	INDIAN SCHOOL AL WADI AL KABIR ASSESSMENT II (2025 - 2026) Answer Key
Class: XI	Sub: MATHEMATICS (041) Max Marks: 80 Date:04.12.2025 Time:3 hour
1	(C) 4
2	(A) (A ∪ B)' = {5, 7, 9}
3	(C) 1
4	(B) $x \in R - \{3, -3\}$
5	(D) 0
6	(C) 13
7	(B) 0
8	(A) $x \in (-\infty, 120]$
9	(A) 9
10	(B) 3
11	(A) 110
12	(A) 300
13	(B)26
14	(B) 80
15	(B)11
16	(A)1
17	(D) (-1, -1)
18	(C) -1
19	(d) Assertion (A) is false but reason (R) is true.
20	(c) Assertion (A) is true but reason (R) is false.

21	$A - B = \{2,3\}$ $C' = \{1,2,5,6,7\}$ $((A - B) \cup C') = \{1,2,3,5,6,7\}$	1 M $\frac{1}{2}$ M $\frac{1}{2}$ M
22	a $\text{L.H.S.} = \frac{\cos(\pi + x)\cos(-x)}{\sin(\pi - x)\cos\left(\frac{\pi}{2} + x\right)}$ $= \frac{-\cos x \cos x}{-\sin x \sin x}$ $= \cot^2 x$ $= \text{R.H.S.}$	 1 M 1 M
	OR	
	b $\text{L.H.S.} = \sin(n+1)x \sin(n+2)x + \cos(n+1)x \cos(n+2)x$ $= \cos\{(n+1)x - (n+2)x\}$ $= \cos(nx + x - n - 2x)$ $= \cos(-x)$ $= \cos(x)$	 1 M 1 M
23	Step 1: Simplify numerator $z_1 + z_2 + 1 = (2 - i) + (1 + i) + 1 = 4$ Step 2: Simplify denominator $z_1 - z_2 + 1 = (2 - i) - (1 + i) + 1 = 2 - 2i$ Step 3: Divide and rationalize $\frac{4}{2 - 2i} = \frac{4}{2(1 - i)} = \frac{2}{1 - i}$ $\frac{2}{1 - i} \cdot \frac{1 + i}{1 + i} = \frac{2(1 + i)}{2} = 1 + i$	$\frac{1}{2}$ M $\frac{1}{2}$ M $\frac{1}{2}$ M $\frac{1}{2}$ M
24	Vowels: A, I, E (3) → must occupy odd positions (1, 3, 5, 7) (i) Choose 3 odd positions for vowels: ${}^4C_3 = 4$ (ii) Arrange vowels: $3! = 6$ ⇒ Total vowel arrangements $= 4 \times 6 = 24$ (iii) Arrange consonants (4 letters in remaining 4 positions): $4! = 24$ Total arrangements $= 24 \times 24 = \boxed{576}$	 1 M $\frac{1}{2}$ M $\frac{1}{2}$ M
25	Ans: Let r be common ratio of the G.P. a, b, c, d then $b = ar$, $c = ar^2$ and $d = ar^3$. $\therefore a + b = a + ar = a(1 + r)$; $b + c = ar + ar^2 = ar(1 + r)$; $c + d = ar^2(r + 1)$ Now, $(b + c)^2 = [ar(1 + r)]^2 = [a(1 + r)][ar^2(1 + r)] = (a + b)(c + d)$ $\therefore a + b, b + c, c + d$ are in G. P. OR $S_n = \frac{4}{9}\left(\sum_{k=1}^{n} 10^k - \sum_{k=1}^{n} 1\right) = \frac{4}{9}\left(\frac{10(10^n - 1)}{9} - n\right)$ $\frac{4}{81}(10^{n+1} - 10 - 9n)$	1 M 1 M 1 M 1 M

26	(i) 140 (ii) 90 (iii) 20	1 M 1M 1M
27	(i) Domain (F) = [–2, 2] (ii) R – {1,4} OR (i) R = {(1,1), (1,2), (1,3), (1,4), (1,6), (2,4), (2,6), (3,6)} (ii) Domain = {1,2,3}, Range = {1,2,3,4,6}	1.5 M 1.5 M 1 M 1M 1M
28	A is in Quadrant III (where sine is negative). B is in Quadrant IV (where sine is negative). $Sin\ A\ = -\frac{7}{25}$ $Sin\ B\ = -\frac{4}{5}$ $sin(A+B) = (\frac{-7}{25})(\frac{3}{5}) + (\frac{-24}{25})(\frac{-4}{5})$ $= \frac{3}{5}$ OR $\tan\left(\frac{\pi}{4}+x\right) = \frac{1+\tan x}{1-\tan x}$ $\tan\left(\frac{\pi}{4}-x\right) = \frac{1-\tan x}{1+\tan x}$ $= \frac{1+\tan x}{1-\tan x} \times \frac{1+\tan x}{1-\tan x} = \left(\frac{1+\tan x}{1-\tan x}\right)^2$	 1 M 1 M $\frac{1}{2}$ M $\frac{1}{2}$ M 1 M 1 M 1 M
29	$7.2 \leq \frac{7.48+7.85+x}{3} \leq 7.8$	1 M 1.5 M

	$7.2 \leq \frac{15.33 + x}{3} \leq 7.8$ $21.6 \leq 15.33 + x \leq 23.4$ $6.27 \leq x \leq 8.07$	$\frac{1}{2}$ M
30		1.5 M

xi	*fi*	Cumulative Frequency	|xi − M|	fi|xi − M|
10	2	2	2	4
11	3	5	1	3
12	8	13	0	0
14	3	16	2	6
15	4	20	3	12
	$\sum fi$=20			$\sum$ fi|xi − M| = 25

Median=12

$$MD = \frac{\sum f_i|x_i - M|}{N} = \frac{25}{20}$$

1 M

= 1.25

$\frac{1}{2}$ M

31	Ans: $6^n - 5n - 1 = (1+5)^n - 5n - 1$ $= [1 + 5n + {}^nC_2 \cdot 5^2 + {}^nC_3 \cdot 5^3 + ...5^n] - 5n - 1$ $= 25[{}^nC_2 + 5.{}^nC_3 + ...5^{n-2}]$ which is divisible by 25.	1 M 1 M 1 M
32	$(i)\ 11C4 = 330$ $(ii)\ 6C2 \times 5C2 = 150$ $(iii)\ 6C4 + 5C4 = 20$ (iv) $5C2 \times 6C2 + 5C3 \times 6C1 + 5C4 = 215$	1 M 1 M 1 M 2 M
33	$(\sqrt{2}+1)^6 - (\sqrt{2}-1)^6 = 2\left[\binom{6}{1}(\sqrt{2})^1 + \binom{6}{3}(\sqrt{2})^3 + \binom{6}{5}(\sqrt{2})^5\right]$ $= 2\left[6(\sqrt{2}) + 20(\sqrt{2})^3 + 6(\sqrt{2})^5\right]$ $(\sqrt{2}+1)^6 - (\sqrt{2}-1)^6 = 140\sqrt{2}$ $140 \cdot 1.414 = 197.96$ $(\sqrt{2}+1)^6$ lies between 197 and 198	1.5 M 1 M 1.5 M 1 M

34		(i) Given $\frac{\text{AM}}{\text{GM}} = \frac{\frac{a+b}{2}}{\sqrt{ab}} = \frac{m}{n}$. Let $\frac{a+b}{2} = mk, \quad \sqrt{ab} = nk.$ Then $a + b = 2mk, \quad ab = n^2k^2.$ So a and b are roots of $x^2 - 2mkx + n^2k^2 = 0.$ Roots: $x = k\left(m \pm \sqrt{m^2 - n^2}\right).$ Hence, $a: b = \left(m + \sqrt{m^2 - n^2}\right): \left(m - \sqrt{m^2 - n^2}\right).$ OR The roots form a G.P.: $a, ar, ar^2, ar^3.$ From $a + b = 3,$ $$a + ar = 3 \Rightarrow a(1 + r) = 3$$ From $c + d = 12,$ $$ar^2 + ar^3 = 12 \Rightarrow ar^2(1 + r) = 12 \Rightarrow 3r^2 = 12 \Rightarrow r^2 = 4 \Rightarrow r^4 = 16$$ Also, $$p = ab = a^2r, \quad q = cd = a^2r^5$$ $$\frac{q+p}{q-p} = \frac{r^5 + r}{r^5 - r} = \frac{r^4 + 1}{r^4 - 1} = \frac{16 + 1}{16 - 1} = \frac{17}{15}$$ $$\therefore (q + p): (q - p) = 17: 15$$	1 M 1 M 1 M 1 M 1 M 1 M 1.5 M 1 M 1.5 M
35	a	Let the point of intersection of the two given lines be $P(x_1, y_1)$. $$2x - 3y + 4 = 0 \quad (1)$$ $$3x + 4y - 5 = 0 \quad (2)$$ Solving (1) and (2):$P(x_1, y_1) = \left(\frac{-1}{17}, \frac{22}{17}\right)$ The given line is $6x - 7y + 8 = 0$. Its slope is $m_1 = \frac{6}{7}$. Since the required path is perpendicular, its slope will be $$m_2 = -\frac{1}{m_1} = -\frac{7}{6}$$ Therefore, the equation of the lie using one-point form, $$y - y_1 = m(x - x_1)$$ $$y - \left(\frac{22}{17}\right) = -\frac{7}{6}\left(x - \frac{-1}{17}\right)$$ $$119x + 102y = 125$$	1.5 M 1 M 1.5 M 1 M
	b	OR Given point $P(1,2)$ and mirror line $x - 3y + 4 = 0$. Let the image be $P'(x, y)$. (1) Midpoint lies on the mirror: Midpoint M of PP' is $$M\left(\frac{1 + x}{2}, \frac{2 + y}{2}\right).$$ Since M lies on $x - 3y + 4 = 0,$	1 M

		$\frac{1+x}{2} - 3 \cdot \frac{2+y}{2} + 4 = 0 \Rightarrow x - 3y + 3 = 0$ (2) PP' is perpendicular to the mirror: Slope of $x - 3y + 4 = 0$ is $\frac{1}{3}$, hence slope of PP' is -3. $\frac{y-2}{x-1} = -3 \Rightarrow 3x + y - 5 = 0$ Solving (A) and (B): $x = \frac{3}{5}, \quad y = -\frac{1}{5}$ $\therefore$ Image of (1,2) is $\boxed{\left(\frac{6}{5}, \frac{7}{5}\right)}$.	1 M 1 M 1 M 1 M
36		(i) Number of ways of selecting 3 questions from Section A and 4 from Section B: $^5C_3 \times {}^7C_4$ $= \boxed{350}$ (ii) Student answers at least 3 questions from each section. Possible selections are: (3 from A, 4 from B), (4 from A, 3 from B), $\Rightarrow {}^5C_3{}^7C_4 + {}^5C_4{}^7C_3$ $= 10 \times 35 + 5 \times 35 = 350 + 175 = 525$ $\therefore$ Total ways $= \boxed{525}$	1 M 1 M 1 M 1 M
37		Given the GP for pots: $a = 2,\ r = 2$. Thus $t_n = 2^n$ and $S_n = a\frac{r^n - 1}{r - 1} = 2(2^n - 1) = 2^{n+1} - 2.$ (i) Difference between 7th and 5th row: $t_7 - t_5 = 2^7 - 2^5 = 128 - 32 = \boxed{96}$. (ii) Total pots in first ten rows: $S_{10} = 2(2^{10} - 1) = 2(1024 - 1) = 2 \times 1023 = \boxed{2046}$. (iii a) If total pots $= 510$, find number of rows n: $2^{n+1} - 2 = 510 \Rightarrow 2^{n+1} = 512 = 2^9 \Rightarrow n + 1 = 9 \Rightarrow \boxed{n = 8}$. OR (iii b) For $a = 1,\ r = 3$ and total $= 1093$: $\frac{3^n - 1}{2} = 1093 \Rightarrow 3^n - 1 = 2186 \Rightarrow 3^n = 2187 = 3^7 \Rightarrow \boxed{n = 7}$.	1 M 1 M 2 M 2 M
38		i) $\frac{-1}{3}$ ii) $13x - y - 9 = 0$ iii) Slope = 3 $3x - y + 1 = 0$ (OR) **(iii)** Slope = 3 $3x - y - 4 = 0$	1 M 1 M 1 M 1 M 1 M 1 M

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