Indraprastha Gandhi
V - B 15/1/24

Amity International School, Pushp Vihar

Class X Pre-board 2

Mathematics (Standard)

Max Marks 80

Time: **3 hrs**

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 Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

Section-A

Section A consists of 20 questions of 1 mark each

1. Two concentric circles are of radii 17 cm and 8 cm. Then, the length of the chord of the larger circle which touches the smaller circle is

(a) 16 (b) 36 (c) 15 (d) None of these

2. A card is drawn from a well-shuffled deck of 52 cards. Then, the probability that the card drawn is a black ace is

(a) $\frac{1}{52}$ b) $\frac{1}{26}$ (c) $\frac{1}{13}$ (d) $\frac{3}{52}$

3. The product of the zeroes of the polynomial $3x^2 - 7x + 18$ is

(a) -4 (b) $\frac{7}{3}$ c) $-\frac{7}{3}$ (d) 6

4. If one zero of the quadratic polynomial $kx^2 + 5x + k$ is 3, then the value of k is

(a) $-\frac{3}{2}$ (b) $\frac{15}{8}$ c) $\frac{1}{3}$ (d) $\frac{2}{3}$

5. The distance of point P(6, - 8) from the origin is

(a) 10 units (b) $\sqrt{14}$ units (c) 2 units (d) 4 units

6. The centroid of a ΔABC, whose vertices are A(1, 2), B(-1,3) and C(3, -1) are

(a) $\left(\frac{3}{2}, 2\right)$ (b) (3, 4) (c) $\left(1, \frac{4}{3}\right)$ (d) None of these

7. Coordinates of A and B are (-3, a) and (1, a + 4). If mid-point of AB is (-1, 1), then the value of a is

(a) 0 (b) -1 (c) $-\frac{1}{2}$ (d) 1

8. The discriminant of the quadratic equation $x^2 - 4x + 1 = 0$ is

(a) $2\sqrt{3}$ (b) 12 (c) 15 (d) -8

9. In the given figure, DE || BC. If AD = x, DB = x - 2, AE = x + 2 and EC = x - 1, then the value of x is

(a) 2 (b) 6 (c) 4 (d) 3

10. A pendulum swings through an angle of 30° and describes an arc 11.1 cm in length. The length of pendulum is

(a) 6 cm (b) 16.8 cm (c) 8.4 cm (d) 21.19 cm

11. The square root of all positive integers are

(a) rational number

(b) irrational number

(c) may be rational or irrational number

(d) None of the above

12. If the pair of lines are coincident, then we say that pair of lines is consistent and it has a

(a) unique solution (b) no solution (c) infinite solutions (d) None of these

13. If $x \cot 45° \cos 60° = \sin 30° \sin 90°$ then the value of x is

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

14. The prime factor of 1584 is

(a) $2^5 \times 3 \times 11$ (b) $2^5 \times 3^3 \times 11$ (c) $2^3 \times 3 \times 11^2$ (d) $2^4 \times 3^2 \times 11$

15. If we join two hemispheres of same radius along their bases, then we get a

(a) cone (b) cylinder (c) cuboid (d) sphere

16. Two identical solid cubes of side 3a are joined end to end. Then, total surface area of the resulting cuboid is

(a) $8a^2$ (b) $6a^2$ (c) $90a^2$ (d) $12a^2$

17. The median of the data 12, 15, 17, 19, 22, 27 is

(a) 17 (b) 18 (c) $\frac{41}{2}$ (d) 19

18. The pair of equations $3x + 2y + 7 = 0$ and $6x + 4y + 14 = 0$ has

(a) unique solution

(b) exactly two solutions

(c) infinitely many solutions

(d) no solution

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

19. **Assertion (A)** In a circle of radius 6 cm, the angle of a sector is 60°, the area of the sector is $\frac{132}{7}$ cm ^{2}.

Reason (R) Area of the circle with radius r is πr^2.

(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) $x^2 + 5x + 7$ has no real zeroes.

Reason (R) A quadratic polynomial can have at the most two zeroes.

(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. Find all possible solutions of the following pair of equation

$ax + by - a + b = 0$ and $bx - ay - a - b = 0$

Or

Find the solution of the following system of equations .

$1.1x + 1.5y + 2.3 = 0,\ 0.7x - 0.2y = 2$

22. The length of minute hand of a clock is 21 cm. Find the area swept by the minute land in one minute. $\left[\text{take}, \pi = \frac{22}{7}\right]$

23. Without solving the following quadratic equation, find the value of p, for which the roots are equal.

$px^2 - 4x - 3 = 0$

24. Find the 25th term of the AP $-5, \frac{-5}{2}, 0, \frac{5}{2}, \ldots$

Or

Determine the AP, whose 3rd term is 5 and the 7th term is 9.

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

Section-C

Section C consists of 6 questions of 3 marks each

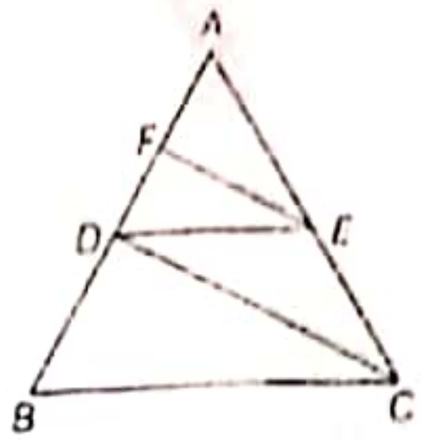
26. An aeroplane flies horizontally in a fixed direction at a height of $1500\sqrt{3}$m from ground. At any time the angle of elevation from a point on a ground is 60° and after 15 s, the angle of measurement of an aeroplane becomes 30°. Find the speed of the aeroplane.

27. The sum of first 7 terms of an A.P is 182. If its 4^{th} term and the 17^{th} term are in the ratio 1:5, find the A.P.

Or

If S_n denotes the sum of the first n terms of the AP, prove that $S_{30} = 3\,(S_{20} - S_{10})$.

28. In the given figure, DE || BC and CD || EF, then prove that $AD^2 = AB \times AF$.



$\frac{AD}{AF} = \frac{AB}{AD}$

29. Prove that $\frac{\tan A}{1-cotA} + \frac{cotA}{1-tanA} = 1 + tanA + cotA$

30. The difference of the squares of two numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers.

31. Find the coordinates of the points of trisection of the line segment joining (-2,-3) & (4,-1).

Section-D

Section D consists of 4 questions of 5 marks each

32. In a rain water harvesting system, the rain water from a roof 22m x 20m drains into a cylindrical tank having diameter of base 2m and height 3.5m. If the tank is full, find the rainfall in cm.

17,60,000

33. Find the mean and median of the following data.

Classes	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	3	4	7	15	10	7	4

34. A card is drawn from a well-shuffled pack of 52 cards. Find the probability that the card drawn is

(i) 5 of heart or diamond

$\frac{4}{52}, \frac{4}{52}$

(ii) jack or queen

(iii) ace and king

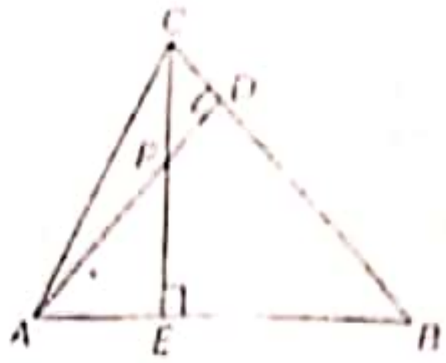
(iv) a red card or a king

35. Sides AB and AC and median AD of ΔABC are respectively proportional to sides PQ and PR and median PM of another ΔPQR. Show that $\Delta ABC \sim \Delta PQR$.

Or

In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P.

180, 1
90, 2
45, 4
9, 20
18, 10



Show that

(i) $\Delta AEP \sim \Delta CDP$.

(ii) $\Delta ABD \sim \Delta CBE$.

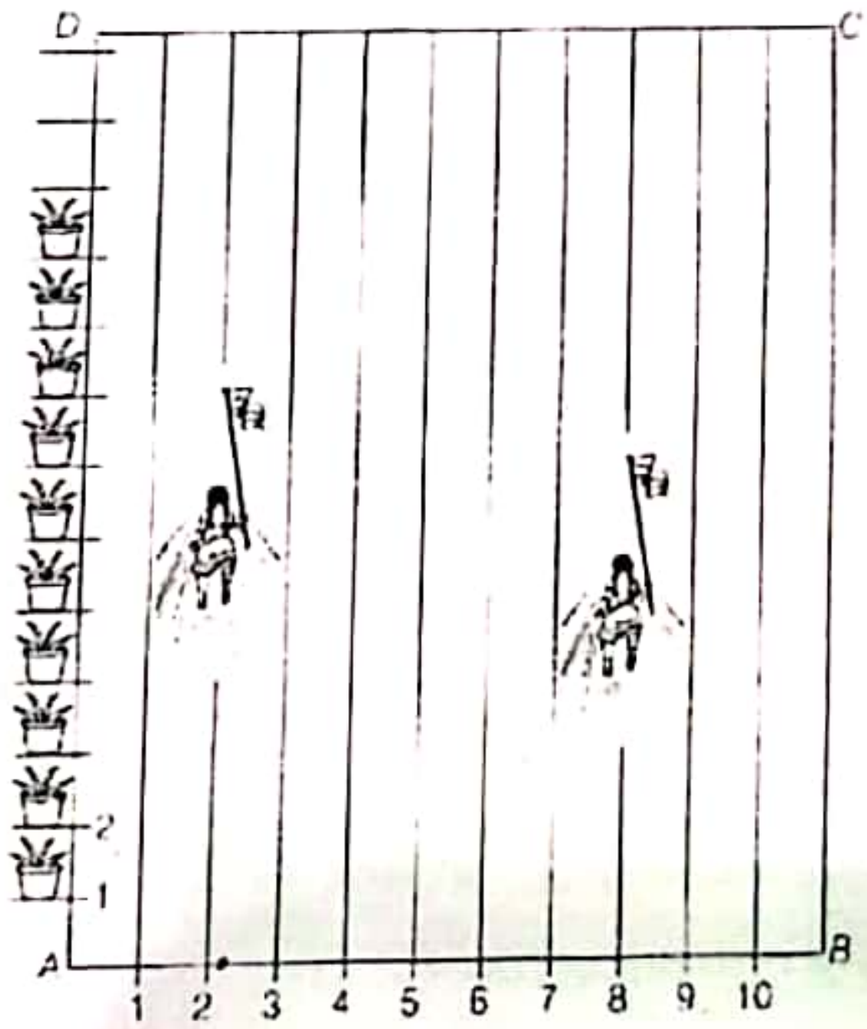
(iii) $\Delta AEP \sim \Delta ADB$.

(iv) $\Delta PDC \sim \Delta BEC$.

Section-E

Case study based questions are compulsory

36. To conduct Sports Day activities in your rectangular shaped school ground ΔBCD, lines have been drawn with chalk powder at a distance of 1 m each, 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in figure.



Niharika runs $\frac{1}{4}$ th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th the distance AD on the 8th line and posts a red flag.

On the basis of above information, answer the following questions.

(i) Write the coordinates of green flag. (1) 2, 25

(ii) Write the coordinates of red flag. (1) 8, 20

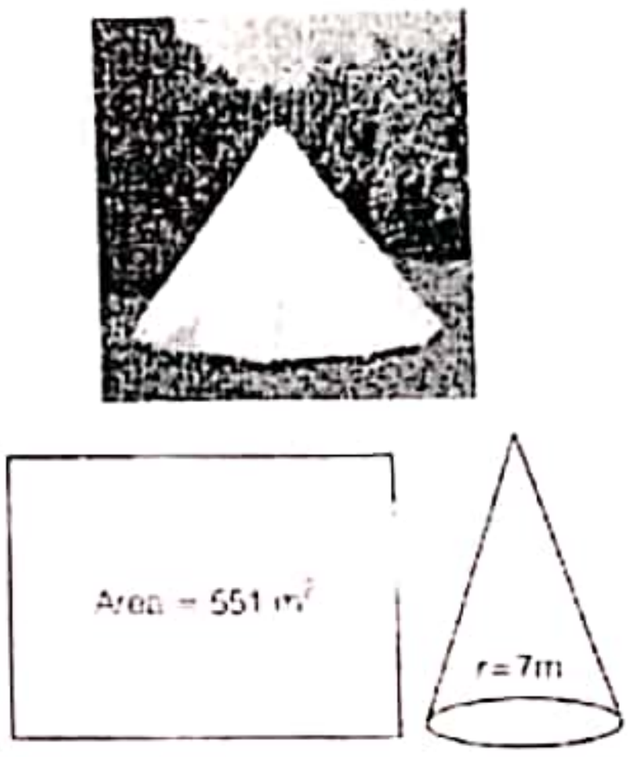
(iii) Find the distance between both the flags. (2)

Or

If Rashmi has to post a blue flag exactly half way between the line segment joining the flags, then find the coordinates of that point. (2) $(6, \frac{45}{2})$

37. Adventure camps are the perfect place for the children to practice decision making to... themselves without parents and teachers guiding their every move. Some students of a school reached for adventure at Sakleshpur. At the camp, the waiters served some students with a welcome drink in a cylindrical glass and some students in a hemispherical cup whose dimensions are shown below

After that they went for a jungle trek. The jungle trek was enjoyable but tiring. As dusk fell, it was time to take shelter. Each group of four students was given a canvas of area 551 m^2. Each group had to make a conical tent to accommodate all the four students. Assuming that all the stitching and wasting incurred while cutting, would amount to 1 m^2, the students put the tents. The radius of the tent is 7 m.



On the basis of above information, answer the following questions.

(i) Find the volume of cylindrical cup. (1)

(ii) Find the volume of hemispherical cup. (1)

(iii) Find the height of the conical tent prepared to accommodate four students. (2)

Or How much space on the ground is occupied by each student in the conical tent? (2)

38. To enhance the reading skills of grade X students, the school nominates you and two of your friends to set up a class library. There are two sections- Section A and Section B of grade X. There are 32 students in section A and 36 students in section B.

On the basis of above information answer the following questions.

(i) What is the minimum number of books you will acquire for the class library, so that they can be distributed equally among students of Section A or Section B? (1)

(ii) If the product of two positive integers is equal to the product of their HCF and LCM is true. then find the HCF (32, 36) if the LCM is 288. (1)

(iii) Express 5310 as product of primes. (2)

Or

If p and q are positive integers such that $p = ab^2$ and $q = a^2b$, where a and b are prime numbers, then find the LCM (p, q). (2)