DELHI PUBLIC SCHOOL INDIRAPURAM, GHAZIABAD
PRE-BOARD EXAMINATION–1: 2023-2024
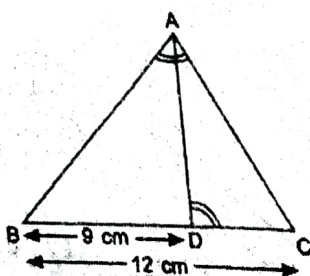
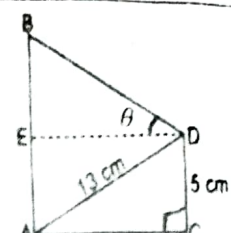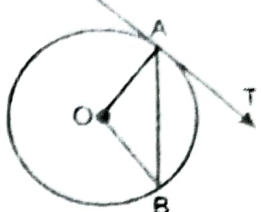| Time: 3 Hours	M. M. 80	CLASS – X MATHEMATICS SET–B	No. of Q.: 38	No. of Pages:04
			Roll No.	
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General Instructions:
1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 1 mark each.
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 Qs of 2 marks, 2 Qs 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 π =22/7 wherever required if not stated.

Section A
### Section A consists of 20 questions of 1 mark each.

1. $2\cos^2 60^0 - 1/2$ is   [1]
    (a) $\sin 30^0$ (b) $\cos 90^0$ (c) $\tan 60^0$ (d) $\sec 60^0$

2. If the difference between the circumference and radius of a circle is 37cm, then its area is   [1]
    (a) 154 cm^2 (b) 160 cm^2 (c) 200 cm^2 (d) 150 cm^2

3. For what value of Θ, the pair of equations $x + y = \sqrt{2}$ and $x \sin \Theta + y \cos \Theta = 1$, has infinitely many solutions?   [1]
    (a) $\Theta = 60°$ (b) $\Theta = 45°$ (c) $\Theta = 90°$ (d) $\Theta = 30°$

4. Length of the shadow of a person is x when the angle of elevation of the Sun is 45^0. If the length of the shadow increases by $(\sqrt{3}-1)x$, then the angle of elevation of the Sun should become   [1]
    (a) 60^0 (b) 30^0 (c) 90^0 (d) 45^0

5. If a, b, c, d, e and f are in A.P, then $d - b$ is equal to   [1]
    (a) $2(c - a)$ (b) $2(e - d)$ (c) $2(f - d)$ (d) $d - c$

6. If the mode of the data is 18 and the mean is 24, then median is   [1]
    (a) 18   (b) 22   (c) 24   (d) 33

7. If the distance of the point (4 , a) from y-axis is double its distance from x-axis, then a is   [1]
    (a) 4   (b) 8   (c) 2   (d) 6

8. The maximum number of common tangents that can be drawn to two circles intersecting at two distinct points is   [1]
    (a) 1   (b) 2   (c) 3   (d) 4

9. If D is a point on the side BC of a $\triangle ABC$ such that $\angle ADC = \angle BAC$, BD=9cm and BC=12cm then AC =   [1]
    (a) 3 cm   (b) 6 cm
    (c) 9 cm   (d) 12 cm

10. The difference of the LCM and HCF of 12, 15, 21 is   [1]
    (a) 3   (b) 423   (c) 417   (d) 420

11.	In the given figure, if AB =15 cm, then the value of tanθ is: (a) 4/6 (b) 15/6 (c) 5/6 (d) 13/6	[1]
12.	If the roots of the equation $ax^2 + bx + c = 0$ are reciprocal of each other, then (a) $a = -b$ (b) $b = a$ (c) $c = a$ (d) none of these	[1]
13.	In the given figure, O is the centre of a circle, AB is a chord and AT is the tangent at A. If $\angle AOB = 120^\circ$, then complement of $\angle BAT$ is (a) 30° (b) 90° (c) 120° (d) 60°	[1]
14.	The 16th term of the sequence $x - 7, x-2, x +3, \ldots.$ is (a) $x + 63$ (b) $x + 73$ (c) $x + 68$ (d) $x - 68$	[1]
15.	If $4x^2 - 6x - m$ is divisible by $x - 3$, the value of m completely divides (a) 9 (b) 45 (c) 20 (d) 36	[1]
16.	Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is (a) 3:4 (b) 4:3 (c) 9:16 (d) 16:9	[1]
17.	The edge of a cube whose volume is equal to that of a cuboid of dimensions 8cm x 4cm x 2cm is (a) 6cm (b) 4cm (c) 2cm (d) 3cm	[1]
18.	Four vertices of a parallelogram taken in order are $(1, 2), (4, 6), (5,7)$ and (a, b). Then a and b are (a) a=2, b=4 (b) a=3, b=4 (c) a=2, b=3 (d) a=3, b=5	[1]
19.	The probability of getting a number from 1 to 100 which is divisible by 1 and itself only is (a) 25/100 (b) 23/100 (c) 25/98 (d) 23/98	[1]
20.	From a well shuffled deck of 52 cards, jacks, queens, kings and aces of red colour are removed. From the remaining cards, a card is chosen at random. Probability of card being a red card or a face card is (a) 6/11 (b) 12/44 (c) 6/52 (d) 24/36	[1]

<center>Section B</center>

<center>Section B consists of 5 questions of 2 marks each.</center>

21.	Prove that $\sqrt{5}$ is an irrational number.	[2]
22.	Through the midpoint M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC at L and AD produced to E. Prove that EL =2BL.	[2]
23.	If sin (A+B) = $\sqrt{3}/2$ and sin (A - B) = 1/2 ; $0^\circ < A+B \le 90^\circ$; A > B, find A and B. <center>OR</center> If $3x$ = cosecΘ and $3/x$ = cotΘ , find the value of $3(x^2 - 1/x^2)$	[2]
24.	Prove that the tangents drawn from the same external point to a circle are equal in length.	[2]
25.	Find perimeter of the sector OAB shown in the figure, given radius as 7 cm and $\angle AOB = 60^\circ$. <center>OR</center> In a circle of radius 42cm, an arc subtends an angle of 60° at the centre. Find: (i) length of the arc (ii) area of the sector formed by the arc.	[2]
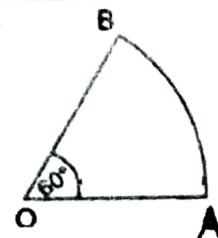
Section C

Section C consists of 6 questions of 3 marks each.

26.	The largest number that will divide 615 and 963 so as to leave remainder 6 in each case is $k^2 + 6$. Find value of k.	[3]
27.	In the given figure, ABCDE is a pentagon with BE ∥ CD and BC ∥ DE. BC is perpendicular to CD. If the perimeter of ABCDE is 21m, find the value of x and y.	[3]
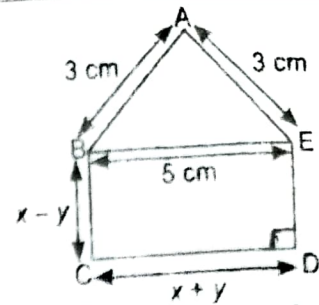
**OR**

The largest angle of a triangle is equal to the sum of the other two angles. The smallest angle is ¼ of the largest angle. Find the angles of the triangle.

28.	Evaluate: $$\frac{tan^2 60° + 4cos^2 45° + 3sec^2 30° + 5cos^2 90° + 1}{cosec 30° - \frac{7}{2}sec^2 45° + cot^2 30° - 1}$$	[3]
29.	Write a quadratic polynomial whose one zero is $1+\sqrt{2}$ and product of zeroes is -1.	[3]
30.	In the given figure, ABC is a right angled triangle, right angled at A, with BD =30cm and DC= 7cm. A circle with centre O is inscribed inside the triangle. Find radius of the circle.	[3]
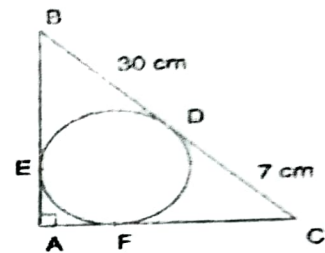
OR

In the given figure, a triangle ABC is drawn to circumscribe a circle of radius 4cm such that the side BC is divided into segments BD and DC by the point of contact D in lengths of 8cm and 6cm respectively. If area of ΔABC is 84cm², then find the length of sides AB and AC.
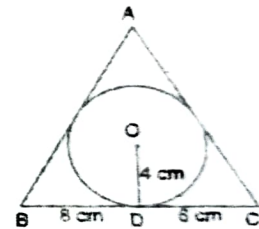

31.	Compute the mode for the following frequency distribution.	[3]

CLASS:	100-110	110-120	120-130	130-140	140-150	150-160	160-170
FREQUENCY:	4	6	20	32	33	8	2

Section D

Section D consists of 4 questions of 5 marks each.

32.	Three consecutive positive integers are such that the sum of the square of the first and the product of the other two is 46, find the integers.	[5]

OR

Solve for x : $(a+b)^2 x^2 + 8(a^2 - b^2)x + 16(a-b)^2$

33.	State and prove Basic Proportionality Theorem. In the given figure, DE ∥ BC, find x. Given that AD = 3x+19, CD = x+3, BE = 3x+4 and CE = x	[5]
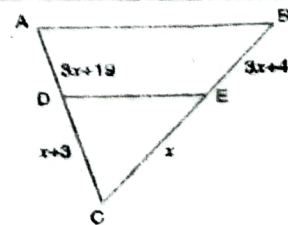
34.	Solid spheres of diameter 6cm are dropped into a cylindrical beaker containing some water and are fully submerged. If the diameter of the beaker is 18cm and the water rises by 40cm, find the number of solid spheres dropped into the water. Find the ratio of the surface area of a small sphere with that of curved surface area of cylinder. Also, find the volume of the new sphere recast on melting all the small spheres.	[5]

OR

A tent is of the shape of a right circular cylinder upto a height of 3m and then becomes a right circular cone with a maximum height of 13.5m above the ground. Find the total canvas used in making the tent, if the radius of the base is 14m. How many persons can be accommodated in the tent if each person requires 4m² of area?

| | | | | | | | | | [5] |

35. If the median of the following frequency distribution is 46, find the missing frequencies.

CLASS:	10-20	20-30	30-40	40-50	50-60	60-70	70-80	TOTAL
FREQUENCY:	12	30	x	65	y	26	18	230

Section E

Section E consists of 3 questions of 4 marks each.

36. A ladder of length 6m makes an angle of 45° with the floor while leaning against one wall of a room. If the foot of the ladder is kept fixed on the floor and it is made to lean against the opposite wall of the room, it makes an angle of 60° with the floor.

As per the given information, answer the following questions

(i) Draw a properly labeled figure for the above situation.

(ii) Find height of the wall covered by the ladder when it is leaned at an angle of 60°.

(iii) Find distance between two walls.

OR

Find the difference of the length of walls covered by the ladder in two cases.

[1]
[1]
[2]

37. A polygon has 31 sides, the lengths of which, starting from the smallest are in AP. If the perimeter of the poylgon is 527cm and the length of the largest side is sixteen times the smallest.
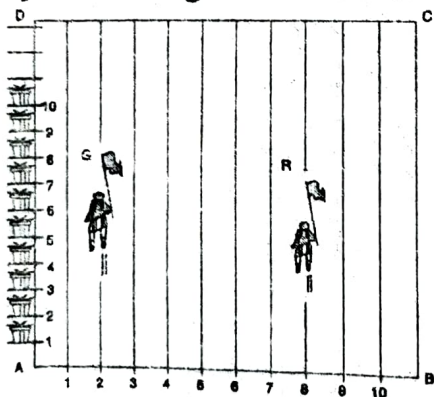
Answer the following questions based on above information

(i) Find the length of the smallest side.

(ii) What is the common difference?

(iii) What is the sum of three middle most sides?

OR

Find the ratio of the sum of last three terms to the sum of all 31 terms.

[1]
[1]
[2]

38. A city school is organizing annual sports event in a rectangular shaped ground ABCD. The tracks are being marked with a gap of 1m each in the form of straight lines. 120 flower pots are placed with a distance of 1m each along AD. Shruti runs 1/3rd of the distance in the second line along AD and posts her flag. Saanvi runs 1/5th of the distance AD in the eighth line and posts her flag.

[1]
[1]
[2]

Based on the above information, answer the following questions.

(i) Malti has to post her flag in the 6th line at 1/6th the distance AD. Find the coordinates of centroid of triangle formed by joining the points of three flags.

(ii) Find the distance between Shruti and Saanvi's flag.

(iii) Find the coordinates of the point between Shruti and Saanvi's flag that divides the distance between two flags in the ratio of 3:1.

OR

Find the distance between mid points of flags posted by (Malti and Shruti) and (Shruti and Saanvi)