



Delhi Public School, Howrah

PRE-BOARD-I EXAMINATION (2024-2025)

Class-X

Care must be taken not to write anything on the question paper. All the questions must be attempted in the correct sequence.

Mathematics Basic (Code No-241)

F.M. 80

Time: 3 Hours

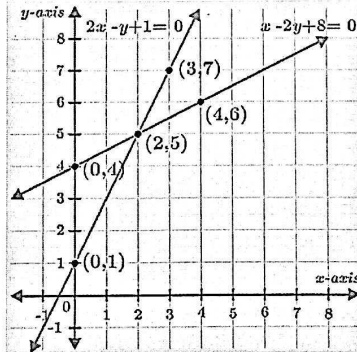
General Instructions:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Questions of section B, 2 Questions of section C and 2 Questions of section D has been provided. And internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = 22/7$ wherever required if not stated.
11. Use of calculators is not allowed.

Section A.

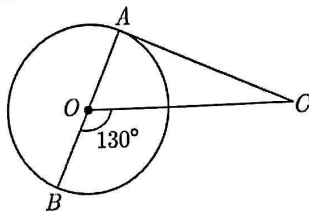
Section A consists of 20 questions of 1 mark each.

1. If $a = 2^3 \times 3$, $b = 2^2 \times 3 \times 5$, $c = 3^2 \times 5^2$, then $LCM(a, b, c)$ is equal to
a)360 b)1800 c)60 d)300
2. The system of linear equations represented by the two lines given in the figure is

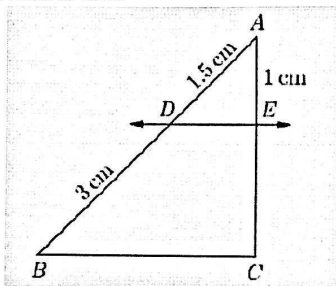


- a) consistent with unique solution b) inconsistent
 - c) consistent with three solutions d) consistent with many solutions
3. The value(s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots, is
a)0 only b)4 c)8 only d)0,8
 4. The distance between the points $(m, -n)$ and $(-m, n)$ is
a) $\sqrt{m^2 + n^2}$ units b) $m + n$ units c) $2\sqrt{m^2 + n^2}$ units d) $\sqrt{2m^2 + 2n^2}$ units

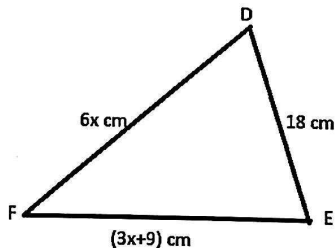
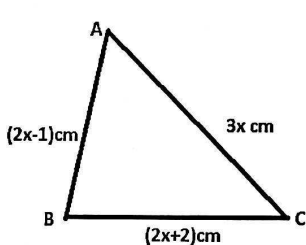
5. In the given figure, AOB is a diameter of the circle with centre O and AC is a tangent to the circle at A. If $\angle BOC = 130^\circ$, then the measure of $\angle ACO$ is



- a) 50° b) 40° c) 60° d) 80°
6. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.
- a) 56m b) 24m c) 21m d) 42m
7. If $3\cot \theta = 2$, then the value of $\frac{4\sin \theta - 3\cos \theta}{2\sin \theta + 6\cos \theta}$ is
- a) $\frac{3}{2}$ b) $\frac{1}{2}$ c) $\frac{1}{3}$ d) none of these
8. In the given figure, $DE \parallel BC$. The value of EC is



- a) 1.5cm b) 3cm c) 2cm d) 1cm
9. The HCF of two numbers is 18 and their product is 12960. Their LCM will be
- a) 420 b) 600 c) 720 d) 800
10. The 4th term from the end of the A.P $-8, -5, -2, \dots, 49$ is
- a) 37 b) 40 c) 1 d) 43
11. In given figure, if $\triangle ABC \sim \triangle DEF$, find x.



- a) 5 b) 4 c) 6 d) 8
12. If two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then the length of each tangent is equal to
- a) $3\sqrt{3}$ cm b) 3cm c) 6cm d) $3/\sqrt{3}$ cm
13. The value of $2(\sin^2 45^\circ + \cot^2 30^\circ) - 6(\cos^2 45^\circ - \tan^2 30^\circ)$ is
- a) 6 b) 3 c) 2 d) 4

14. What is the total surface area of a solid hemisphere of diameter 'd'?
- a) $3\pi d^2$ b) $2\pi d^2$ c) $\frac{1}{2}\pi d^2$ d) $\frac{3}{4}\pi d^2$
15. The probability of getting exactly one tail in tossing a pair of coins is
- a) 0 b) 1 c) $1/3$ d) $1/2$
16. The roots of the quadratic equation $x^2+7x+10=0$ are:
- a) -5,-2 b) 5,2 c) 5,-2 d) -5,2
17. Find the upper limit of the modal class from the given distribution.

Height(in cm)	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
18. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3, then the value of k is
- a) $\frac{4}{3}$ b) $-\frac{4}{3}$ c) $\frac{2}{3}$ d) $-\frac{2}{3}$

ASSERTION REASONING QUESTIONS

In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

- a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
 b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
 c) Assertion (A) is true but reason (R) is false.
 d) Assertion (A) is false but reason (R) is true.
19. Assertion(A) : The n^{th} term of the sequence -8,-4,0,4,..... is $(4n-12)$.
 Reason (R) : The n^{th} term of an AP is determined by $a_n = a + (n - 1)d$.
20. Assertion(A): \sqrt{a} is an irrational number, where a is a prime number.
 Reason (R): Square root of any prime number is an irrational number.

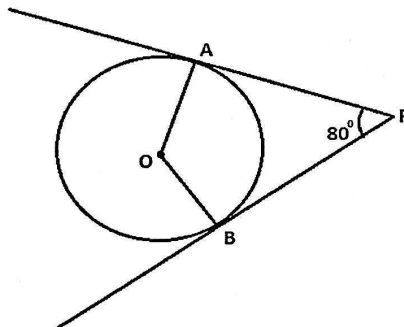
SECTION B

Section B consists of 5 questions of 2 marks each.

21. (a) Find the point on x-axis which is equidistant from the points (2,-2) and (-4,2).

OR

- (b) In what ratio does the point P(-4,6) divide the line segment joining the points A(-6,10) and B(3,-8)?
22. In the given figure, if tangents PA and PB from an external point P to a circle with centre O, are inclined to each other at an angle of 80° , then find $\angle AOB$.



23. (a) Determine the AP whose third term is 5 and seventh term is 9.

OR

- (b) In an AP, if $S_n = n(4n + 1)$, then find the AP.
24. If $\tan(A + B) = 1$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, $0^\circ < A + B < 90^\circ$, $A > B$, then find the values of A and B.

25. The mode of the following frequency distribution is 38. Find the value of x .

Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	7	9	12	16	x	6	11

SECTION C

Section C consists of 6 questions of 3 marks each

26. Prove that $\sqrt{3}$ is an irrational number.
 27. (a) P(-2,5) and Q(3,2) are two points. Find the coordinates of the point R on PQ such that PR=2QR.

OR

- (b) If the point C(-1,2) divides the line segment joining A(2,5) and B(x,y) in the ratio 3:4, find the coordinates of B.

28. Prove that $(\operatorname{cosec} \theta - \cot \theta)^2 = \frac{1 - \cos \theta}{1 + \cos \theta}$

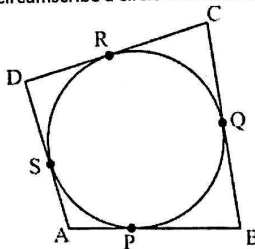
29. Find the mean using step deviation method.

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	10	8	9	6

30. (a) Prove that the lengths of tangents drawn from an external point to a circle are equal.

OR

- (b) A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.



31. A fraction becomes $\frac{1}{3}$ when 2 is subtracted from the numerator and it becomes $\frac{1}{2}$ when 1 is subtracted from the denominator. Find the fraction.

SECTION D

Section D consists of 4 questions of 5 marks each

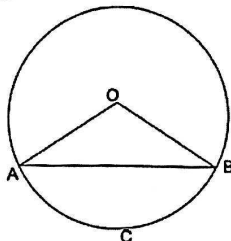
32. (a) A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than the initial speed. If it takes 3 hours to complete the whole journey, what was the initial average speed?

OR

- (b) A motor boat whose speed is 24 km/h in still water, takes 1 hour more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream.

33. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.

34. The perimeter of sector OACB of the circle centred at O and of radius 24 cm, is 73.12 cm.



- (i) Find the central angle $\angle AOB$.
- (ii) Find the area of the minor segment ACB. (Use $\pi=3.14$ and $\sqrt{3}=1.73$)
35. (a) From the top of a 120 m high tower, a man observes two cars on the opposite sides of the tower and in a straight line with the base of the tower with angles of depression as 60° and 45° . Find the distance between two cars.

OR

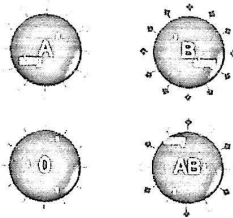
- (b) Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point in between them on the road, the angles of elevation of the top of poles are 60° and 30° respectively. Find the height of the poles and the distance of the point from the poles.

SECTION E

36. Case Study I:

Blood groups are classifications of blood based on the presence or absence of certain antigens on the surface of red blood cells. These antigens are substances that can trigger an immune response if they are foreign to the body. In a sample of 50 people, 21 had type O blood, 22 had type A, 5 had type B and rest had type AB blood group.

BLOOD GROUP



Based on the above information, answer the following questions:

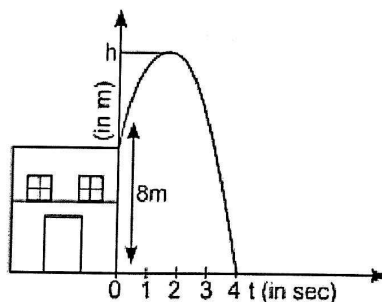
- (i) What is the probability that a person chosen at random had type O blood? 1
- (ii) What is the probability that a person chosen at random had type AB blood? 1
- (iii) (a) What is the probability that a person chosen at random had neither type A nor type B blood group? 2

OR

- (b) What is the probability that a person chosen at random had either type A or type B or type O blood group? 2

37. Case Study II:

Sukriti throws a ball upwards, from a rooftop which is 8 m high from ground level. The ball reaches to some maximum height and then returns and hit the ground. If height of the ball at time t (in sec) is represented by h (in m), then equation of its path is given as $h(t) = -t^2 + 2t + 8$.



Based on the above information, answer the following questions:

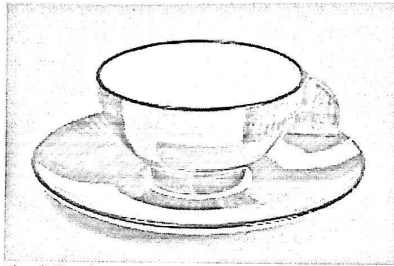
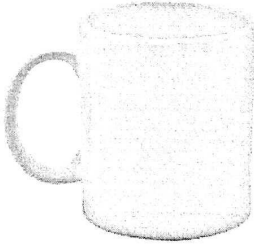
- (i) What is the shape of the polynomial represented by the above graph? 1
- (ii) Find the zeroes of the polynomial $h(t)$. 1
- (iii) (a) Find the maximum height achieved by the ball. 2

OR

- (b) At what time the height of the ball will be 5 m from the ground. 2

38. Case Study III:

In a coffee shop, coffee is served in two types of cups. One is cylindrical in shape with diameter 7 cm and height 14 cm and the other is hemispherical with diameter 21 cm.



Based on the above information, answer the following questions:

- (i) Find the area of the base of the cylindrical cup. 1
- (ii) What is the curved surface area of the cylindrical cup? 1
- (iii) (a) Find the capacity of the hemispherical cup. 2

OR

- (b) Find the capacity of the cylindrical cup. 2