THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"

DATE: 27/09/2024	FIRST TERMINAL EXAMINATION (2024 - 25)	TIME: 3 Hrs
GRADE: X	MATHEMATICS (041)	MAX MARKS: 80

GENERAL INSTRUCTIONS:

1. THIS QUESTION PAPER HAS 5 SECTIONS A, B, C, D, E
2. SECTION A HAS 20 MCQS CARRYING 1 MARK EACH
3. SECTION B HAS 5 QUSTIONS CARRYING 2 MARKS EACH
4. SECTION C HAS 6 QUESTIONS CARRYING 3 MARKS EACH
5. SECTION D HAS 4 QUESTIONS CARRYING 5 MARKS EACH
6. SECTION E HAS 3 CASE BASED INTERGRATED UNITS OF ASSESSMENT (4 MARKS EACH) WITH SUBPARTS OF THE VALUES OF 1, 1 AND 2 MARKS EACH RESPECTIVELY.
7. ALL QUESTIONS ARE COMPULSORY. HOWEVER, AN INTERNAL CHOICE IN 2 QUESTIONS OF 5 MARKS, 2 QUESTIONS OF 3 MARKS AND 2 QUESTIONS OF 2 MARKS HAS BEEN PROVIDED. AN INTERNAL CHOICE HAS BEEN PROVIDED IN THE 2 MARKS QUESTIONS OF SECTION E

SL. NO.	SECTION A	MARKS
	SECTION A CONSISTS OF 20 QUESTIONS OF 1 MARK EACH	
1.	Two positive numbers have their HCF as 12 and their product as 6336. The number of pairs possible for the numbers is a. 2 b. 3 c. 4 d. 1	1
2.	If one zero of the polynomial $6x^2 + 37x - (k - 2)$ is reciprocal of the other, then the value of k is: a. 4 b. - 6 c. 6 d. – 4	1
3.	The condition for which the pair of equations $ax + 2y = 7$ and $3x + by = 16$ represent parallel lines is: a. $ab = \frac{7}{16}$ b. $ab = 6$ c. $ab = 3$ d. $ab = 2$	1
4.	If x, 2x + 9 and 4x + 3 are three consecutive terms of an AP, then the value of x is a. 3 b. 10 c. 13 d. 15	1
5.	If nth term of an AP is 7n + 4. The common difference is	1

	a. 7n b. 4 c. 7 d. 1	
6.	The point on X axis equidistant from the points P(5, 0) and Q(- 1, 0) a. (2, 0) b (- 2 , 0) c. (3, 0) d. (2, 2)	1
7.	Given that $\cos\theta = \frac{\sqrt{3}}{2}$, then the value of $\dfrac{\cos ec^2\theta - \sec^2\theta}{\cos ec^2\theta + \sec^2\theta}$ is a. − 1 b. 1 c. $\frac{1}{2}$ d. $\frac{-1}{2}$	1
8.	Given that $\sin\theta = \frac{a}{b}$, $\cos\theta =$ a. $\dfrac{b}{a}$ b. $\dfrac{b}{\sqrt{b^2 - a^2}}$ c. $\dfrac{\sqrt{b^2 - a^2}}{b}$ d. $\dfrac{a}{\sqrt{b^2 - a^2}}$	1
9.	The mean of the first n natural numbers is $\frac{5n}{9}$, then the value of n is a. 5 b. 4 c. 9 d. 10	1
10.	If the probability of a player winning a game is 0.79, then the probability of his losing the same game is: a. 1.79 b. 0.21 c. 0.31 d. 0.29	1
11.	If a digit is chosen at random from the digits 1 to 9, then the probability that this digit is an odd prime number is a. $\frac{1}{3}$ b. $\frac{2}{3}$ c. $\frac{4}{9}$ d. $\frac{5}{9}$	1
12.	The value of k for which the pair of equations kx = y + 2 and 6x = 2y + 3 has infinitely many solutions. a. is k = 3 b. does not exist c. k = - 3 d. k = 4	1
13.	If α, β are zeroes of the polynomials $x^2 - 1$, then value of (α + β) is a. 2 b. 1 c. − 1 d. 0	1
14.	The ratio of HCF to LCM of the least composite number and the least prime number is a. 1:2 b. 2:1 c. 1:1 d. 1:3	1
15.	The nature of the roots of the quadratic equation $9x^2 - 6x - 2 = 0$ is: a. No real roots c. 2 equal real roots b. 2 distinct real roots d. more than 2 real roots	1
16.	If the zeroes of the quadratic polynomial $ax^2 + bx + c$, a ≠ 0 are equal, then	1

	a. c and b have opposite signs b. c and a have opposite signs c. c and b have same signs d. c and a have same signs		
17.	If two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$, where a and b are prime numbers, then LCM (p, q) is: a. $2a^2b^2$ b. $180a^2b^2$ c. $12a^2b^2$ d. $180a^3b^4$	1
18.	The upper limit of the modal class of the given distribution is:	1

HEIGHT	BELOW 140	BELOW 145	BELOW 150	BELOW 155	BELOW 160	BELOW 165
NUMBER OF GIRLS	4	11	29	40	46	51

a. 165   b. 160   c. 155   d. 150

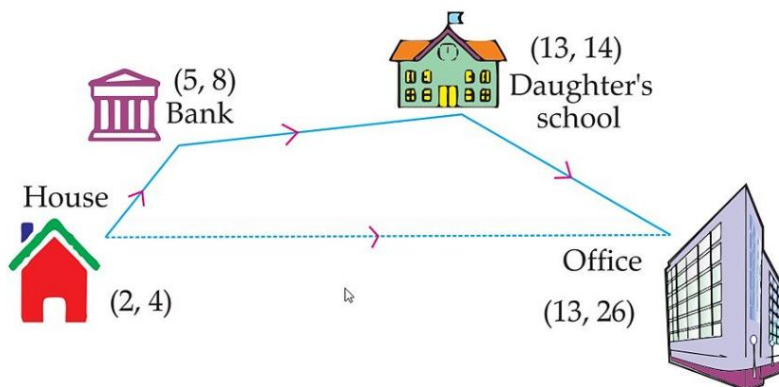| 19.	Assertion(A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 350. Reason(R): HCF is always a factor of LCM. a. Both A and R are true and R is the correct explanation of A b. Both A and R are true and R is not the correct explanation of A c. A is true but R is false d. A is false but R is true	1
20.	Assertion(A): a, b, c are in AP if and only if 2b = a + c Reason(R): The sum of first n odd natural numbers is n^2 a. Both A and R are true and R is the correct explanation of A b. Both A and R are true and R is not the correct explanation of A c. A is true but R is false d. A is false but R is true	1
	SECTION B	
	SECTION B CONSISTS OF 5 QUESTIONS OF 2 MARKS EACH	
21.	If α and β are the zeroes of the polynomial $4x^2 - x - 4$, find the quadratic polynomial whose zeroes are $\frac{1}{2\alpha}$ and $\frac{1}{2\beta}$	2
22.	Prove that $\sqrt{5}$ is an irrational number.	2
23.	Solve the following pair of linear equations in two variables. 7x – 2y = 5 and 8x + 7y = 15 Also state the nature of its graph.	2

24.	If $4\cot^2 45 - \sec^2 60 + \sin^2 60 + p = \frac{3}{4}$, find the value of p Or Prove that $\frac{(\sin A)^2}{1-\cos A} = \frac{1+\sec A}{Sec\,A}$	2
25.	If the centre of a circle is (2a, a - 7), then find the values of a, if the circle passes through the point (11, -9) and has diameter $10\sqrt{2}$ units. Or If the point P(x, y) is equidistant from the points A(a+b, b - a) and B(a − b, a + b). Prove that bx = ay	2
	SECTION C	
	SECTION C CONSISTS OF 6 QUESTONS OF 3 MARKS EACH	
26.	Rohan's mother is 26 years older than him. The product of their ages 3 years from now will be 360. Formulate the quadratic equation to find their ages and find the mother's present age. Or A motor boat, whose speed is 20 km/hr in still water takes 1 hour more to go 48 km upstream than to return downstream to the same spot. Find the speed of the stream.	3
27.	Find the ratio in which the y – axis divides the line segment joining the points (6, -4) and (-2, -7). Also find the point of intersection.	3
28.	Prove that $\frac{Cos\,A-\sin A+1}{\cos A+\sin A-1}$ = cosec A + cot A, using the identity $\cosec^2 A = 1 + \cot^2 A$ Or Prove that: $$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$	3
29.	A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increase from 30∘ to 60∘ as he walks towards the building. Find the distance he walked towards the building.	3
30.	Find the median of the following frequency distribution	3
31.	Two different dice are thrown together. Find the probability that the numbers obtained	3

CLASS	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 - 70
FREQ	8	7	15	20	12	8	10

a. Have a sum less than 7
b. Have a product less than 16
c. Is a doublet of odd numbers

	SECTION D	
	SECTION D CONSISTS OF 4 QUESTIONS OF 5 MARKS EACH	
32.	Solve the following pair of linear equations graphically: 2x + y = 4 2x − y = 4 Also find the coordinates of the vertices of the triangle formed by the lines with Y – axis and also find the area of the triangle. Or Points A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If they travel in same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?	5

33.	The ratio of the 11th term to 17th term of an AP is 3:4.
	   a. Find the ratio of 5th term to 21st term of the same AP.
	   b. Also find the ratio of the sum of first 5 terms to that to first 21 terms
	
	Or
	
	   a. Find the sum of first 20 terms of an AP in which d = 5 and a_{20} = 135
	   b. The 16th term of an AP is 5 times its third term. If its 10th term is 41, then find the sum of its first fifteen terms
		5

34.	Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point P between them on the road, the angle of elevation of the top of one pole is 60∘ and the angle of depression from the top of another pole at P is 30∘. Find the height of each pole and distances of the point P from the poles.	5
35.	Solve for x: $\frac{1}{x+1} + \frac{3}{5x+1} = \frac{5}{x+4}$. x ≠ -1, $\frac{-1}{5}$, - 4	5

		SECTION E	
		CASE BASED QUESTIONS	
36.		CASE STUDY 1: Rajeev went out from his house to reach the office. But he had to get some work done before going to the office. So, he first of all went to the bank first, from there he went to his son's school, and then reaches to office. The position of home, school, bank and office on coordinate axis is shown in the following figure: (Assume that all distances covered are in straight lines). If the house is situated at (2, 4), bank at (5, 8), school at (13, 14) and office at (13, 26) and coordinates are in km, then answer the following questions: 	
		a. If Rajeev goes directly from bank to his office, how much distance he would travel?	1
		b. How much distance he will travel, if goes directly from home to the office? Or Find the distance of the point (-6, 8) from the origin	2
		c. If at the mid-point of the bank and school, there is a park, what are the coordinates of the park?	1
37.		CASE STUDY: As the demand of the products grew, a manufacturing company decided to hire more employees. For which they want to know the mean time required to complete the work for a worker. The following table shows the frequency distribution of the time required for each worker to complete the work.	

TIME IN HOURS	15 – 19	20 – 24	25 – 29	30 – 34	35 - 39
NUMBER OF WORKERS	10	15	12	8	5

| | | | |
|---|---|---|
| | a. Find the mean time required to complete the work for a worker in hours | 1 |
| | B. Find mode of the data

 OR

 Find median of the data. | 2 |
| | C. If a worker works for 8hrs a day, then find approximate time required to complete the work for a worker (in days) | 1 |
| 38. | CASE STUDY:

 A boy 4 m tall spots a pigeon sitting on the top of a pole of height 54m from the ground. The angle of elevation of the pigeon from the eyes of boy at any instant is 60^0. The pigeon flies away horizontally in such a way that it remained at a constant height from the ground. After 8 seconds, the angle of evaluation of the pigeon from the same point is 45^0. Based on the above information answer the following questions (take $\sqrt{3} = 1.73$
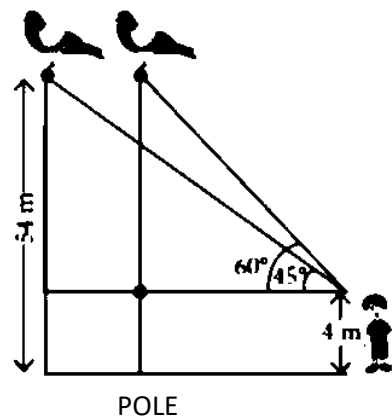
 POLE | |
| | i. If the distance between the positions of pigeon increases, then the angle of elevation
 (a) Increases   (b) Decreases
 (c) Remains unchanged   (d) can't say | 1 |
| | ii. Find the distance between the boy and the pole.
 (a) 50m   (b) $\frac{50}{\sqrt{3}}\, m$
 (c) $50\sqrt{3}m$ (d) $60\sqrt{3}$

 Or

 How much distance the pigeon covers in 8 seconds?
 (a) 12.13m   (b) 19.60m | 2 |

	(c) 21.09m	(d) 26.32m	
	iii. Find the distance of first position of the pigeon from the eyes of the boy (a) 54m (b) 100m (c) $\frac{100}{\sqrt{3}} m$ (d) $100\sqrt{3}$		1