition in 1911, the event left an indelible mark on the nationalist psyche, fuelling a stronger and more united demand for self-rule.</p> <p>After reading the passage, select the correct tone of the passage.</p>
Choices/Choice A	Indifferent and Serious
Choices/Choice B	Optimistic and Playful
Choices/Choice C	Ironic and Critical
Choices/Choice D	Reflective and Analytical
Solution	D: Reflective and Analytical
Explanation	<p>The passage highlights the Partition of Bengal as a manipulative act by the British to weaken the nationalist movement. The passage also examines the historical event in detail, reflecting on its impact on Indian nationalism and the resulting socio-political changes. The tone is thoughtful and analytical, focusing on the causes, consequences, and shifts in nationalist strategies during this period. Hence, the correct choice is option D.</p>



Question ID	73
Question Type	MCQ-SC
Difficulty Level	Easy



Topic: Subtopic (concept)	Supporting and Opposing Argument
Question Details/Question Stem	<p>The Enlightenment, also known as the Age of Reason, was a philosophical movement in the 17th and 18th centuries that emphasised reason, individualism, and scepticism of traditional authority. Thinkers like John Locke, Voltaire, and Immanuel Kant championed ideas of liberty, equality, and the separation of church and state. While supporters believed the movement laid the foundation for modern democracy and human rights, critics argued it often disregarded cultural and religious traditions, leading to social upheavals. For example, the French Revolution, inspired by Enlightenment principles, achieved significant strides towards equality but was also marked by violence and instability. This dual legacy continues to spark debates on whether the Enlightenment's focus on reason overshadowed its potential for cultural and ethical inclusivity.</p> <p>As per the passage, which of the following arguments best supports the Enlightenment's impact?</p>
Choices/Choice A	The Enlightenment fostered progress in democracy and human rights, but it neglected cultural and ethical traditions.
Choices/Choice B	The Enlightenment's reliance on reason ensured complete harmony in all aspects of society.
Choices/Choice C	The Enlightenment's principles of individualism eradicated all forms of social and political inequality.
Choices/Choice D	The Enlightenment successfully balanced traditional authority with modern values of liberty and equality.
Solution	A: The Enlightenment fostered progress in democracy and human rights, but it neglected cultural and ethical traditions.
Explanation	The passage emphasises the choice correctly because it reflects the dual perspective presented in the passage. The passage acknowledges the Enlightenment's role in advancing democracy and human rights while also highlighting criticisms about its disregard for cultural and religious traditions. Hence, the correct answer is choice A.



Question ID	74
Question Type	MCQ-SC
Difficulty Level	Medium



Topic: Subtopic (concept)	Error and Correct Usage Identification
Question Details/Question Stem	<p>The discovery of penicillin in 1928 by Alexander Fleming was a breakthrough moment in the history of medicine. Penicillin, derived from a mould, was the first true antibiotic capable of treating bacterial infections in humans. Its impact was immediate and profound, saving millions of lives during World War II and beyond. However, overuse and misuse of antibiotics have led to the emergence of antibiotic-resistant bacteria, posing a major challenge to modern medicine. The discovery of penicillin, while revolutionary, also highlighted the need for responsible medical practices in order to maintain the effectiveness of antibiotics.</p> <p>Identify the grammatical error in the following sentence from the passage and choose the correct version:</p>
Choices/Choice A	Error: 'derived from a mould'; Correction: 'derive from a mould'
Choices/Choice B	Error: 'capable to treating'; Correction: 'capable of treating'
Choices/Choice C	Error: 'was the first true antibiotic'; Correction: 'is the first true antibiotic'
Choices/Choice D	Error: 'need for responsible'; Correction: 'need to be responsible'
Solution	B: Error: 'capable to treating'; Correction: 'capable of treating'
Explanation	<p>The error lies in the phrase 'capable to treating', which incorrectly uses 'to' after 'capable'. The correct usage is 'capable of treating'. The word 'capable' should be followed by the preposition 'of' when introducing a gerund, such as 'treating.' Also, 'to' is used with the base form of verbs without 'ing'; hence, using 'to' is incorrect here. Hence, the correct answer is choice B.</p>



Question ID	75
Question Type	MCQ-SC
Difficulty Level	Medium



Topic: Subtopic (concept)	Higher Order Inference
Question Details/Question Stem	<p>Statement:</p> <p>The government’s decision to impose higher taxes on fossil fuels as part of its climate change policy has led to widespread protests from industries that rely heavily on fossil energy. While the government claims that the tax is essential to reduce carbon emissions and invest in renewable energy, critics argue that it disproportionately harms small businesses and working-class families who depend on fossil fuels for their livelihoods.</p> <p>Inferences:</p> <ol style="list-style-type: none">1. The government is focusing on reducing carbon emissions as part of its climate change strategy.2. The fossil fuel tax is intended to encourage a shift towards renewable energy sources.3. The protests from industries suggest significant economic resistance to the new tax policy.4. The tax may negatively impact lower-income groups and small businesses that rely on fossil fuels. <p>Which of the following high-order inferences can be drawn from the statement and the inferences provided?</p>
Choices/Choice A	The government’s climate policy will lead to the immediate abandonment of fossil fuel use across all industries.
Choices/Choice B	The protests will likely result in the immediate reversal of the tax policy.
Choices/Choice C	The implementation of the fossil fuel tax demonstrates a conflict between economic interests and environmental goals.
Choices/Choice D	Small businesses are likely to benefit from the government's climate change policy due to investment in renewable energy.
Solution	C: The implementation of the fossil fuel tax demonstrates a conflict between economic interests and environmental goals.
Explanation	Choice C is accurate because the statement highlights a fundamental tension between the government’s environmental goals (reducing carbon emissions and promoting renewable energy) and the economic impact on industries and individuals that rely on fossil fuels. This tension is a direct conflict between environmental objectives and economic interests, as reflected in the protests and criticism from affected groups. Thus, the correct answer is choice C.

Question ID	76
Question Type	MCQ-SC



Difficulty Level	Medium
Topic: Subtopic (concept)	Supporting and Opposing Argument
Question Details/Question Stem	<p>The psychological approach to understanding human behaviour focuses on the role of the mind and its processes in shaping individual actions. The cognitive perspective emphasises how our mental processes such as perception, memory, and problem-solving affect our behaviour. Proponents of this view argue that understanding these cognitive processes can lead to better educational practices, improved mental health treatments, and more effective decision-making. However, critics argue that the psychological approach, particularly its emphasis on cognition, often overlooks the broader social, cultural, and environmental factors that also play significant roles in influencing behaviour. These critics maintain that behaviour cannot be fully understood without considering the complex interactions between an individual and their environment, including the influence of socioeconomic status, family dynamics, and societal norms.</p> <p>Which of the following represents the most plausible opposing argument to the psychological approach to understanding human behaviour as described in the passage?</p>
Choices/Choice A	Cognitive processes are the only factors influencing human behaviour, and social influences should be disregarded.
Choices/Choice B	While cognitive processes are important, the psychological approach should account for broader social, cultural, and environmental factors influencing behaviour.
Choices/Choice C	The psychological approach gives undue importance to external factors like socioeconomic status and family dynamics.
Choices/Choice D	The psychological approach is ineffective in explaining behaviour and should be replaced with biological explanations.
Solution	B: While cognitive processes are important, the psychological approach should account for broader social, cultural, and environmental factors influencing behaviour.
Explanation	The correct answer is B because it reflects the core of the opposing argument presented in the passage. Critics of the psychological approach argue that while cognitive processes play a significant role, the approach is incomplete without considering the broader social, cultural, and environmental factors that influence behaviour. This aligns with the criticism that the psychological approach often overlooks these factors. Hence, the correct answer is choice B.



Question ID	77
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Summary and Tone of the Passage
Question Details/Question Stem	<p>Chemical reactions are processes in which substances, known as reactants, undergo changes to form new substances called products. These reactions involve the breaking and forming of chemical bonds between atoms and molecules. Although there are different types of reactions, each type of reaction follows specific patterns and can be influenced by factors such as temperature, pressure, concentration, and the presence of catalysts. For instance, in a combustion reaction, a substance reacts with oxygen to release energy in the form of heat and light, as seen when fossil fuels burn.</p> <p>Chemical reactions are central to many processes in both nature and industry, from respiration in living organisms to the manufacturing of various chemicals. Understanding these reactions helps in optimising processes and developing new technologies.</p> <p>In light of the above, which of the following statements best summarises the passage?</p>
Choices/Choice A	Chemical reactions are unpredictable processes that do not follow any specific patterns and occur only under extreme conditions.
Choices/Choice B	All chemical reactions are similar, and they occur spontaneously without any external influences or specific patterns.
Choices/Choice C	Chemical reactions involve the transformation into products and can be classified into various types, each influenced by specific factors.
Choices/Choice D	Chemical reactions primarily occur in industrial settings and have occasional relevance to biological processes or natural systems.
Solution	C: Chemical reactions involve the transformation into products and can be classified into various types, each influenced by specific factors.
Explanation	Choice C accurately reflects the main ideas in the passage. The passage explains that chemical reactions involve the transformation of reactants into products and outlines different types of chemical reactions. It also emphasises that these reactions can be influenced by factors like temperature, pressure, concentration, and catalysts. Hence, the correct answer is option C.



Question ID	78
Question Type	MCQ-SC
Difficulty Level	Medium
Topic: Subtopic (concept)	Cause and Effect Relationship
Question Details/Question Stem	<p>Indian politics has experienced significant transformation over the decades. In the early years post-independence, the political landscape was primarily dominated by the Indian National Congress, which played a central role in shaping the country's democratic foundations. However, over time, there has been a shift towards a multi-party system, with regional and smaller political parties gaining influence. This change has been particularly evident in the last few decades, as regional parties have increasingly secured power in various states, challenging the dominance of national parties.</p> <p>One of the key factors behind this shift has been the rise of identity-based politics, where issues like caste, religion, and language have been used to mobilise voters. As a result, coalition governments have become more common, leading to a more fragmented political environment. This has led to both positive and negative consequences, such as increased representation of diverse groups but also political instability and difficulty in policy implementation.</p> <p>Based on the passage, which of the following best represents the cause-and-effect relationships discussed?</p>
Choices/Choice A	The dominance of national parties has led to increased political fragmentation and instability.
Choices/Choice B	Political instability in India has resulted in the increased influence of smaller political parties.
Choices/Choice C	The shift towards a multi-party system has resulted in a more centralised political environment.
Choices/Choice D	The rise of identity-based politics has led to the formation of more coalition governments, which have caused political instability.
Solution	D: The rise of identity-based politics has led to the formation of more coalition governments, which have caused political instability.
Explanation	The choice D highlights that the rise of identity-based politics has contributed to the formation of coalition governments, which in turn has led to political instability. This is a direct cause-and-effect relationship.



Question ID	79
Question Type	MCQ-SC
Difficulty Level	Hard
Topic: Subtopic (concept)	Supporting and Opposing Argument
Question Details/Question Stem	<p>Advances in gene-editing technologies, particularly CRISPR-Cas9, have revolutionised modern biology, offering unparalleled precision in altering DNA sequences. These tools have unlocked new possibilities in medicine, agriculture, and environmental science. Scientists are now exploring the potential of gene editing to cure genetic disorders such as sickle cell anaemia and cystic fibrosis by correcting faulty DNA.</p> <p>In agriculture, CRISPR has been used to develop crops that are more resistant to pests, diseases, and changing climatic conditions, potentially addressing food security challenges. However, these advancements come with significant ethical concerns. The possibility of creating "designer babies" or editing human embryos to select for preferred traits has sparked heated debates about morality, accessibility, and potential misuse.</p> <p>Furthermore, unintended genetic consequences, such as off-target effects, could lead to unforeseen health and environmental risks, necessitating stringent oversight and regulatory frameworks. Despite these concerns, proponents argue that the benefits of gene editing—if carefully managed—far outweigh its risks.</p> <p>Which of the following arguments best supports the application of gene-editing technologies, based on the passage?</p>
Choices/Choice A	The ethical implications of gene editing, such as "designer babies," render its use too risky for both individuals and society.
Choices/Choice B	Gene-editing tools like CRISPR can mitigate global food insecurity by creating pest-resistant and climate-resilient crops.
Choices/Choice C	Off-target effects in gene editing highlight the need for its prohibition rather than regulation.
Choices/Choice D	The potential misuse of gene editing for altering human embryos justifies halting all research into this technology.
Solution	B: Gene-editing tools like CRISPR can mitigate global food insecurity by creating pest-resistant and climate-resilient crops
Explanation	B is the best choice because it aligns with the passage's argument that gene-editing tools can address food security challenges by improving crop resistance, supporting the positive applications of this technology. Hence, the correct answer is choice B.

Question ID	80
Question Type	MCQ-SC



Difficulty Level	Hard
Topic: Subtopic (concept)	Higher Order Inference
Question Details/Question Stem	<p>The fall of the Berlin Wall in 1989 marked a pivotal moment in world history, symbolising the end of decades of Cold War tensions between the Soviet bloc and the West. The Wall had stood since 1961, physically and ideologically dividing East and West Berlin, and, by extension, Germany and Europe. Its demolition was not merely the result of an overnight political shift, but a culmination of years of growing dissatisfaction within Eastern Bloc countries, coupled with changing political climates in both the Soviet Union and across Europe. Economic struggles, internal resistance movements, and a shift in Soviet policy under Mikhail Gorbachev's reforms (such as glasnost and perestroika) played significant roles in eroding the strength of the Soviet-controlled Eastern Europe.</p> <p>On November 9, 1989, East German authorities, overwhelmed by mounting pressure from the population and international developments, announced that citizens could cross the border freely. This announcement was immediately followed by joyous celebrations, with masses of East and West Germans tearing down the Wall that had separated families, ideologies, and economies for nearly three decades. The fall of the Berlin Wall didn't just signify the end of physical barriers; it marked the beginning of the reunification of Germany and a significant step towards the eventual collapse of the Soviet Union.</p> <p>The event dramatically altered the political landscape of Europe, symbolising the triumph of democratic ideals over authoritarianism. However, it also set in motion a complex set of challenges. The unification of Germany posed economic, social, and political challenges, as the integration of East Germany's weaker economy and different social structures into the more prosperous West required significant effort and resources. Furthermore, the collapse of the Eastern bloc led to the emergence of new geopolitical tensions and power dynamics in the post-Cold War world.</p> <p>Which of the following statements best reflects a higher-order inference of the core ideas as described in the passage?</p>
Choices/Choice A	The fall of the Berlin Wall was primarily caused by the economic collapse of the Soviet Union, leading to the immediate reunification of Germany.
Choices/Choice B	The dismantling of the Berlin Wall resulted in a straightforward unification process, but also introduced unforeseen geopolitical tensions and challenges in integrating East and West Germany.



Choices/Choice C	The Berlin Wall's fall was the direct consequence of decades of Soviet authoritarian control, with little influence from internal movements within the Eastern Bloc.
Choices/Choice D	The end of the Berlin Wall was a key moment in European history, representing the broader collapse of communist regimes across Eastern Europe.
Solution	D: The end of the Berlin Wall was a key moment in European history, representing the broader collapse of communist regimes across Eastern Europe.
Explanation	Based on the given passage, the correct answer is D because the passage clearly explains that the fall of the Berlin Wall was not an isolated event. It was symbolic of the broader collapse of communist regimes across Eastern Europe, marking the end of the Cold War and the beginning of a new political landscape. The passage connects the fall of the Berlin Wall to significant geopolitical shifts, including the eventual collapse of the Soviet Union and the reunification of Germany. Hence, the correct answer is choice D.

