

FIRST YEAR HIGHER SECONDARY EXAMINATION 1/15
MARCH - 2018

SUBJECT: MATHEMATICS (SCIENCE) Code: 118.

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
1		$S_n = 4(1+11+111+\dots)$ $= \frac{4}{9}(9+99+999+\dots)$ $= \frac{4}{9}((10-1) + (100-1) + (1000-1) + \dots)$ $= \frac{4}{9}(10+100+1000+\dots - n)$ $= \frac{4}{9}\left(\frac{10(10^n-1)}{9} - n\right)$ <p>Remark - for the formula $S_n = a\frac{(r^n-1)}{r-1}$ - give 1 score</p>	<p>1</p> <p>1/2</p> <p>1/2</p> <p>1</p>	3
2		$\sin 2x + \sin 6x - \sin 4x = 0$ $2\sin 4x \cos 2x - \sin 4x = 0$ $\sin 4x(2\cos 2x - 1) = 0$ $\sin 4x = 0, \cos 2x = \frac{1}{2} = \cos \frac{\pi}{3}$ <p>$\therefore 4x = n\pi, 2x = 2n\pi \pm \frac{\pi}{3}$ $x = \frac{n\pi}{4}, n \in \mathbb{Z}, x = n\pi \pm \frac{\pi}{6}, n \in \mathbb{Z}$</p> <p>Remark - for the formula $\sin C \pm \sin D$ give 1 mark</p>	<p>1/2</p> <p>1</p> <p>1/2</p> <p>1</p>	3
3	(1)	$P(A \cap B) = P(A \cup B)$ $= P(A) + P(B) - P(A \cap B)$ $= \frac{1}{4} + \frac{1}{2} - \frac{1}{6} = \frac{7}{12}$ <p>Remark - for formula $P(A \cup B)$ give 1 score</p>	1	

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	(ii)	$P(\text{not } A \text{ and not } B) = P(A' \cap B')$ $= P(A \cup B)'$ $= 1 - P(A \cup B)$ $= 1 - \frac{7}{12} = \frac{5}{12}$ <p>Remark - (1) $P(A \cup B)' = 1 - P(A \cup B)$ give (2) For de-morgan law - $\frac{1}{2}$ score } $\frac{1}{2}$ score</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	2+1
4		$\frac{b-c}{b+c} = \frac{2R \sin B - 2R \sin C}{2R \sin B + 2R \sin C}$ $= \frac{\sin B - \sin C}{\sin B + \sin C}$ $= \frac{2 \cos \left(\frac{B+C}{2} \right) \cdot \sin \left(\frac{B-C}{2} \right)}{2 \sin \left(\frac{B+C}{2} \right) \cdot \cos \left(\frac{B-C}{2} \right)}$ $= \cot \left(\frac{B+C}{2} \right) \cdot \tan \left(\frac{B-C}{2} \right)$ $= \tan \frac{A}{2} \cdot \tan \left(\frac{B-C}{2} \right)$ $= \frac{1}{\cot \frac{A}{2}} \cdot \tan \left(\frac{B-C}{2} \right)$ <p>$\therefore \cot \frac{A}{2} \cdot \frac{b-c}{b+c} = \tan \left(\frac{B-C}{2} \right)$</p> <p>$\therefore \tan \left(\frac{B-C}{2} \right) = \cot \frac{A}{2} \cdot \left(\frac{b-c}{b+c} \right)$</p> <p>Remark - $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ give $\frac{1}{2}$ score</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
5	(a)	1 or (i)	1	3
	(b)	$(\sin x + \cos x)^2 = \sin^2 x + \cos^2 x + 2\sin x \cos x$ $= 1 + \sin 2x$	1	
	(c)	<p>Maximum value of $\sin 2x = 1$ \therefore maximum value of $\sin x + \cos x = \sqrt{1+1}$ $= \sqrt{2}$</p> <p>Remark:- For any answers give 1 score</p>	1	
6	(a)	(iv) or doesn't exist Remark - Give 1 score for (i) 2	1	3
	(b)	$\lim_{x \rightarrow 2} \frac{x^3 - 4x^2 + 4x}{x^2 - 4} = \lim_{x \rightarrow 2} \frac{x(x^2 - 4x + 4)}{(x+2)(x-2)}$	1	
		$= \lim_{x \rightarrow 2} \frac{x(x-2)^2}{(x+2)(x-2)}$ $= \lim_{x \rightarrow 2} \frac{x(x-2)}{x+2} = 0$	1/2 1/2	
7	(i)	$P(\text{black}) = \frac{26}{52} = \frac{1}{2}$	1	3
	(ii)	$P(\text{face card}) = \frac{12}{52} = \frac{3}{13}$	1	
	(iii)	$P(\text{black face card}) = \frac{6}{52} = \frac{3}{26}$	1	
		Remark:- $P(A) = \frac{n(A)}{n(S)}$ - Give 1/2 score		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
8	(i)	$P(A) = \{ \phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, c\}, A \}$	1	1
	(ii)	${}^n C_2 = 10$ $\frac{n(n-1)}{1 \times 2} = 10$ $n^2 - n - 20 = 0$ $n = 5$	1 $\frac{1}{2}$ $\frac{1}{2}$	2
	(iii)	$n(P(A)) = 2^5 = 32$ Remarks: (ii) For direct answer give 2 score (iii) For any value of 'n' obtained in (ii), for correct $n(P(A))$ give full score	1	1
9.	a)	$A = \{ 3, 4, 6, 10 \}$ $B = \{ 2, 3, 4, 5, 11 \}$	$\frac{1}{2}$ $\frac{1}{2}$	1
	(b)	$(A \cup B)' = \{ 1, 7, 8, 9, 12, 13 \}$ $A' = \{ 1, 2, 5, 7, 8, 9, 11, 12, 13 \}$ $B' = \{ 1, 6, 7, 8, 9, 10, 12, 13 \}$ $A' \cap B' = \{ 1, 7, 8, 9, 12, 13 \}$ $\therefore (A \cup B)' = A' \cap B'$	1 1	2

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total								
	(c)	$n(A \cap B)^c = n(U) - n(A \cap B)$ $= 13 - 2 = 11$	1	1								
10	a)	(b) or (c)	1	1								
	(b)	(a)	1	1								
	(c)	 <table border="1" data-bbox="438 1512 1045 1713"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>1</td> <td>0</td> <td>1</td> </tr> </table> <p data-bbox="422 1702 1260 1836">Remarks: For any three correct co-ordinates give 1 score</p>	x	0	1	2	y	1	0	1	1	2
x	0	1	2									
y	1	0	1									
				:								

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
11	(a)	Domain = $[-4, 4]$ Range = $[0, 4]$	1	2
	(b)	$x^2 + y^2 = 16$ $y^2 = 16 - x^2$ $y = \sqrt{16 - x^2}$ i) $f(x) = \sqrt{16 - x^2}$ <u>Remarks</u> : for $x^2 + y^2 = 16$, give full score.	2	2
12	(a)	i) (8)	1	1
	(b)	$P(1) = 1 = \frac{3^1 - 1}{2} = 1$ $P(k) = 1 + 3 + 3^2 + \dots + 3^{k-1} = \frac{3^k - 1}{2}$ $P(k+1) = 1 + 3 + 3^2 + \dots + 3^{k-1} + 3^k$ $= \frac{3^k - 1}{2} + 3^k = \frac{3^{k+1} - 1}{2}$	1 1 1	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
13	a)	$\frac{2x-1}{3} \geq \frac{5(3x-2) - 4(2-x)}{20}$ $40x - 20 \geq (15x - 10 - 8 + 4x) 3$ $40x - 20 \geq 54x - 54$ $-14x \geq -34$ $x \leq 2$	1 1 1	4
	b)		1	
14	a)	$t_n = 2n+1$	1	
	b)	$t_n = (2n+1)n^2$ $= 2n^3 + n^2$ $S_n = \sum t_n$ $= \sum (2n^3 + n^2)$ $= 2 \left[\frac{n(n+1)}{2} \right]^2 + \frac{n(n+1)(2n+1)}{6}$ $= \frac{n(n+1)}{2} \left[n(n+1) + \frac{2n+1}{3} \right]$ $= \frac{n(n+1)}{2} \cdot \left(\frac{3n^2 + 5n+1}{3} \right)$ $= \frac{n(n+1)(3n^2 + 5n+1)}{6}$	1 1	4

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
15		$(4-h)^2 + (1-k)^2 = r^2 \quad \text{--- ①}$ $(6-h)^2 + (5-k)^2 = r^2 \quad \text{--- ②}$ $16+h^2-8h+1+k^2-2k =$ $36+h^2-12h+25+k^2-10k$ $4h+8k = 44 \quad \text{--- ③}$ <p>Since centre lies on the line $4x + y = 16$</p> $4h+k = 16 \quad \text{--- ④}$ <p>Solving ③ and ④, $k=4, h=3$</p> $\therefore r^2 = (4-3)^2 + (1-4)^2 = 10$ $\therefore r = \sqrt{10}$ <p>Hence equ. is $(x-3)^2 + (y-4)^2 = 10$</p> <p><u>Remark</u> :- For alternate method give full score. Any correct formula give one score.</p>	1 1 1 1	4
16)	a) b) c)	<p>a) 10</p> <p>b) distance = $\sqrt{(4-4)^2 + (8-0)^2 + (10-0)^2}$ $= \sqrt{164}$</p> <p>c) Since the line segment divided the yz plane, its x coordinate is zero.</p>	1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		$\therefore \frac{mx_2 + nx_1}{m+n} = 0,$ $mx_2 + nx_1 = 0, \quad mx_2 = -nx_1$ $\frac{m}{n} = -\frac{x_1}{x_2} = -\frac{4}{6} = -\frac{2}{3}$ $\therefore m:n = -2:3.$ <p><u>Remark</u> :-</p> <p>b) For writing the distance formula give one score.</p> <p>c) For alternate method give full score.</p>	<p>1</p> <p>1</p>	<p>4</p>
17.	<p>a)</p> <p>b)</p>	<p>275 is a perfect square.</p> <p>Let $\sqrt{2}$ is rational.</p> $\sqrt{2} = \frac{p}{q}, \quad p \text{ and } q \text{ have no common factor.}$ $p^2 = 2q^2,$ <p>$\therefore 2$ divides p^2 $\therefore 2$ divides p.</p> $\therefore p = 2k, \quad p^2 = 4k^2$ $2q^2 = 4k^2, \quad q^2 = 2k^2$ <p>$\therefore 2$ divides q^2 $\therefore 2$ divides q.</p> <p>$\therefore p$ and q have a common</p>	<p>1</p> <p>1</p> <p>1</p>	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		factor 2. \therefore Contradicts our assumption. Hence $\sqrt{2}$ is irrational.		4
18.	a) b) c)	$x^2 + x + 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-1 \pm \sqrt{-3}}{2} = \frac{-1 \pm \sqrt{3}i}{2}$ $\text{Let } z = -\frac{1}{2} + i\frac{\sqrt{3}}{2}$ $r = \sqrt{x^2 + y^2} = \sqrt{\frac{1}{4} + \frac{3}{4}} = 1$ $\sin \theta = \frac{\sqrt{3}}{2}, \cos \theta = -\frac{1}{2}, \tan \theta = -\sqrt{3}$ $\theta = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$ $\therefore z = r (\cos \theta + i \sin \theta)$ $= 1 \left(\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3} \right)$ $\text{Let } \alpha = \frac{-1 + i\sqrt{3}}{2}, \beta = \frac{-1 - i\sqrt{3}}{2}$ $\alpha^2 = \left(\frac{-1 + i\sqrt{3}}{2} \right)^2 = \frac{1 - i2\sqrt{3} - 3}{4}$ $= \frac{-1 - i\sqrt{3}}{2} = \beta$	1 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1	6

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
19.	(a)	$L_1 \Rightarrow \text{slope} = \frac{2-4}{2-0} = -1$ $\therefore \text{Eqn } y - y_1 = m(x - x_1)$ $y - 4 = -1(x - 0)$ $x + y = 4$	1 1 1 1	4
		Remarks, writing Eqn: $y - y_1 = m(x - x_1)$ give $L_2 \Rightarrow y = 1$ $L_3 \Rightarrow y = x$	1 1 1	4
		Remarks:- For any two Eqns of $L_1, L_2, \text{ or } L_3$	give 4 score.	
	(b)	$x + y \leq 4$ $y \geq 1$ $y \leq x$	1 1	2
		Remarks For any two correct inequalities give 2 score.		
20	(a)	option (i) or $(x + \frac{1}{x})^n$ Or option (iv) $(x^2 + \frac{1}{x})^{10}$	1 1	
	(b)	$(x^2 + \frac{3}{x})^4 = {}^4C_0 x^8 + {}^4C_1 x^6 \cdot \frac{3}{x} + {}^4C_2 x^4 \cdot (\frac{3}{x})^2$ $+ {}^4C_3 x^2 (\frac{3}{x})^3 + {}^4C_4 (\frac{3}{x})^4$ $= x^8 + 12x^5 + 64x^2 + 36 + \frac{81}{x}$	1 1	
		Remarks: For writing formula for $(a+b)^n$ give -1 score.		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
20.	(c)	$T_{r+1} = (-1)^r 18C_r (x^2)^{18-r} \left(\frac{2}{r}\right)^r$ $= (-1)^r 2^r \cdot 18C_r x^{36-3r}$ <p>for term with x^{10}</p> $\left. \begin{aligned} 36-3r &= 10 \\ r &= \frac{26}{3} \end{aligned} \right\}$ <p>does not exist term contain x^{10}.</p> <p>Remarks: For writing No term give -1 score. writing general term of $(a+b)^n$ - give 1 score.</p>	1 1 1	6
21.	(a)	$a=5, b=3, c=\sqrt{a^2-b^2}=4$ $e = \frac{\sqrt{a^2-b^2}}{a} = \frac{4}{5}$ <p>Focus: $(\pm ae, 0) = (\pm 4, 0)$</p> <p>Remarks: - writing a and b give 1 score. For any Alternula method give full score.</p>	1 1	
	(b)	$\frac{x}{a} + \frac{y}{b} = 1 \quad \text{ie} \quad \frac{x}{5} + \frac{y}{3} = 1$ <p>Or $3x+5y=15$ give full score.</p>	2	
		Remarks: for $\frac{x}{a} + \frac{y}{b} = 1$ give 1 score.		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
21	(c)	<p>slope of $L = \frac{-3}{5}$</p> <p>Eqn of Parallel line with slope $\frac{-3}{5}$ and point $(4, 0)$ is</p> $y - 0 = \frac{-3}{5}(x - 4)$ <p>ie $3x + 5y = 12$.</p>	1 1	6
		<p>Remarks: - writing Eqn of line $y - y_1 = m(x - x_1)$ give 1 score.</p> <p>(2) For two pt formula give 1 score.</p> <p>(3) For any alternate method and correct answer give full marks</p>		
22.	(a)	$\frac{dy}{dx} = \lim_{h \rightarrow 0} \left[\frac{f(x+h) - f(x)}{h} \right]$ $= \lim_{h \rightarrow 0} \frac{\sin(x+h) - \sin x}{h}$ $= \lim_{h \rightarrow 0} \frac{2 \cos(x + h/2) \cdot \sin h/2}{h}$ $= \cos x.$	1 1 1	3
		<p>Remarks (1) For direct answer give 1 score.</p> <p>(2) writing formula $\sin x - \sin y = 2 \cos \left(\frac{x+y}{2} \right) \cdot \sin \left(\frac{x-y}{2} \right)$ - 1 score.</p>		
	(b)	$\frac{dy}{dx} = \frac{\sin x (5x^4 + \sin x) - (x^5 - \cos x) \cos x}{\sin^2 x}$ $= \frac{\sin x 5x^4 - x^5 \cos x + 1}{\sin^2 x}$		3

Remarks: (1) Eqn of Quotient rule give 1 score.

(2) For correct application of Q.R give two score.

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
23.	(a)	$12 \times (n-1)P_3 = 5 \times (n+1)P_3$ $12 \times (n-1)(n-2)(n-3) = 5 \times (n+1) \times (n-1)$ $7n^2 - 65n + 72 = 0$ $n = 8 \text{ or } \frac{9}{7}$	1 1	2
		Remarks: - For writing formula for nP_r give 1 score.		
	(b)	$nP_r = r! \times nC_r$ $840 = r! \times 35$ $r! = 24$ $r = 4$	1	1
		Remarks: - for formulas of nP_r and nC_r give 1 score.		
	(c)	Two diff: vowels can be selected in $5C_2$ ways Two diff: consonants can be selected in $21C_2$ ways Total selection 4 letters = $5C_2 \times 21C_2$ \therefore Total words = $4! \times 5C_2 \times 21C_2$	1 1 1	3

Qn. No	Sub Qns	Answer Key/Value Points						Score	Total
24.	(a)	class	f_i	x_i	$f_i x_i$	x_i^2	$f_i x_i^2$		
		10-20	6	15	90	225	1350		
		20-30	15	25	375	625	9375		
		30-40	13	35	455	1225	15925		
		40-50	7	45	315	2025	14175		
		50-60	9	55	495	3025	27225		
			50		1730		68050		
								- 2	
		(a) Mean $\bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{1730}{50} = 34.6$						1	
		(b) Variance $\sigma^2 = \frac{\sum f_i x_i^2}{\sum f_i} - (\bar{x})^2$							6
		$= \frac{68050}{50} - (34.6)^2$						1	
		$= 163.84$						1	
		S.D. = 12.8						1	
		(c) C.V = $\frac{\sigma}{\bar{x}} \times 100$							
		$= \frac{12.8}{34.6} \times 100 = 36.99$						1	
		<u>Remarks:</u> (i) For Eqns of \bar{x} , σ^2 , C.V, give one score.							

(2) For approximate $\bar{x} = 35$, and finding S.D and C.V give corresponding scores.

SECOND YEAR HIGHER SECONDARY EXAMINATION MARCH 2018

SUBJECT: MATHEMATICS

CODE. NO:

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1		Antony P St. Joseph's HSS Truro 09442315479		
2		Biju Joseph 07051 SMHSS ARAKUZHA		
3		Mimi James, 06018, SMHSS Kaliyari, Idukki		
4		Pramesh. K.V, GVIHSS Kerkikapuram Kannur (913019)		
5		V.P. GEETHA HSS BSSHSS KULLENKODE		
6		Thomas Thomas HSS, Nilumale HSS Champuzhi		
7		Ananda Kumar MK SHMGVHSS, Edakkinna, Malappuram		
8		C.K. Salih. HMVHSS Manjeri, Malappuram		
9		Binesh. k, GVHSS (THS) Vadakkara Kozhikode		
10		Shareef. cheelil. RACHSS, Katamen,		
11		Tomy Thomas SJHSS Nedumkuzha		
12		Antony. V.H HSS, HPSS chelvan Alappuzha		
13		Shini. P. Francis, NVT (Maths). GVHSS Thrikkakara, Ernakulam.		
14		Julie M Varghese, Chaldean Syrian HSS Thressur		
15		Mary. P. Jose NVT Maths MARIVGVHSS Santhipuram		

16. Jayamol.M, GUVHSS, Eravipuram, Kollam

Jayamol

17. Ambika . M.R , GUVHSS, PURAMATTOM

Ambika

2022

1. The first part of the paper is a multiple choice question. It asks about the main theme of the story 'The Blind Men and an Elephant'. The correct answer is 'The story is about the limitations of human perception'.

2. The second part is a short answer question. It asks to explain the meaning of the proverb 'Don't judge a book by its cover'. The answer is that one should not judge a person or a thing based on their appearance, but rather on their inner qualities.

3. The third part is a paragraph writing question. It asks to write a paragraph about the importance of education. The answer should discuss how education helps in personal growth, provides skills for employment, and contributes to the development of society.

4. The fourth part is a letter writing question. It asks to write a letter to a friend about a recent trip. The answer should describe the location, the activities done, and the overall experience.

5. The fifth part is a story writing question. It asks to write a story about a person who overcomes a challenge. The answer should include a clear beginning, middle, and end, showing the character's struggle and eventual success.