SET	A

INDIAN SCHOOL MUSCAT
HALF YEARLY EXAMINATION 2023
APPLIED MATHEMATICS

SUB.CODE: 241

CLASS: XI   Max.Marks: 80

Date: 12.09.'23

	QN.NO	VALUE POINTS	MARKS SPLIT UP
		MARKING SCHEME	
		SECTION- A	
	1	(b) 23	1 mark each Q1 to Q20.
	2	(b) 30	
	3	(a) 50	
	4	(b) $\frac{2}{5}$	
	5	(a) 6	
	6	(c) 24	
	7	(c) 1.7781	
	8	(d) $\frac{-3}{5}$	
	9	(b) 100	
	10	(b) n(B)	
	11	(c) 108	
	12	(c) mother	
	13	(d) Fencing	
	14	(d) $\frac{-3}{7}$	

15	(a) 190	
16	(c) 67	
17	(d) 90	
18	(c) 33	
19	(b) Both A and R are true but R is not the correct explanation of A	
20	(d) A is false but R is true	
21	Section-B ERPW	For each letter ½ m
22	Conclusion I is true and Conclusion II is false	1m each
23	Let $\dfrac{a}{r}$, a, ar be three terms of G.P. $\Rightarrow \quad a^3 = 512 \quad \Rightarrow \quad a = 8$ $\Rightarrow \quad \dfrac{8}{r} + 4, 12, 8r \ (AP)$ $24 = (8r + \dfrac{8}{r} + 4)$ $\Rightarrow \quad 6 = 2r + \dfrac{2}{r} + 1$ $2r^2 - 5r + 2 = 0$ $r = 2, r = \dfrac{1}{2}$ so the terms are (16, 8, 4) or (4, 8, 16)	Getting a ½ mark Finding r 1 mark Getting final ans 1 mark

Let the first term of the G.P. be a and its common ratio be r.
Now,
4th term $= t_4 = 54 \Rightarrow ar^3 = 54$
9th term $= t_9 = 13122 \Rightarrow ar^8 = 13122$
$\dfrac{ar^8}{ar^3} = \dfrac{13122}{54}$
$\Rightarrow r^5 = 243$
$\Rightarrow r = 3$
$ar^3 = 54$
$\Rightarrow a \times (3)^3 = 54$
$\Rightarrow a = \dfrac{54}{27} = 2$
∴ Required G.P. $= a, ar, ar^2, ar^3, \ldots\ldots$
$= 2, 2 \times 3, 2 \times (3)^2, 54$
$= 2, 6, 18, 54$

24	The word 'OBEDIENCE' has 5 vowels – three E's, one O and one I; it has four different consonants — B, D, N, C.	½ m	
	Considering 5 vowels as a block and 4 consonants as another block. The two block can be arranged in $\lfloor 2$ ways.	½ m	
	Now, within the block of vowels, 5 vowels can be arranged in $\dfrac{\lfloor 5}{\lfloor 3}$ ways. Also, within the	½ m	
	block of consonants, 4 different consonants can be arranged in $\lfloor 4$ ways.	½ m	
	By the multiplication principle of counting, the required number of words formed		
	$$= \lfloor 2 \times \dfrac{\lfloor 5}{\lfloor 3} \times \lfloor 4 = 2 \times 5 \times 4 \times 24 = 960.$$		
	(OR)		
	3 balls can be selected from 6 red balls in $^6C_3$ ways.		
	3 balls can be selected from 5 white balls in $^5C_3$ ways.		
	3 balls can be selected from 5 blue balls in $^5C_3$ ways.		
	Thus, by multiplication principle,		
	required number of ways of selecting 9 balls	Each Step ½ m	
	$$^6C_3 \times {}^5C_3 \times {}^5C_3 = \dfrac{6!}{3!3!} \times \dfrac{5!}{3!2!} \times \dfrac{5!}{3!2!}$$		
	$$= \dfrac{6 \times 5 \times 4 \times 3!}{3! \times 3 \times 2 \times 1} \times \dfrac{5 \times 4 \times 3!}{3! \times 2 \times 1} \times \dfrac{5 \times 4 \times 3!}{3! \times 2 \times 1}$$		
	$$= 20 \times 10 \times 10$$		
	$$= 2000$$		
25	$A = \left| 30 \times 8 - \dfrac{11}{2}m \right|$	½ m ½ m	
	$240 - 90 = \dfrac{11}{2}m$		
	$m = \dfrac{300}{11} = 27$ min 16 sec	½ m	
	Therefore the required time is 8:27:16	½ m	
26	Section-C		
	Slope of line joining the points (2, 3) and (3, -1) is -4	1m each	
	Slope of the required line is -1/4		
	Equation of the line passing through the point (5, 2) with slope -1/4 is		
	X – 4y + 3 = 0		
	(OR)		
	Getting (i) slope- intercept form (ii) intercept form and also find its slope and y-intercept	1m+1m ½ m +½ m	
27	No. of odd days upto 2000 years = 0	½ m	
	From 2001 to 2023, no. of odd days = 0	½ m	
	1st Jan 2024 to 15th August 2024 = 4 odd days	1m	
	Total no. of odd days = 4	½ m	

		Therefore, 15th August 2024 is Thursday.	½ m
28		Let the first term of the A.P. be a and the common difference be d. ∴ a = a, b = a + d and c = a + 2d a + b + c = 18 ⇒ a + (a + d) + (a + 2d) = 18 ⇒ 3a + 3d = 18 ⇒ a + d = 6 ....(i) Now, according to the question, a + 4, a + d + 4 and a + 2d + 36 are in G.P. ∴ $(a + d + 4)^2 = (a + 4)(a + 2d + 36)$ ⇒ $(6 - d + d + 4)^2 = (6 - d + 4)(6 - d + 2d + 36)$ ⇒ $(6 - d + d + 4)^2 = (6 - d + 4)(6 - d + 2d + 36)$ ⇒ $(10)^2 = (10 - d)(42 + d)$ ⇒ $100 = 420 + 10d - 42d - d^2$ ⇒ $d^2 + 32d - 320 = 0$ ⇒ (d + 40)(d − 8) = 0 ⇒ d = 8, − 40 Now, putting d = 8, -40 in equation (i), we get, a = -2, 46, respectively. For a = - 2, and d = 8, we have: a = -2, b = 6, c = 14 And, for a = 46 and d = - 40, we have; a = 46, b = 6, c = -34	
29		$\frac{1}{3} \div \frac{8}{9} \times \frac{4}{5} + (8)^{\frac{2}{3}} - 3^2$ After simplication, getting the ans. -4.7	Each step 1m
30		$\frac{8 \log 2 - 2 \log 4}{\log 2}$ Using laws of logarithm, simplified and getting the ans 4 (OR) Getting x =2, y = 3 and z = 5 Substitution and getting final ans 38	Each step 1m Each step ½ m 1 ½ m
31		Roster form = {(2,1), (4,2), (6, 3) (8,4), (10, 5)} Domain = { 2,4,6,8,10 } Range = { 1,2,3,4.5}	
32		Section-D Possible Venn Diagram Conclusions	For figs. 3m Conclusion 2m
33		Identifying the Qn. Is AP, getting d = 500 A = 20000 25th term is 32,000 His monthly pension is Rs. 16,000 (OR) Identifying the qn. Is GP, getting first term	½ + 1 ½ 1m 1m 1m 1m

		Common ratio	1 m
		Applying S_n formula and getting 87380	2m
		Cost = Rs. 174760	1m
34		Let x = $\dfrac{(5.364)^3 \times (49.76)^{\frac{1}{2}}}{(83.45)^{\frac{1}{3}}}$	½ m
		Applying log on both sides and using laws of logarithms	
		Getting the ans log x = 2.3965	3m
		Taking antilog on both sides	
		And getting the final ans x = 249.2	1 ½ m
		(OR)	
		P = 10,000 r = 4% per half year n= 20 half years	Each
		Getting A = $10,000(1.04)^{20}$	step
		Taking log on both sides, we get log A = 4. 34	1m
		Taking antilog on bothsides we get A = 21880	
		C.I. = Rs 11880	
35		Drawing Venn diagram and for working	2m
		Getting ans (a) 160	1m
		(b) 40	1m
		(c) 50	½ m
		(d) 30	each
36		(i) 120 ways	1m
		(ii) 48	1m
		(iii) 12	2m
		(OR) (iii) 24	2m
37		(i) Rupesh	1m
		(ii) Rishi	1m
		(iii) Sachin and Ashwini	2m
		(OR) (iii) Sachin and Rupesh	2m
38		(i) (5,3)	1m
		(ii) 5x – 3y +23 =0	1m
		(iii) 5x – 3y – 16 =0	2m
		(OR) (iii) 3x + 5y – 30 =0	2m