



HOMERTON GRAMMAR SCHOOL

Creating Tomorrow's Achievers... Today!

Class: X ; Subject: Mathematics

Mid Term Examination (2026-27)

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Set : B

Roll No: 17

Time Allotted: 3 hours

Maximum Marks: 80

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General Instructions:

This question paper is divided into 5 sections: A, B, C, D and E.

- Section A consists of 20 questions (1 to 20). Each question carries 1 mark.
- Section B consists of 5 questions (21 to 25). Each question carries 2 marks.
- Section C consists of 6 questions (26 to 31). Each question carries 3 marks.
- Section D consists of 4 questions (32 to 35). Each question carries 5 marks.
- Section E consists of 3 questions (36 to 38). Each question carries 4 marks.
- All questions are compulsory.
- Internal choices are provided in some questions.
- Maintain the sequence of the sections while answering.

Section-A

Q1	If α, β are the zeros of the polynomial $f(x) = x^2 - p(x+1) - c$ such that $(\alpha+1)(\beta+1) = 0$, then $c =$				1
	(a) 1	(b) 0			
	(c) -1	(d) 2			
Q2	What should be added to the polynomial $x^2 - 5x + 4$, so that 3 is the zero of the resulting polynomial?				1
	(a) 1	(b) 2			
	(c) 4	(d) 5			

Q3	If the zeroes of the polynomial $ax^2 + bx + 2a/b$ are reciprocals of each other, then the value of b is				
	(a)	2	(b)	$1/2$	
	(c)	-2	(d)	$-1/2$	
Q4	Let $p = x^2 y^3 z^n$ and $q = x^3 y^m z^2$, where x, y, z are prime numbers. If LCM (p, q) = $x^3 y^4 z^3$, then the value of $(2m + 3n)$ is				1
	(a)	18	(b)	17	
	(c)	15	(d)	14	
Q5	The HCF of smallest odd prime and smallest composite number is				1
	(a)	1	(b)	3	
	(c)	12	(d)	4	
Q6	If the HCF of 408 and 1032 is expressible in the form $1032m - 408 \times 5$, then the value of m is				1
	(a)	1	(b)	3	
	(c)	2	(d)	4	
Q7	The value of k for which system of equations $kx + y = k^2$ and $x + ky = 1$ has infinitely many solutions is				1
	(a)	1	(b)	3	
	(c)	2	(d)	4	
Q8	The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by				1
	(a)	(0, -3)	(b)	(0, 3)	
	(c)	(2, 0)	(d)	(-2, 0)	
Q9	If $y = 1$ is a common root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then ab equals				1
	(a)	3	(b)	$-7/2$	
	(c)	6	(d)	-3	

10 If the equation $(a^2 + b^2)x^2 - 2(ac + bd)x + c^2 + d^2 = 0$ has equal roots, then 1

- (a) $ab = cd$ (b) $ad = bc$
 (c) $ad = \sqrt{bc}$ (d) $ab = \sqrt{cd}$

Q11 If the ratio of 18th term to 11th term of an A.P. is 3:2, then the ratio of the 21st term to 5th term is 1

- (a) 3:2 (b) 3:1
 (c) 1:3 (d) 2:3

Q12 If the 2nd term of an A.P. is 13 and 5th term is 25, what is its 7th term? 1

- (a) 30 (b) 33
 (c) 37 (d) 38

Q13 In an A.P., $S_p = q$, $S_q = p$ and S_r denotes the sum of first of r terms. Then, S_{p+q} is equal to 1

- (a) 0 (b) $-(p+q)$
 (c) $p+q$ (d) pq

Q14 If $\tan\theta = \frac{a}{b}$, then $\frac{a \sin\theta + b \cos\theta}{a \sin\theta - b \cos\theta}$ is equal to 1

- (a) $\frac{a^2 + b^2}{a^2 - b^2}$ (b) $\frac{a^2 - b^2}{a^2 + b^2}$
 (c) $\frac{a + b}{a - b}$ (d) $\frac{a - b}{a + b}$

Q15 The value of $(1 + \tan^2\theta)(1 + \sin\theta)(1 - \sin\theta)(1 + \cos\theta)(1 - \cos\theta)(1 + \cot^2\theta)$ is 1

- (a) 1 (b) -1
 (c) 0 (d) -2

Q16 A circle drawn with origin as the center passes through $(13/2, 0)$. The point which does not lie in the interior of the circle is 1

- (a) $(-3/4, 1)$ (b) $(2, 7/3)$
 (c) $(5, -1/2)$ (d) $(-6, 5/2)$

Q17 In a family of 3 children, the probability of having at least one boy is

(a) $7/8$

(b) $1/8$

(c) $5/8$

(d) $3/4$

Q18 If the probability of the letter chosen at random from the word "Mathematics" to be a vowel is $\frac{2}{2x+1}$, then x is equal to

(a) $4/11$

(b) $9/4$

(c) $11/4$

(d) $4/9$

Assertion and Reason based Questions: (Choose the correct option)

(A) Both Assertion and Reason are true and Reason is the correct explanation for Assertion

(B) Both Assertion and Reason are true but Reason is not the correct explanation for Assertion

(C) Assertion is true but Reason is false.

(D) Assertion is false but Reason is true.

Q19 **Assertion:** If $a \neq 0, b \neq 0$, then the points $O(0,0), A(a, a^2), B(b, b^2)$ are non-collinear.

Reason: If points P, Q and R are collinear, then $PQ + QR = PR$.

Q20 **Assertion:** For $0 \leq \theta \leq 90^\circ$, $(\operatorname{cosec} \theta - \cot \theta)$ and $(\operatorname{cosec} \theta + \cot \theta)$ are reciprocal of each other.

Reason: $\cot^2 \theta - \operatorname{cosec}^2 \theta = 1$.

Section-B

Q21 If α and β are the zeroes of the polynomial $p(y) = y^2 - 5y + 3$, then find the value of $\alpha^4 \beta^3 + \alpha^3 \beta^4$.

Q22 Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.

Q23 Find the value of 'p' for which the equation $px(x-2) + 6 = 0$ has two equal roots. Also, find the roots.

Q24 Evaluate: $\frac{5 \cos^2 60^\circ + 4 \sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$ 2

Q25 A box contains 20 cards numbered from 1 to 20. A card is drawn at random from the box. Find the probability that the number on the drawn card is
(i) divisible by 2 or 3 (ii) a prime number 2

SECTION - C

Q26 Prove that $\frac{2-\sqrt{3}}{5}$ is an irrational number, given that $\sqrt{3}$ is an irrational number. 3

Q27 If α and β are the zeroes of the polynomial $f(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = 21/4$, find then value of k . 3

Q28 If two adjacent vertices of a parallelogram are $(3,2)$ and $(-1,0)$ and the diagonals intersect at $(2,-5)$, then find the coordinates of the other two vertices. 3

Q29 Five cards the ten, jack, queen, king and ace of diamonds, are well-shuffled with their face downwards. One card is then picked up at random.
(i) What is the probability that the card is the queen?
(ii) If the queen is drawn and put aside, what is the probability that the second card picked is (a) an ace? (b) a queen? 3

Q30 Prove that: $\frac{\tan^2 A}{\tan^2 A - 1} + \frac{\operatorname{cosec}^2 A}{\sec^2 A - \operatorname{cosec}^2 A} = \frac{1}{1 - 2\cos^2 A}$ 3

Q31 Find the ratio in which y -axis divides the line segment joining the points $(5,-6)$ and $(-1,-4)$. 3

Section-D

Q32 The sum of a two digit number and the number obtained by interchanging its digits is 110. If 10 is subtracted from the original number, the new number is 4 more than 5 times the sum of the digits in the first number. Find the original number. 5

Q33 There is a square field whose side is 44m. A square flower bed is prepared in its center leaving a gravel path all around the flower bed. The total cost of laying the flower bed and gravelling the path at ₹2.75 and ₹1.50 per square metre, respectively, is ₹4904. Find the width of the gravel path. 5

Q34 (i) Prove: $\tan^2 A + \cot^2 A + 2 = \sec^2 A \operatorname{cosec}^2 A$ 3

(ii) If $\tan A = \sqrt{3}$, where A is an acute angle, then find the value of $\frac{\sin^2 A}{1 + \cos^2 A}$. 2

- Q35** The sum of first and eighth terms of an A.P. is 32 and their product is 60. Find the first term and the common difference of the A.P. Hence, also find the sum of first 20 terms.

Section-E

- Q36** Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic "Water Kingdom" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹150 per child and ₹250 per adult.



On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹55,000 was collected. Based on the above, answer the following questions:

- (i) If the number of children visited be x and the number of adults visited be y , then write the given situation algebraically. (2)
- (ii) (a) How many children visited the amusement park that day? (2)
Or
(b) How many adults visited the amusement park that day?

- Q37** Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86 m at the Asian Grand Prix in 2017 is the biggest distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56 m only. Being an athlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9 cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress. 4

