COMMON PRE-BOARD EXAMINATION – 2023
MATHEMATICS (Basic) (241)

Time Allowed: 3 Hours　　　　　　　**CLASS : X**　　　　　　　**Maximum Marks: 80**

General Instructions:
1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. Section E has 3 Case Based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks and 2 questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take $\pi = \frac{22}{7}$, wherever required if not stated.

Section A

Q.No.	Section A consists of 20 questions of 1 mark each.	Marks

1. One year ago, a man was 8 times as old as his son. Now, his age is equal to the square of his son's age. The present ages of son and his father are　　1

   (a) 7 yrs, 49 yrs　　　(b) 5 yrs, 25 yrs　　　(c) 6 yrs, 36 yrs　　　(d) 8 yrs, 64 yrs

2. The LCM of smallest two-digit composite number and smallest composite number is　　1

   (a) 12　　　　　(b) 4　　　　　(c) 20　　　　　(d) 44

3. The 10th term from the end of the A.P. 4, 9,14, ..., 254 is　　1

   (a) 209　　　　(b) 205　　　　(c) 214　　　　(d) 213

4. The value of c for which the pair of equations $cx - y = 4 \ and \ 6x - 2y = 8$ will have infinitely many solutions is　　1

   (a) 3　　　　(b) – 3　　　　(c) – 12　　　　(d) 12

5. The value(s) of k for which the quadratic equation $2x^2 + kx + 2 = 0$ has equal roots is　　1

   (a) 4　　　　(b) ± 4　　　　(c) – 4　　　　(d) 0

6. If $A \left(\frac{m}{3}, 5\right)$ is the mid point of the line segment joining the points Q (-6, 7) and R (-2, 3), then the value of m is　　1

   (a) – 12　　　　(b) – 4　　　　(c) 12　　　　(d) – 6

7. In the given figure, QA and PB are perpendiculars on AB, if AO = 10 cm, BO = 6 cm and
PB = 9 cm, then the length of AQ is   1
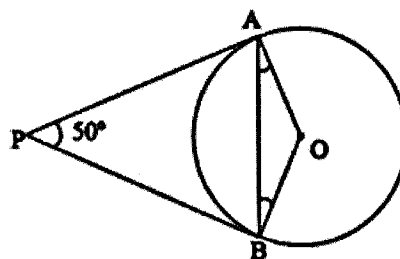

(a) 15 cm   (b) 25 cm

(c) 10 cm   (d) 20 cm
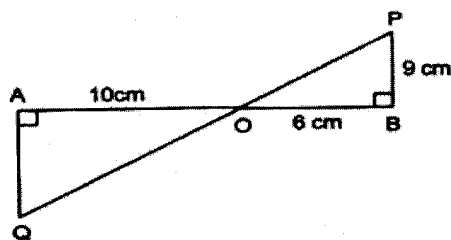
8. The angle of depression of a car, standing on the ground, from the top of a 75 m high tower   1
is 30°. The distance of the car from the base of tower (in m) is:

(a) 25√3   (b) 50√3   (c) 75√3   (d) 150

9. In the given figure, if PA and PB are tangents to the   1
circle with centre O such that ∠APB = 50°, then

∠OAB is equal to
(a) 25°   (b) 30°
(c) 40°   (d) 50°

10. If $sin\ \theta\ =\ \frac{1}{\sqrt{2}}$, then the value of $cos\ \theta$ is :   1

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{1}{2}$

11. If the height and length of the shadow of a man are equal, then the angle of elevation of the   1
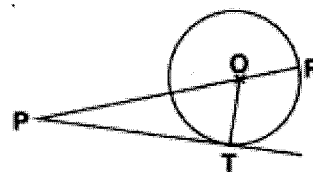sun is
(a) 45°   (b) 60°   (c) 30°   (d) 90°

12. If the length of the minute hand of a clock is 14 cm, then the area swept by the minute hand in 1
5 minutes is ....

(a) $\frac{154}{3}\ cm^2$ (b) $\frac{145}{3}\ cm^2$ (c) $\frac{144}{3}\ cm^2$ (d) $\frac{130}{3}\ cm^2$

13. In the given circle of radius 7 cm, tangent PT is drawn from a   1
point P such that PT = 24 cm. If O is the centre of the circle,
then the length of PR is ....

(a) 30 cm   (b) 28 cm
(c) 32 cm   (d) 25 cm

14. From a solid circular cylinder with height 10 cm and radius of the base 6 cm, a right circular   1
cone of the same height and same base is removed, then the volume of remaining solid is
(a) 280 π cm³   (b) 330 π cm³   (c) 240 π cm³   (d) 440 π cm³

15. $(\sin 30° + \cos 30°) - (\sin 60° + \cos 60°) = \ldots\ldots$ 1

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

16. In a circle of diameter 42 cm, if an arc subtends an angle of 60° at the centre, then length of arc is   1

   (a) 11 cm   (b) $\frac{22}{7}$ cm   (c) 22 cm   (d) 44 cm

17. A ladder makes an angle of 60° with the ground, when placed along a wall. If the foot of ladder is 8 m away from the wall, the length of ladder is: 1

   (a) 4 m   (b) 8 m   (c) $8\sqrt{2}$ m   (d) 16 m

18. The given figure represents the graph of a polynomial

   $y = p(x)$. The number of zeroes of $p(x)$ is … …   1

   (a) 1   (b) 2

   (c) 3   (d) 4
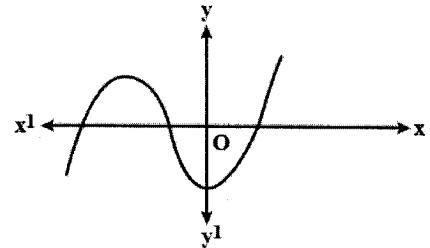
Direction for questions 19 & 20:

In question numbers 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

19. **Assertion:** Cards are numbered as 1, 2, 3, 4, ………15 are put in a box and mixed thoroughly and one card is drawn at random. The probability of getting an even number is $\frac{1}{2}$.   1

Reason: For any event E, we have $0 \le P(E) \le 1$.

(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.

20. **Assertion (A):** The ratio in which the line segment joining (2, -3) and (5, 6) internally divided by x axis is 1:2.   1

   Reason (R): If a point (x, y) divides the line segment joining the points (x_1, y_1) and (x_2, y_2) in the ratio $m_1 : m_2$, the $(x, y) = \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$

(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.

Section B

Section B consists of 5 questions of 2 marks each.

21. In a school, there are two Sections A and B of class X. There are 48 students in Section A and 60 students in Section B. Determine the least number of books required for the library of the school so that the books can be distributed equally among all students of each Section.

    2

22. Prove that the tangents drawn from an external point to a circle are equal.

    2

23. Find the perimeter of a quadrant of a circle of radius 14 cm.

    2

    ### [OR]

    Find the diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm.

24. A, B and C are points on OP, OQ and OR respectively such that AB // PQ and AC // PR. Show that BC // QR.

    2
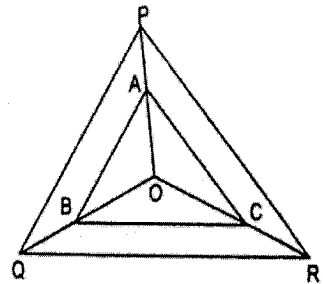
    ### [OR]
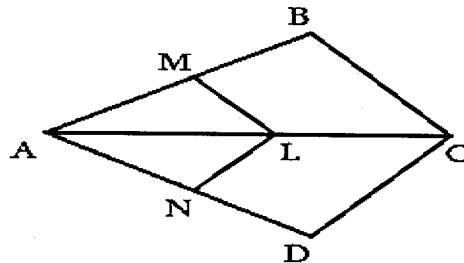
    In the given figure,

    if LM || CB and LN || CD, then

    prove that $\dfrac{AM}{AB} = \dfrac{AN}{AD}$.

25. A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out

    2

    (i) an orange flavoured candy

    (ii) a lemon flavoured candy

Section C

Section C consists of 6 questions of 3 marks each.

26. Prove that $3 + 2\sqrt{5}$ is an irrational number, given that $\sqrt{5}$ is an irrational number.

    3

27. Find the zeroes of the quadratic polynomial p(x) = $x^2 - 3x - 10$ and verify the relationship between the zeroes and the coefficients of the polynomial.   3

28. The diagonal of a rectangular field is 60 metres more than the shorter side. If the longer side is 30 metres more than the shorter side, then find the sides of the field.   3

[OR]

The sum of a two digit number and the number obtained by reversing the order of its digits is 99. If the digits differ by 3, then find the number.

29. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is   3

    (i)   8?

    (ii)   13?

    (iii) less than or equal to 12?

30. In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C, is intersecting XY at A and X'Y' at B. Prove that $\angle AOB = 90°$.   3
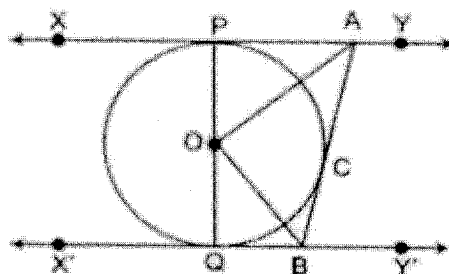
30. If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$.   3

[OR]

Prove that $\dfrac{\tan\theta}{1-\cot\theta} + \dfrac{\cot\theta}{1-\tan\theta} = 1 + \tan\theta + \cot\theta$.

Section D

Section D consists of 4 questions of 5 marks each.

32 Draw the graphs of the equations x − y + 1 = 0 and 3x + 2y − 12 = 0. Determine the coordinates of the vertices of the triangle formed by these lines and x-axis.   5

[OR]

Places A and B are 100km apart on a highway. one car starts from A and another from B at the same time. If the car travels in the same direction at different speeds, they meet in 5 hours. If they travel towards each other they meet in one hour. What is the difference of speeds in Km/hr of the two cars?

33. If the median of the following frequency distribution is 32.5, find the missing frequencies.   5

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

34. A juice seller was serving his customers using glasses. The inner diameter of the cylindrical glass   5
was 5 cm, but the bottom of the glass had a hemispherical raised portion which reduced the
capacity of the glass. If the height of a glass was 10 cm, find the apparent capacity of the glass and
its actual capacity. (Use π = 3.14.)

[OR]

The internal and external diameter of a hemispherical vessel are 16 cm and 12 cm
respectively. If the cost of painting 1 cm² of the surface area is ₹ 5.00, then find the total
cost of painting the vessel all over. (Use π = 3.14.)

35. Prove that If a line is drawn parallel to one side of a triangle to intersect the other two sides in   5
distinct points, the other two sides are divided in the same ratio.

In the figure, find EC if $\frac{AD}{DB} = \frac{AE}{EC}$ by using the above theorem.
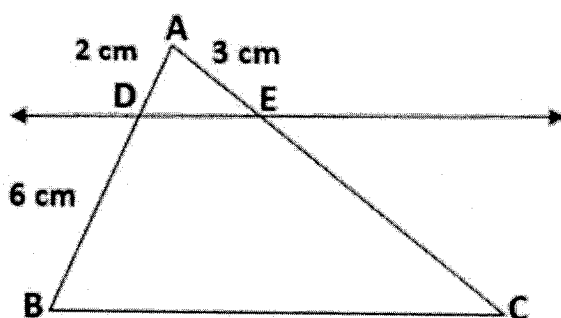
Section E

Case study based questions are compulsory.

36. **Case Study – 1**

Morning assembly is an integral part of the school's schedule. Almost all the schools
conduct morning assemblies which include prayers, information of latest happenings,
inspiring thoughts, speech, national anthem, etc. All schools are always particular
about their morning assembly schedule. Morning assembly is important for a child's
development. All the activities carried out in morning assembly by the school staff
and students have a great influence in every point of life. The positive effects of
attending school assemblies can be felt throughout students' life.

Students stand in rows and columns for the assembly and this make a coordinate system. Suppose a school have 100 students and they all assemble for prayer in 10 rows as given below.
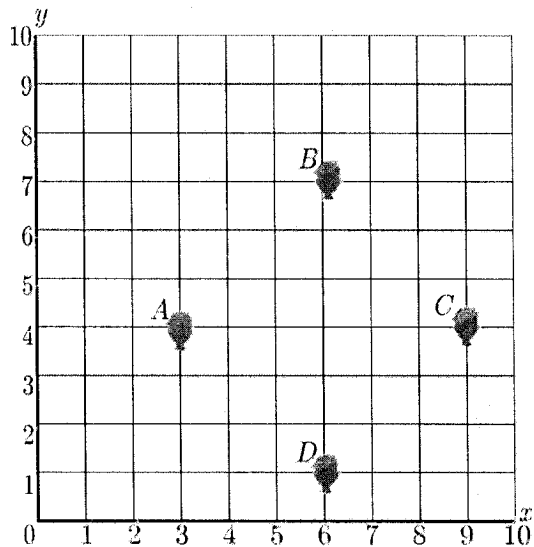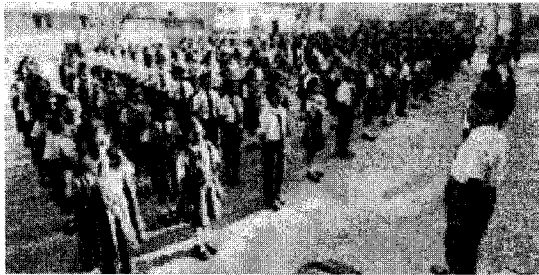
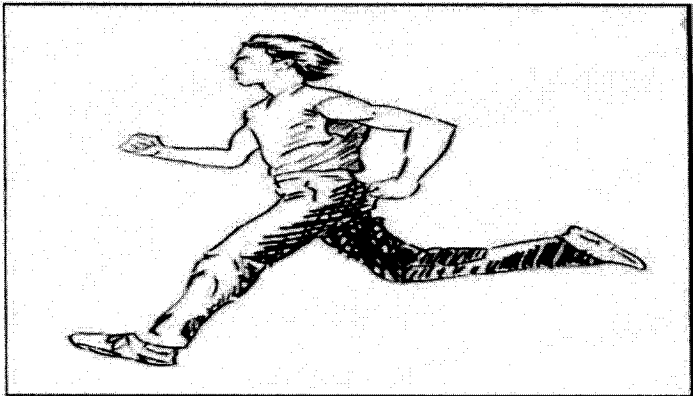**Based on the above information, answer the following questions.**

(i) Find the distance between A and B. 1

(ii) Find the mid-point of CD. 1

(iii) Find the ratio in which the point (4, 5) divides the line segment AB.

[OR] 2

Is it possible to place another student E in the assembly in such a way that he is equidistant from each of the four students A, B, C and D? If so, what should be his position?

37. **Case Study – 2**

Your friend Veer wants to participate in a 200 m race. He can currently run that

distance in 51 seconds and with each day of practice it takes him 2 seconds less. He wants to do in

31 seconds.

Based on the above information, answer the following questions.

(i) What is the AP formed in this situation?

1

(ii) What is the minimum number of days he needs to practice till his goal is achieved?

2

[OR]

Find the total number of seconds he ran till his goal was achieved.

(iii) Find the value of x, for which $2x,\ x+10,\ 3x+2$ are three consecutive terms of AP.

1

38. Case Study – 3

A TV tower stands vertically on a bank of a canal. From a point on the other bank directly opposite to the tower, the angle of elevation of the top of the tower is 60º. From another point 20 m away from this point on the line join this point to the foot of the tower, the angle of elevation of the top of the tower is 30º
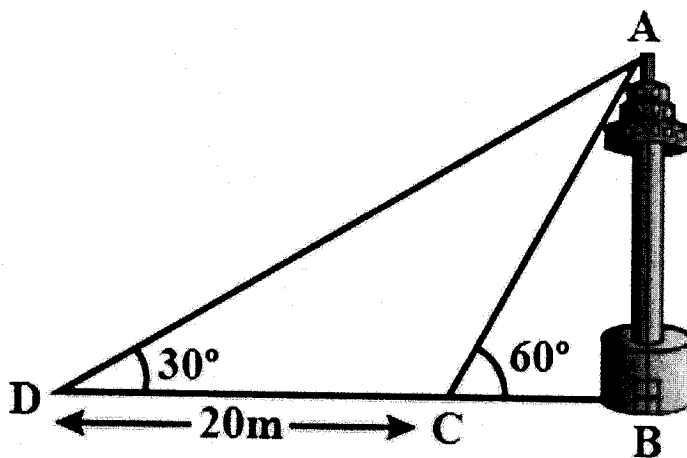
Based on the above information, answer the following questions.

(i) What is the height of the tower?

2

[OR]

What is the width of the canal?

(ii) What is the length of AC?

1

(III) What is the measure of $\angle DAC$?

1