



MID TERM EXAMINATION 2023-24
SUBJECT – Mathematics(CLASS: X)

Time: 3Hr

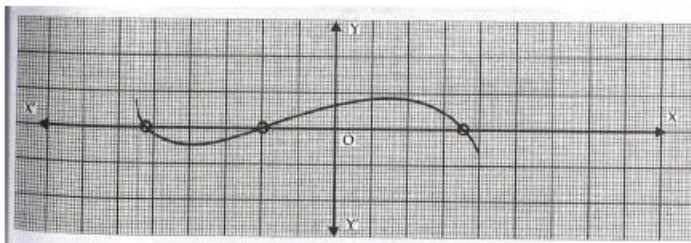
Sample paper

M.M: 80

General Instructions:

- (i) This Question Paper has 5 Sections A, B, C, D and E.
- (ii) Section A has 20 MCQs carrying 1 mark each
- (iii) Section B has 5 questions carrying 02 marks each.
- (iv) Section C has 6 questions carrying 03 marks each.
- (v) Section D has 4 questions carrying 05 marks each.
- (vi) Section E has 3 case based integrated units of assessment (04 marks each) with sub- parts.
- (vii) All Questions are compulsory. However, an internal choice has been provided.

1. The exponent of 5 in the prime factorisation of 3750 is
(a) 3 (b) 4 (c) 5 (d) 6
2. The quadratic polynomial whose one zero is 6 and sum of the zeroes is 0 is
(a) $X^2 + 36$ (b) $X^2 - 36$ (c) $36 - x^2$ (d) $x^2 + 6$
3. If p and q are coprime numbers then
H.C.F (p,q) X L.C.M(p,q) =
(a) -pq (b) pq (c) p/q (d) 0
4. In triangle ABC, right angled at C, then $\cos (A + B) =$
(a) 1 (b) -1 (c) 2 (d) 0
5. If $\sin A = 12/13$, then $\cos A =$
(a) $5/13$ (b) $13/5$ (c) $12/13$ (d) $5/12$
6. For an event E, $P(E) + P(\text{not } E) = q$, then the value of $q^3 - 1$ is
(a) 4 (b) -1 (c) 1 (d) 0
7. The graph of the polynomial P(x) is shown. The number of zeroes of P(x) is



- (a) 1 (b) 2 (c) 3 (d) 4
8. The pair of linear equations $2x - 3y = 1$, and $3x - 2y = 4$ have
(a) Unique solution (b) no solution (c) infinitely many solutions (d) none
9. The (HCF + LCM) for the numbers 50 and 20 is
(a) 10 (b) 100 (c) 1000 (d) 50

10. The exponent of 5 in the prime factorisation of 3750 is
 (a) 3 (b) 4 (c) 5 (d) 6

11. The number of polynomials having zeroes as -2 and 5 is
 (a) 1 (b) 2 (c) 3 (d) more than three

12. If α and β are the zeroes of polynomial $f(x) = 4x^2 + 3x + 7$, then $1/\alpha + 1/\beta$ is
 (a) $7/3$ (b) $-7/3$ (c) $3/7$ (d) $-3/7$

13. A quadratic polynomial, the sum and product of whose zeroes are $-1/4$ and $1/4$ respectively, is:

(a) $4x^2 + x + 1$ (b) $x^2 - 3x + 2$ (c) $x^2 + 3x - 2$ (d) None of these

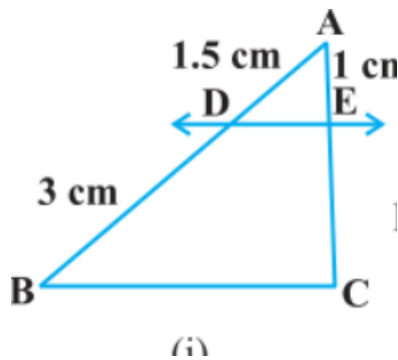
14. What is the quadratic polynomial whose sum and the product of zeroes is $\sqrt{2}$, $1/3$ respectively?

(a) $3x^2 - 3\sqrt{2}x + 1$ (b) $3x^2 + 3\sqrt{2}x + 1$
 (c) $3x^2 + 3\sqrt{2}x - 1$ (d) None of the above

15. If in two triangles ABC and PQR, $AB/QR = BC/PR = CA/PQ$, then

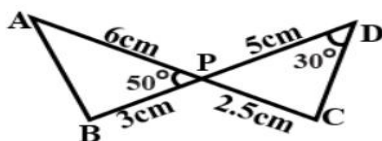
(a) $\Delta PQR \sim \Delta CAB$ (b) $\Delta PQR \sim \Delta ABC$ (c) $\Delta CBA \sim \Delta PQR$ (d) $\Delta BCA \sim \Delta PQR$

16. In figure. (i) $DE \parallel BC$. Find EC



(a) 2cm (b) 3cm (c) 0.5cm (d) 1.5cm

17. Find $\angle PAB$



(a) 50° (b) 30° (c) 60° (d) 100°

18. **A bag has 3 red balls and 5 green balls. If we take a ball from the bag, then what is the probability of getting red balls only?**

- (a) 3 (b) 8 (c) $\frac{3}{8}$ (d) $\frac{8}{3}$

DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason ®. Choose the correct option:

- a) Both assertion (A) and reason ® are true and reason ® is the correct explanation of assertion (A)
- b) Both assertion (A) and reason ® are true and reason ® is not the correct explanation of assertion (A)
- c) Assertion (A) is true but reason ® is false.
- d) Assertion (A) is false but reason ® is true.

19. **(Assertion):** $x=2, y=1$ is a solution of pair of equations $3x-2y=4$, and $2x+y=5$

(Reason) : A pair of values (x,y) satisfying each one of the equations in given system of two simultaneous linear equations in x and y is called a solution of the system of equations .

20. **Assertion:** The probability of an event that cannot happen or which is impossible, is equal to zero.

Reason: The probability lies between 0 and 1. Hence, it cannot be negative

Section – B

Questions carry 2 marks each

21. Prove that $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

22. Two tankers contain 850 litres and 680 litres of petrol respectively. Find the maximum capacity of the container which can measure the petrol of either tanker in exact number of times.

23. Prove that $3 + \sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.

24. If one zero of the polynomial $p(x) = (a^2 + 4) x^2 + 20x + 4a$ is reciprocal of the other, find the value of a .

25. Divide 19 into two parts such that sum of their squares is 193.

Or

Find the two consecutive odd positive integers, sum of whose squares is 290

Section - C

Questions carry 3 marks each

26. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $AO/BO = CO/DO$. Show that ABCD is a trapezium.

27. If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 - x - 2$, find a polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$
28. For which value of a and b will the following pair of linear equations have infinitely many solutions?

$$\begin{aligned} X + 2y &= 1 \\ (a - b)x + (a + b)y &= a + b - 2 \end{aligned}$$

29. If $\sin \theta + \cos \theta = \sqrt{3}$, then prove that $\tan \theta + \cot \theta = 1$

30. If $\operatorname{cosec} \theta + \cot \theta = p$, then prove that $\cos \theta = \frac{p^2 - 1}{p^2 + 1}$

Prove that
$$\frac{\sin A - \cos A + 1}{\sin A + \cos A - 1} = \frac{\operatorname{Or} 1}{\sec A - \tan A}$$

31. Find the zeroes of $4a^2 - 4a + 1$ and verify the relationship between the zeroes and the coefficients.

Section - D

Questions carry 5 marks each

32. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$.
33. A girl of height 90 cm is walking away from base of lamp post at a speed of 2 m/sec. If lamp post is 3.6 m above the ground, find the length of her shadow after 4 seconds.
34. A plane left 30 minutes later than the schedule time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km/hr from its usual speed. Find its usual speed.
35. A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eye of the girl at any instant is 60° . After some time the angle of elevation reduces to 30° . Find the distance travelled by the balloon during the interval.

Or

Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles.

Section - E (Case Study)

36. It is common that Governments revise travel fares from time to time based on various factors such as inflation (a general increase in prices and fall in the purchasing value of money) on different types of vehicles like auto Rickshaws, taxis, Radio cab etc. The auto charges in a city comprise of a fixed charge together with the charge for the distance covered. Study following situation:



Name of the city	Distance travelled (Km)	Amount paid (Rs.)
City A	10	75
	15	110
City B	8	91
	14	145

Situation 1: In city A, for a journey of 10 km, the charge paid is Rs 75 and for a journey of 15 km, the charge paid is Rs 110.

Situation 2: In a city B, for a journey of 8km, the charge paid is Rs91 and for a journey of 14km, the charge paid is Rs 145.

Refer situation 1

(i) If the fixed charges of auto rickshaw be Rs x and the running charges be Rs y km/hr, represent the pair of linear equations.

(ii) A person travels a distance of 50km. How much amount he has to pay ?

Refer situation 2

(iii) What will a person have to pay for travelling a distance of 30km?

37. A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.



(a) What is the angle of elevation if they are standing at a distance of 42m away from the monument?

(b) They want to see the tower at an angle of 60° . So, they want to know the distance where they should stand and hence find the distance.

(c) If the altitude of the Sun is at 60° , then find the height of the vertical tower that will cast a shadow of length 20 m.

(d) The ratio of the length of a rod and its shadow is 1:1. What is the angle of elevation of the Sun?

38. Rahul and Ravi planned to play Business (board game) in which they were supposed to use two dice.



(ii) Ravi got first chance to roll the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is 8?

(ii) Ravi got next chance What is the probability of getting a multiple of 3 as the sum?

(iii) Rahul got first chance to roll the dice. What is the probability of getting an even number as the sum?

(iv) Rahul got next chance. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is 13?