

ANSWER KEY

September

1/10

FIRST... YEAR HIGHER SECONDARY EXAMINATION 2021

PART-~~II~~/III

SUBJECT: ...MATHEMATICS... (SCIENCE) (HI)

CODE NO: ...FY265

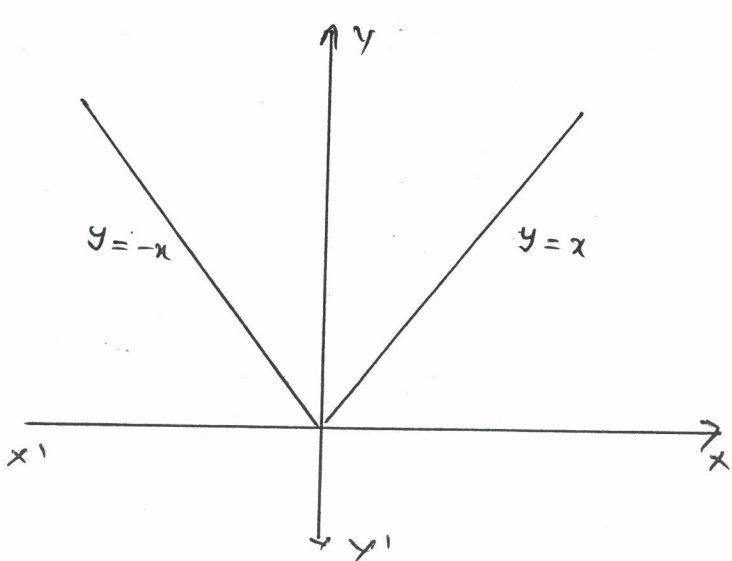
VERSION: ...

...Q... SCORES

....2... HOURS

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
1		$A = \{1, 2\}$ Subsets are $\phi, \{1\}, \{2\}, \{1, 2\}$	3	3
2.	(i)	$U = \{1, 2, 3, 4, 5, 6, 7\}$ $A \cap B = \{2\}$	1 2	3
3		$A \times B = \{(1, 3), (1, 4), (2, 3), (2, 4)\}$	3	3
4	(i)	$\pi/6$	1	
	(ii)	$\frac{5\pi}{3} = \frac{5\pi}{3} \times \frac{180}{\pi}$ $= 300^\circ$	1 1	3
5.		$7! - 5!$ $= 5! (7 \times 6 - 1)$ $= 5! \times 41 = 120 \times 41$ $= 4920$	1 1 1	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
6	(i)	(B) 720	1	3
	(ii)	$\frac{6!}{4!} = \frac{6 \times 5 \times 4!}{4!}$	1	
		$= \underline{\underline{30}}$	1	
7.		$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$	1	3
		$= \frac{4-2}{5-3} = \frac{2}{2}$	1	
		$= 1$	1	
8.	(i)	(A) x-axis	1	3
	(ii)	2nd octant	2	
9.		P (2, 3, 5) , Q (4, 3, 1)		3
		$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$	1	
		$= \sqrt{(4-2)^2 + (3-3)^2 + (1-5)^2}$	1	
		$= \sqrt{4 + 0 + 16}$	1	
		$= \sqrt{20} \text{ units}$		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
10.		$\lim_{x \rightarrow 1} x^2 + x + 1$ $= 1 + 1 + 1$ $= 3$	1 1 1	3
11.		$\frac{d}{dx} (x^2 - 2)$ $= \frac{d}{dx} (x^2) - \frac{d}{dx} (2)$ $= 2x - 0 = 2x$	2 1	3
12.		It is false that $\sqrt{2}$ is a rational number.	3	3
13.	(i)	$A \cap B = \{2, 4, 6\}$ $A - B = \{1, 3, 5\}$	2 2	4
14.			4	4

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score										
15.		<table><thead><tr><th>A</th><th>B</th></tr></thead><tbody><tr><td>(a) $\frac{1}{\sin x}$</td><td>(ii) $\operatorname{cosec} x$</td></tr><tr><td>(b) $\frac{1}{\cos x}$</td><td>(iv) $\sec x$</td></tr><tr><td>(c) $\frac{\sin x}{\cos x}$</td><td>(i) $\tan x$</td></tr><tr><td>(d) $\frac{\cos x}{\sin x}$</td><td>(iii) $\cot x$</td></tr></tbody></table>	A	B	(a) $\frac{1}{\sin x}$	(ii) $\operatorname{cosec} x$	(b) $\frac{1}{\cos x}$	(iv) $\sec x$	(c) $\frac{\sin x}{\cos x}$	(i) $\tan x$	(d) $\frac{\cos x}{\sin x}$	(iii) $\cot x$	1 1 1 1	4
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16.		let $P(n): 1+3+3^2+\dots+3^{n-1} = \frac{3^n-1}{2}$ when $n=1$ $P(1): \text{LHS} = 1$ $\text{RHS} = \frac{3^1-1}{2} = 1$ $\therefore P(1)$ is true $P(k): 1+3+3^2+\dots+3^{k-1} = \frac{3^k-1}{2}$ $P(k+1) = 1+3+3^2+\dots+3^{k-1}+3^k$ $= \frac{3^k-1}{2} + 3^k$ $= \frac{3^k-1+2 \cdot 3^k}{2}$ $= \frac{3 \cdot 3^k-1}{2} = \frac{3^{k+1}-1}{2}$ $\therefore P(k+1)$ is true Then by M.I $P(n)$ is true for every $n \in \mathbb{N}$	1 1 1 1	4										

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
17.	(i)	$z = 2 + 3i$	2	4
		$\bar{z} = 2 - 3i$	1	
	(ii)	$ z = \sqrt{2^2 + 3^2}$ $= \sqrt{4 + 9} = \sqrt{13}$	1	
18.		$z = 3 - 4i$ $z^{-1} = \frac{1}{3 - 4i}$ $= \frac{3 + 4i}{3^2 + 4^2}$ $= \frac{3 + 4i}{25}$ $= \frac{3}{25} + \frac{4}{25}i$	1 1 1 1	4
19		$(x+1)^4 = 4C_0 x^4 + 4C_1 x^3 + 4C_2 x^2 + 4C_3 x + 4C_4$ $= x^4 + 4x^3 + 6x^2 + 4x + 1$	2 2	4
20	(i)	$\alpha = \frac{25}{5} = 5$	2	4
	(ii)	$a_4 = \alpha r^3$	1	
		$= 5 \times 5^3$		
		$= 5^4$ <u><u>625</u></u>	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
21		x_1, y_1 $(-2, 3) \quad m = 4$ equation of line is $y - y_1 = m(x - x_1)$ $y - 3 = 4(x + 2)$ $y - 3 = 4x + 8$ $\underline{\underline{4x - y + 11 = 0}}$	1 1 1 1	4
22.		Focus $(3, 0)$ vertex $(0, 0)$ $\therefore a = 3$ eqn of parabola. $y^2 = 4ax$ $y^2 = 12x$	1 2 1	4
23.		$\frac{d}{dx} (x^3 + 3x^2 + 4)$ $\frac{d}{dx} (x^3) + 3 \frac{d}{dx} (x^2) + \frac{d}{dx} (4)$ $= 3x^2 + 3 \times 2x + 0$ $= \underline{\underline{3x^2 + 6x}}$	1 2 1	4

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score
24.	(i)	$S = \{1, 2, 3, 4, 5, 6\}$	2	4
	(ii)	$A = \{1, 2, 3\}$		
		$B = \{2, 3, 5\}$		
		$A \text{ and } B = A \cap B$ $= \{2, 3\}$	1 1	
25.		$U = \{1, 2, 3, 4, 5, 6\}$		6
		$A = \{2, 3\}$		
		$B = \{3, 4, 5\}$		
	(i)	$A \cup B = \{2, 3, 4, 5\}$	3	
	(ii)	$A' = \{1, 4, 5, 6\}$	2	6
		$B' = \{1, 2, 6\}$	1	
26.	(i)	$(x-1, 3) = 4, 3$ $x-1 = 4$ $x = 5$	1 1	
	(ii)	$A \times B = \{(a, x), (a, y), (b, x), (b, y)\}$ $A = \{a, b\}$ $B = \{x, y\}$	2 2	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total Score												
27.		$z_1 = 2 + 3i \quad z_2 = 1 + i$ (i) $\begin{aligned} z_1 + z_2 &= (2 + 3i) + (1 + i) \\ &= (2 + 1) + (3 + 1)i \\ &= 3 + 4i \end{aligned}$ (ii) $\begin{aligned} z_1 - z_2 &= (2 + 3i) - (1 + i) \\ &= (2 - 1) + (3 - 1)i \\ &= 1 + 2i \end{aligned}$	1 1 1 1 1	6												
28.		<table><tr><td>x</td><td>0</td><td>8</td></tr><tr><td>y</td><td>4</td><td>0</td></tr></table> $x + 2y = 8$ <table><tr><td>x</td><td>0</td><td>4</td></tr><tr><td>y</td><td>8</td><td>0</td></tr></table> $2x + y = 8$	x	0	8	y	4	0	x	0	4	y	8	0	2 4	6
x	0	8														
y	4	0														
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y	8	0														

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29.		$3x + 4y + 10 = 0$ (i) Slope = $-\frac{a}{b}$ $= -\frac{3}{4}$ (ii) x-intercept = $-\frac{c}{a}$ $= -10/3$ (iii) y-intercept = $-\frac{c}{b}$ $= -10/4$ $= -5/2$	1 1 1 1	6																														
30.		<table><thead><tr><th>x_i</th><th>$x_i - \bar{x}$</th><th>$(x_i - \bar{x})^2$</th></tr></thead><tbody><tr><td>6</td><td>-3</td><td>9</td></tr><tr><td>7</td><td>-2</td><td>4</td></tr><tr><td>10</td><td>-1</td><td>1</td></tr><tr><td>12</td><td>3</td><td>9</td></tr><tr><td>13</td><td>4</td><td>16</td></tr><tr><td>4</td><td>-5</td><td>25</td></tr><tr><td>8</td><td>-1</td><td>1</td></tr><tr><td>12</td><td>3</td><td>9</td></tr><tr><td>72</td><td></td><td>$\sum (x_i - \bar{x})^2 = 74$</td></tr></tbody></table>	x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$	6	-3	9	7	-2	4	10	-1	1	12	3	9	13	4	16	4	-5	25	8	-1	1	12	3	9	72		$\sum (x_i - \bar{x})^2 = 74$	2	
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	(i)	$\bar{x} = \frac{6+7+10+12+13+4+8+12}{8}$ $= \frac{72}{8}$ $= 9$	1	6
	(ii)	Variance $\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n}$ $= \frac{74}{8}$ $= 9.25$	1 1 1	