CBSE BOARD SAMPLE PAPERS (2023-24) MATHEMATICS Class-X (STANDARD)

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CBSE SAMPLE PAPERS

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CBSE PAPER - 2022-23 (STANDARD)

TIME : 3 HRS.

MAX. MARKS: 80

General Instructions :

- >> This question paper contains 38 questions. All questions are compulsory.
- **>>** This Question Paper is divided into FIVE Sections Section A, B, C, D and E.

- ✤ In Section-D question number 32 to 35 are Long Answer (LA) type questions carrying 5 marks each.
- ➤ There is no overall choice. However: an internal choice has been provided in 2 questions in Section-B, 2 questions in Section-C, 2 questions in Section-D and 3 question in Section-E.
- **>>** Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.
- **>>** Use of calculator is NOT allowed.

SECTION-A

Each question is of 1 mark.

(1) 3

1. The graph of y = p(x) is given, for a polynomial p(x). The number of zeroes of p(x) from the graph is

 $x' \xleftarrow{0} \bigvee_{y'} x \xrightarrow{y=p(x)} x$ (2) 1
(3) 2

2. The value of k for which the pair of equations kx = y + 2 and 6x = 2y + 3 has infinitely many solutions,

(1) is k = 3 (2) does not exist (3) is k = -3

- 3. If p 1, p + 1 and 2p + 3 are in A.P., then the value of p is
 - (1) -2 (2) 4 (3) 0 (4) 2
- 4. In what ratio, does x-axis divide the line segment joining the points A(3, 6) and B(-12, -3)?
 (1) 1: 2
 (2) 1: 4
 (3) 4: 1
 (4) 2: 1

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(4) 0

(4) is k = 4

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5. In the given figure, PQ is tangent to the circle centred at O. If $\angle AOB = 95^{\circ}$, then the measure of $\angle ABQ$ will be



(1) 47.5° (2) 42.5° (3) 85° (4) 95°

6. If 2 tan A = 3, then the value of $\frac{4\sin A + 3\cos A}{4\sin A - 3\cos A}$ is

(1)
$$\frac{7}{\sqrt{13}}$$
 (2) $\frac{1}{\sqrt{13}}$ (3) 3 (4) does not exist

7. If α,β are the zeroes of a polynomial $p(x) = x^2 + x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ equals to

- (1) 1 (2) 2 (3) -1 (4) $\frac{-1}{2}$
- 8. The least positive value of k, for which the quadratic equation $2x^2 + kx 4 = 0$ has rational roots, is
 - (1) $\pm 2\sqrt{2}$ (2) 2 (3) ± 2 (4) $\sqrt{2}$
- 9. $\left[\frac{3}{4}\tan^2 30^\circ \sec^2 45^\circ + \sin^2 60^\circ\right]$ is equal to
 - (1) -1 (2) $\frac{5}{6}$ (3) $\frac{-3}{2}$ (4) $\frac{1}{6}$

10.Curved surface area of a cylinder of height 5 cm is 94.2 cm². Radius of the cylinder is (Take $\pi = 3.14$)(1) 2 cm(2) 3 cm(3) 2.9 cm(4) 6 cm

11. The distribution below gives the marks obtained by 80 students on a test:

Marks	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
Number of	2	1.2	27	57	75	80
Students	5	12	27	57	75	80

The modal class of this distribution is :

(1) 10 - 20 (2) 20 - 30 (3) 30 - 40 (4) 50 - 60

12. The curved surface area of a cone having height 24 cm and radius 7 cm, is

(2) 1056 cm^2

(1) 528 cm^2

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(3) 550 cm^2

(4) 500 cm^2

2



- 13. The distance between the points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$ is
 - (1) $2\sqrt{10}$ units (2) $4\sqrt{10}$ units (3) $2\sqrt{20}$ units (4) 0

14. Which of the following is a quadratic polynomial having zeroes $\frac{-2}{3}$ and $\frac{2}{3}$?

(1) $4x^2 - 9$ (2) $\frac{4}{9}(9x^2 + 4)$ (3) $x^2 + \frac{9}{4}$ (4) $5(9x^2 - 4)$

15. If the value of each observation of a statistical data is increased by 3, then the mean of the data

- (1) remains unchanged (2) increases by 3 (3) increases by 6 (4) increases by 3n
- **16.** Probability of happening of an event is denoted by p and probability of non-happening of the event is denoted by q. Relation between p and q is
 - (1) p + q = 1 (2) p = 1, q = 1 (3) p = q 1 (4) p + q + 1 = 0
- 17. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought ?
 - (1) 40 (2) 240 (3) 480 (4) 750
- **18.** In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim is
 - (1) $\frac{3}{4}$ (2) $\frac{1}{3}$ (3) 1 (4) $\frac{1}{4}$

Direction for (Q.19 and Q.20) : In question numbers 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option :

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.
- 19. Assertion (A): Point P(0, 2) is the point of intersection of y-axis with the line 3x + 2y = 4.
 Reason (R): The distance of point P(0, 2) from x-axis is 2 units.
- 20. Assertion (A) : The perimeter of ∆ABC is a rational number.
 Reason (R) : The sum of the squares of two rational numbers is always rational.





SECTION-B

This section comprises of Short Answer (SA-I) type questions of 2 marks each.

21. (a) Solve the pair of equations x = 3 and y = -4 graphically.

OR

- (b) Using graphical method, find whether following system of linear equations is consistent or not x = 0 and y = -7
- **22.** In the given figure, XZ is parallel to BC. AZ = 3 cm, ZC = 2 cm, BM = 3 cm and MC = 5 cm. Find the length of XY.



23. (a) If $\sin\theta + \cos\theta = \sqrt{3}$, then find the value of $\sin\theta . \cos\theta$.

OR

(b) If
$$\sin \alpha = \frac{1}{\sqrt{2}}$$
 and $\cot \beta = \sqrt{3}$, then find the value of $\csc \alpha + \csc \beta$.

- 24. Find the greatest number which divides 85 and 72 leaving remainders 1 and 2 respectively.
- **25.** A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that drawn ball is (i) red (ii) yellow.



This section comprises of Short Answer (SA-II) type questions of 3 marks each.

- **26.** Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.
- 27. Prove that $\sqrt{5}$ is an irrational number.

4

28. If (-5,3) and (5,3) are two vertices of an equilateral triangle, then find coordinates of the third vertex, given that origin lies inside the triangle. (Take $\sqrt{3}=1.7$)



29. (a) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.



(b) In the given figure, a circle is inscribed in a quadrilateral ABCD in which $\angle B = 90^{\circ}$. If AD = 17 cm, AB = 20 cm and DS = 3 cm, then find the radius of the circle.



- **30.** Prove that : $\frac{\tan \theta + \sec \theta 1}{\tan \theta \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$
- 31. (a) A room is in form of cylinder surmounted by a hemi-spherical dome. The base radius of hemisphere is one-half the height of cylindrical part. Find total height of the room if it contains $\left(\frac{1408}{21}\right)m^3$ of

air.
$$\left(\text{Take } \pi = \frac{22}{7} \right)$$

OR

(b) An empty cone is of radius 3 cm and height 12 cm. Ice-cream is filled in it so that lower part of the cone which is $\left(\frac{1}{6}\right)^{th}$ of the volume of the cone is unfilled but hemisphere is formed on the top. Find

volume of the ice-cream. (Take $\pi = 3.14$)



This section comprises of Long Answer (LA) type, of 5 marks each.

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



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33. (a) The angle of elevation of the top of a tower 24 m high from the foot of another tower in the same plane is 60°. The angle of elevation of the top of second tower from the foot of the first tower is 30°. Find the distance between two towers and the height of the other tower. Also, find the length of the wire attached to the tops of both the towers.

OR

(b) A spherical balloon of radius r subtends an angle of 60° at the eye of an observer. If the angle of elevation of its centre is 45° from the same point, then prove that height of the centre of the balloon

is $\sqrt{2}$ times its radius.

(b) 250 logs are stacked in the following manner:

- 34. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle. Also find the area of the major segment of the circle.
- **35.** (a) The ratio of the 11th term to 17th term of an A.P. is 3 : 4. Find the ratio of 5th term to 21st term of the same A.P. Also, find the ratio of the sum of first 5 terms to that of first 21 terms.

OR

22 logs in the bottom row, 21 in the next row, 20 in the row next to it and so on (as shown by an example). In how many rows, are the 250 logs placed and how many logs are there in the top row?



This section comprises of 3 Case Study questions, each of 4 marks.

36. Case Study-1

While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.

Based on the above information, answer the following questions.

- (I) Write an algebraic equation depicting the above information.
- (II) Write the corresponding quadratic equation in standard form.
- (III) What should be the new dimensions of the enlarged photo?



Can any rational value of x make the new area equal to 220 cm² ?



37. Case Study-2

India meteorological department observes seasonal and annual rainfall every year in different sub-divisions of our country.



It helps them to compare and analyse the results. The table given below shows sub-division wise seasonal (monsoon) rainfall (mm) in 2018 :

Rainfall (mm)	Number of Sub-divisions
200-400	2
400-600	4
600-800	7
800-1000	4
1000-1200	2
1200-1400	3
1400-1600	1
1600-1800	1

Based on the above information, answer the following questions:

- (I) Write the modal class.
- (II) Find the median of the given data.

OR

Find the mean rainfall in this season.

(III) If sub-division having at least 1000 mm rainfall during monsoon season, is considered good rainfall sub-division, then how many subdivisions had good rainfall?

38. Case Study-3

The discus throw is an event in which an athlete attempts to throw a discus. The athlete spins anticlockwise around one and a half times through a circle, then releases the throw. When released, the discus travels along tangent to the circular spin orbit.





In the given figure, AB is one such tangent to circle of radius 75 cm. Point O is centre of the circle and $\angle ABO = 30^{\circ}$. PQ is parallel to OA.



Based on above information :

- (a) find the length of AB.
- (b) find the length of OB.
- (c) find the length of AP.

OR

find the length of PQ.



SAMPLE PAPER - 1

TIME : 3 HRS.

MAX. MARKS: 80

GENERAL INSTRUCTIONS :

>> All questions are compulsory.

- **>>** The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- ➤ Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.

Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.

Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.

Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.

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.

- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- **>>** There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- **»** Use of calculators and cell-phones are not permitted in the Examination Hall.

SECTION-A

1. Consider the following frequency distribution of the heights of 60 students of a class

Height (in cm)	150 – 155	155 – 160	160 – 165	165 – 170	170 – 175	175 – 180
Number of students	15	13	10	8	9	5

The upper limit of the median class in the given data is

(1) 165 (2) 155 (3) 160 (4) 170

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

(1) 12 (2) 4 (3) 20 (4) 44

3. For which value(s) of p will the lines represented by the following pair of linear equations be parallel

$$3x - y - 5 = 0 ; 6x - 2y - p = 0$$

- (1) all real values except 10
- (2) 10
- (3) all red values except $\frac{5}{2}$
- (4) all real values except $\frac{1}{2}$

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4.	If triangle A	BC is right angled at C, then the	e value of sec $(A + B)$ is	
	(1) 0	(2) 1	(3) $\frac{2}{\sqrt{3}}$	(4) not defined
5.	If the differe	nce of Mode and Median of a d	lata is 24, then the differen	nce of median and mean is
	(1) 8	(2) 12	(3) 24	(4) 36
6.	Two dice are	e rolled simultaneously. What is	the probability that 6 will	come up at least once?
	(1) $\frac{1}{6}$	(2) $\frac{7}{36}$	(3) $\frac{11}{36}$	(4) $\frac{13}{36}$
7.	The point wh lies in the	nich divides the line segment join	ing the points $(8, -9)$ and (2, 3) in ratio 1 : 2 internally
	(1) I quadra	nt (2) II quadrant	(3) III quadrant	(4) IV quadrant
8.	The distance	of the point $P(-3, -4)$ from the	x-axis (in units) is	
	(1) 3	(2) -3	(3) 4	(4) 5
9.	If $A\left(\frac{m}{3},5\right)$	is the mid-point of the line segn	nent joining the points Q(-	6, 7) and $R(-2, 3)$, then the
	value of m i	S		
	(1) -12	(2) -4	(3) 12	(4) -6
10.	The total sur	face area of the given solid figu	re is	
			h	
	(1) $\pi r(2h + a)$	$(2) \pi r(\ell + 2h + r)$	(3) $\pi r(\ell + 2h + 2r)$	(4) $\pi r(2h + 2\ell)$
11.	If one root o k is	f the equation $(k - 1)x^2 - 10x +$	3 = 0 is the reciprocal of	the other, then the value of
	(1) 1	(2) 2	(3) 3	(4) 4
12.	Fill the two	blanks in the sequence 2,,26,_	so that the sequence for	rms an A.P
	(1) 14, 38	(2) 16, 40	(3) 12, 36	(4) None of these
13.	A number is that square c	chosen at random from the numbe f this number is less than or equ	rs -5, -4, -3, -2, -1, 0, 1, 2 ual to 1 is	, 3, 4, 5. Then the probability
	(1) $\frac{1}{11}$	(2) $\frac{2}{11}$	(3) $\frac{3}{11}$	(4) $\frac{4}{11}$
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(1) 15 cm

numbers.

CLASS - X STANDARD (CBSE SAMPLE PAPER)

MATHEMATICS

14. The graph of y = p(x), where p(x) is a polynomial in variable x, is as follows.



The number of zeroes of p(x) is

(1) 3 (2) 5 (3) 4 (4) 2 **15.** In the figure, if $\angle ACB = \angle CDA$, AC = 6 cm and AD = 3 cm, then find the length of AB.



(4) 14 cm

16. If the angle between two tangents drawn from an external point 'P' to a circle of radius 'r' and centre O is 60°, then find the length of OP.

(1) r (2) 2r (3)
$$\frac{r}{2}$$
 (4) 3r

17. If the first three terms of an A.P are b, c and 2b, then find the ratio of b and c.
(1) 3:2
(2) 2:3
(3) 1:4
(4) 4:1

- **18.** Find the value(s) of k for which the quadratic equation $x^2 + 2\sqrt{2}kx + 18 = 0$ has equal roots. (1) ± 2 (2) ± 4 (3) ± 3 (4) ± 6
- 19. Assertion (A) : If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.Reason (R) : HCF is always a factor of LCM.
 - (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 - (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 - (3) Assertion (A) is true but Reason (R) is false.
 - (4) Assertion (A) is false but Reason (R) is true.
- 20. Assertion (A) : If a and b are two coprime numbers, then a³ and b³ will be coprime numbers.
 Reason (R) : Two natural numbers are always coprime numbers then their cubes are also coprime
 - (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 - (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
 - (3) Assertion (A) is true but Reason (R) is false.
 - (4) Assertion (A) is false but Reason (R) is true.

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SECTION-B

- 21. Find the number of natural numbers between 102 and 998 which are divisible by 2 and 5 both.
- 22. Prove that the rectangle circumscribing a circle is a square.

OR

If the radii of two concentric circles are 4 cm and 5 cm, then find the length of chord of one circle which is tangent to the other circle.

23. In the given figure, DEFG is square and $\angle BAC = 90^\circ$. Show that $FG^2 = BG \times FC$.



24. Isha is 10 years old girl. On the result day, Isha and her father Suresh were very happy as she got first position in the class. While coming back to their home, Isha asked for a treat from her father as a reward for her success. They went to a juice shop and asked for two glasses of juice.

Aisha, a juice seller, was serving juice to her customers in two types of glasses.

Both the glasses had inner radius 3cm. The height of both the glasses was 10 cm.



First type: A glass with hemispherical raised bottom.

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Second type: A glass with conical raised bottom of height 1.5 cm.

Isha insisted to have the juice in first type of glass and her father decided to have the juice in second type of glass. Out of the two, Isha or her father Suresh, who got more quantity of juice to drink and by how much?

25. Jayanti throws a pair of dice and records the product of the numbers appearing on the dice. Pihu throws 1 dice and records the square of the number that appears on it. Who has the better chance of getting the number 36? Justify?

OR

An integer is chosen between 70 and 100, Find the probability that it is

(i) a prime number (ii) divisible by 7



SECTION-C

26. Given that $\sqrt{5}$ is irrational, prove that $2\sqrt{5} - 3$ is an irrational number.

OR

If HCF of 144 and 180 is expressed in the form 13m - 16. Find the value of m.

27. In the figure, ABCDE is a pentagon with BE||CD and BC||DE. BC is perpendicular to CD. AB = 5cm, AE = 5cm, BE = 7cm, BC = x - y and CD = x + y. If the perimeter of ABCDE is 27cm. Find the value of x and y, given x, $y \neq 0$.



28. Two friends Seema and Aditya work in the same office at Delhi. In the Christmas vacations, both decided to go to their home towns represented by Town A and Town B respectively in the figure given below. Town A and Town B are connected by trains from the same station C (in the given figure)in Delhi. Based on the given situation, answer the following questions:



- (i) Who will travel more distance, Seema or Aditya, to reach to their hometown?
- (ii) Seema and Aditya planned to meet at a location D situated at a point D represented by the midpoint of the line joining the points represented by Town A and Town B. Find the coordinates of the point represented by the point D.
- **29.** If $\sin\theta + \cos\theta = \sqrt{3}$, then prove that $\tan\theta + \cot\theta = 1$



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30. Sides of a right triangular field are 25 m, 24 m and 7 m. At the three corners of the field, a cow, a buffalo and a horse are tied separately with ropes of 3.5 m each to graze in the field. Find the area of the field that cannot be grazed by these animals.

OR

Water is flowing at the rate of 15km/hour through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in the pond rise by 21 cm?

31. Prove the following :

 $\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta \ \csc\theta - 2 \ \sin\theta\cos\theta$

SECTION-D

- **32.** Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.
- **33.** A train covers a distance of 360 km at a uniform speed. Had the speed been 5km/hour more, it would have taken 48 minutes less for the journey. Find the original speed of the train.

OR

Solve the following equation
$$:\frac{1}{x} - \frac{1}{x-2} = 3, x \neq 0, 2$$

- 34. The angle of elevation of an airplane from a point on the ground is 60°. After a flight of 30 seconds, the angle of elevation becomes 30°. If the airplane is flying at a constant height of $3000\sqrt{3}$ m, find the speed of the airplane in km/hr.
- 35. Daily wages of 110 workers, obtained in a survey, are tabulated below:

Daily wages (in ₹)	100 - 120	120 - 140	140 – 160	160 - 180	180 - 200	200 - 220	220 - 240
Number of workers	10	15	20	22	18	12	13

Compute the mean daily wages and modal daily wages of these workers.

OR

Find the mean of the following frequency distribution :

Marks	Below									
	10	20	30	40	50	60	70	80	90	100
Number of	12	22	35	50	70	86	97	104	109	115
students										

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SECTION-E

36. Case Study-1

The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.



- (i) If the first circular row has 30 seats, how many seats will be there in the 10th row?
- (ii) For 1500 seats in the auditorium, how many rows need to be there?

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row? (iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

37. Case Study-2

Varun has been selected by his school to design logo for sports day T-shirts for students and staff. The logo is designed in different geometry and different colours according to the theme. In the given figure, a circle with centre O is inscribed in a $\triangle ABC$, such that it touches the sides AB, BC and CA at points D,E and F, respectively. The lengths of sides AB, BC and CA are 12 cm, 8 cm and 10 cm respectively.



- (i) Find the length of AD and BE.
- (ii) If the radius of the circle is 4 cm, find the area of ΔOAB .
- (iii) Calculate the perimeter of $\triangle ABC$.

OR

If \triangle ABC is stitched by Gold wire then calculate the amount required for the same. The rate of gold wire is Rs.1500 per 100 cm.



38. Case Study-3

A carpenter made a wooden pen stand. It is in the shape of cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm. (See figure).



- (i) What is the volume of cuboid?
- (ii) What is the volume of a conical depression?
- (iii) What is the total volume of conical depressions?

OR

What is the volume of wood in the entire stand?



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SAMPLE PAPER - 2

TIME : 3 HRS.

MAX. MARKS: 80

GENERAL INSTRUCTIONS :

>> All questions are compulsory.

- **>>** The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- ➤ Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.

Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.

Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.

Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.

- 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.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- ➤ There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- **>>** Use of calculators and cell-phones are not permitted in the Examination Hall.

SECTION-A

1.	The number of p	polynomials having zeroes	s as -2 and 5 is	
	(1) 1	(2) 2	(3) 3	(4) more than 3
2.	Given that $\sin\theta$	$=\frac{a}{b}$, then $\cos\theta$ is equal to)	
	(1) $\frac{b}{\sqrt{b^2 - a^2}}$	(2) $\frac{b}{a}$	$(3) \ \frac{\sqrt{b^2 - a^2}}{b}$	$(4) \ \frac{a}{\sqrt{b^2 - a^2}}$
3.	In an AP, if a =	3.5, d = 0, n = 101 then a	is	
	(1) 01	(2) 3.5	(3) 103.5	(4) 104.5
4.	Ratio of sides a	right triangle with respect	to its acute angles are kr	lown as
	(1) Trigonometri	c identities	(2) Trigonometry	y
	(3) Trigonometri	ic ratios of the angles	(4) None of thes	e
5.	In figure, QR is	a common tangent to the gi	iven circles, touching exter	nally at the point T. The tangent
	at T meets QR a	t P. If $PT = 3.8$ cm, then	the length of QR (in cm)	S
	(1) 3.8	(2) 7.6	(3) 5.7	(4) 1.9
6.	The radii of two	circles are 3 cm and 4 cm	respectively. The diamete	r of the circle having area equal
	to sum of the ar	eas of two circles (in cm)	is	
	(1) 5	(2) 7	(3) 10	(4) 14

		PRE-NURTURE & CAI	REER FOUNDATION DIV	ISION MATHEMATICS
7.	The radius (in cm)) of the largest right cir	cular cone that can be be	e cut out from a cube of edge
	4.2 cm is			
	(1) 4.2	(2) 2.1	(3) 8.1	(4) 1.05
8.	If $\sin\theta = \cos\theta$, the	n the value of $2\tan\theta + c$	os ² is	
	(1) 2	5		
	(1) 2	(2) $\frac{1}{2}$	(3) 4	(4) None of these
9.	Two cubes each w	ith 6 cm edge are joined	l end to end. The surface	area of resulting cuboid is
	(1) 360 cm^2	(2) 720 cm^2	(3) 540 cm^2	(4) 180 cm^2
10.	Construction of cu	mulative frequency table	e is useful in determining	the
	(1) Mean	(2) Mode	(3) Range	(4) Median
11.	If the product of z	eroes of $x^2 - 3kx + 2k^2$	– 1 is 7 then values of k	are
	(1) ±4	(2) $\pm 2\sqrt{2}$	(3) ±2	(4) ±6
12.	If $(p - 1)$; $(p + 3)$; $(3p - 1)$ are in AP, the	en p is equal to	
	(1) 1	(2) 2	(3) 3	(4) 4
13.	If sum of the square	es of zeroes of the quadrat	ic polynomial $f(x) = x^2 - 8$	3x + k is 40, find the value of k.
	(1) 52	(2) 24	(3) 12	(4) None
14.	The number of revo	olutions made by a circula	ar wheel of radius 0.25 m i	in rolling a distance of 11 km is
	(1) 2800	(2) 4000	(3) 5500	(4) 7000
15.	AOBC is a rectang	gle whose three vertices	are $A(0, 3)$, $O(0, 0)$ and	B(5, 0). Find the length of its
	diagonal.			
	(1) $\sqrt{17}$	(2) $\sqrt{34}$	(3) $2\sqrt{17}$	(4) $2\sqrt{34}$
		4	$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$	
16.	If $4x = \csc\theta$ and	$\frac{1}{x} = \cot\theta$, the value of 4	$\left[\frac{x}{x^2} - \frac{1}{x^2}\right]$ 1S	
	(1) 1	(2) 1	(2) 1	
	(1) 1	$(2) \frac{-}{2}$	$(3) \frac{-}{4}$	(4) 4
17.	In an AP, if the con	mmon difference $(d) = -4$, and the seventh term (a_7)) is 4, then find the first term.
	(1) 30	(2) 28	(3) 26	(4) 40
				BF
18.	In the figure below	$DE \parallel AC$ and $DE \parallel AE$	Which of these is equal to	

FE .



(1) $\frac{\text{DF}}{\text{AE}}$

18

19. Assertion (A) : If a chord AB subtends an angle of 60° at the centre of a circle, then the angle between the tangents at A and B is also 60°.

Reason (R): The length of the tangent from an external point P on a circle with centre O is always less than OP.

(4) $\frac{FE}{EC}$

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.



CLASS - X STANDARD (CBSE SAMPLE PAPER)

20. Assertion (A) : The length of the tangent drawn from a point 8 cm away from the centre of circle of radius 6 cm is $2\sqrt{7}$ cm.

Reason (**R**) : If the angle between two radii of a circle is 130° , then the angle between the tangents at the end points of radii at their point of intersection is 50° .

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.



21. In the given figure, if $\angle A = 90^\circ$, $\angle B = 90^\circ$, OB = 4.5 cm, OA = 6 cm and AP = 4 cm, then find QB.



- **22.** Five cards-the ten, jack, queen, king and ace of diamonds are well-shuffled with their face downwards. One card is then picked up at random.
 - (i) What is the probability that the card is the queen?
 - (ii) If the queen is drawn and put aside, what is the probability that the second card picked up is an ace?
- **23.** The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, find the other number.

OR

Show that $7 - \sqrt{5}$ is irrational, given that $\sqrt{5}$ is irrational.

24. Find the 20th term from the last term of the AP 3,8,13,....,253

OR

If 7 times the 7th term of an A.P is equal to 11 times its 11th term, then find its 18th term.

25. Find the coordinates of the point P which divides the join of A(-2, 5) and B(3, -5) in the ratio 2 : 3.

26. A fraction becomes $\frac{1}{3}$ when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$ when 8 is added to its denominator. Find the fraction.

OR

Places A and B are 80 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in same direction they meet in 8 hours and if they move towards each other they meet in 1 hour 20 minutes. Find the speed of cars.

27. Prove that $\sin\theta(1 + \tan\theta) + \cos\theta(1 + \cot\theta) = \sec\theta + \csc\theta$



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MATHEMATICS

- 28. A girl empties a cylindrical bucket full of sand, of base radius 18 cm and height 32 cm, on the floor to form a conical heap of sand. If the height of this conical heap is 24 cm, then find its slant height correct up to one place of decimal.
- **29.** The points A(1, -2), B(2, 3), C(k, 2) and D(-4, -3) are the vertices of a parallelogram. Find the value of k.
- **30.** The table shows the daily expenditure on grocery of 25 households in a locality. Find the modal daily expenditure on grocery by a suitable method.

Daily Expenditure (in ₹)	100 – 150	150 - 200	200 - 250	250 - 300	300 - 350
No of households	4	5	12	2	2

31. In the given figure, AB = AC. E is a point on CB produced. If AD is perpendicular to BC and EF perpendicular to AC, prove that $\triangle ABD$ is similar to $\triangle ECF$.





In figure $\angle 1 = \angle 2$ and $\triangle NSQ \cong \triangle MTR$, then prove that $\triangle PTS \sim \triangle PRQ$.



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

OR

The sum of the first 7 terms of an AP is 63 and the sum of its next 7 terms is 161. Find the 28th term of this AP.

33. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from the point.

OR

A tree is broken by the wind. The top struck the ground at an angle of 30° and at a distance of 30 m from the root. Find the whole height of the tree.

|--|



- 34. In the figure given below, $\ell \parallel m$ and line segments AB, CD and EF concurrent at point P. Prove that
 - $\frac{AE}{BF} = \frac{AC}{BD} = \frac{CE}{FD}.$



35. The median of the following data is 525. Find the values of x and y if the total of frequency is 100.

Frequency
2
5
Х
12
17
20
у
9
7
4

SECTION-E

36. Case Study-1

A book store shopkeeper gives books on rent for reading. He has variety of books in his store related to fiction, stories and quizzes, etc. He takes a fixed charge for the first two days and an additional charge for subsequent day. Amruta paid Rs.22 for a book kept for 6 days ; while Radhika paid Rs.16 for keeping the book for 4 days.



Assume that the fixed charge be Rs.x and additional charge (per day) be Rs.y.

- Based on the above information, answer the following questions :
- (i) Frame the algebraic equation for Radhika.
- (ii) Frame the algebraic equation for Amruta.
- (iii) What are the additional charges for each subsequent day for a book?

OR

Which is the total amount paid by both, if both of them have kept the book for 2 more days?



37. Case Study-2

A garden consists of 135 rose plants planted in certain number of columns. There is another set of 225 marigold plants, which is to be planted in the same number of columns.



Read carefully the above paragraph and answer the following questions :

(i) What is the maximum number of columns in which they can be planted?

OR

Find the total number of plants.

- (ii) Find the sum of exponents of the prime factors of the maximum number of columns in which they can be planted.
- (iii) What is total number of rows in which they can be planted?

38. Case Study-3

A horse is tied to a peg at one corner of a square shaped grass field of sides 15 m by means of a 5 m long rope (see the given figure).



- (i) What is the area of the grass field?
- (ii) What would be the area of the field in which the horse can graze.
- (iii) What would be the grazing area if the rope was 10 m instead of 5 m.

OR

Calculate the increase area in grazing if the rope was 10 m long instead of 5 m.



SAMPLE PAPER - 3

TIME : 3 HRS.

MAX. MARKS: 80

GENERAL INSTRUCTIONS :

>> All questions are compulsory.

- **>>** The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- ➤ Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.

Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.

Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.

Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.

- 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.
- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- ➤ There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- **»** Use of calculators and cell-phones are not permitted in the Examination Hall.

SECTION-A

1.	If α , β are z	If α , β are zeroes of polynomial $2y^2 + 7y + 5$, value of $\alpha + \beta + \alpha\beta$ is					
	(1) 0	(2) -1	(3) 1	(4) None of these			
2.	If $x = a$; $y =$	= b is solution of pair of equation	ons $x - y = 2$ and $x + y = 2$	= 4 then a and b are			
	(1) (3, 1)	(2) (1, 3)	(3) (0, 1)	(4) (-1, 2)			
3.	Values of 'k'	for which roots of equation x^2	+ 4x + k = 0 are real is				
	(1) $k \ge 4$	(2) $k \le 4$	(3) $k = 0$	(4) $k = 4$			
4.	ABC is an is	sosceles triangle right angled at	C with $AC = 4$ cm, then	length of AB is			
	(1) 4 cm	(2) 8 cm	(3) $\sqrt{2}$ cm	(4) $4\sqrt{2}$ cm			
5.	If a tower of	30 m high casts a shadow 10	$\overline{3}$ m long on the ground,	then angle of elevation of the			
	sun is						
	(1) 60°	(2) 30°	(3) 45°	(4) 90°			
6.	Volume and	surface area of a solid hemisph	ere are numerically equal	I. Diameter of hemisphere is			
	(1) 3 units	$(2) = \frac{9}{2}$ units	$(3) \frac{3}{-}$ units	(4) 9 units			
	(1) 5 units	$\binom{2}{2}$ 2 and 3	$\begin{pmatrix} 0 \end{pmatrix} 2$	(+) / units			
7.	If mean and	median are 10.5 and 9.6 respec	ctively then mode is				
	(1) 7.8	(2) 3.6	(3) 3.9	(4) 8.4			
8.	The probabil	ity of selecting a rotten apple ra	ndomly from a heap of 90	00 apples is 0.18, then number			
	or rotten app	105 15					
	(1) 170	(2) 162	(3) 180	(4) 150			
		Vour Hand Mark	leads to Strawa Jourd	ation 23			



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9.	If $x = -\frac{1}{2}$ is a solution of quadratic equation $3x^2 + 2kx - 3 = 0$, value of k is								
	$(1) -\frac{9}{4}$	(2) $-\frac{9}{2}$	(3) $\frac{15}{4}$	$(4) -\frac{15}{4}$					
10.	If $k + 1 = \sec^2\theta(1 + \theta)$	$\sin\theta$)(1 – $\sin\theta$), then the	he value of k is						
	(1) 0	(2) 1	(3) 2	(4) 3					
11.	If the quadratic equation $px^2 - 2\sqrt{5} px + 15 = 0$ has two equal roots, then find the value of p.								
	(1) 0	(2) 1	(3) 2	(4) 3					
12.	If $a \cos\theta + b \sin\theta = 4$	and a $\sin\theta - b \cos\theta =$	3, then $a^2 + b^2 =$						
	(1) 7	(2) 12	(3) 25	(4) None of these					
13.	A pendulum swings t pendulum is	hrough an angle of 30°	and describes an arc 8.8 c	m in length. The length of the					
	(1) 15 cm	(2) 16 cm	(3) 15.5 cm	(4) 16.8 cm					
14.	Which of the following	ng can not be the proba	ability of an event?						
	(1) 0	(2) $\frac{1}{5}$	(3) $\frac{5}{4}$	(4) 1					
15.	The probability of guessing the correct answer to a certain test question is $\frac{x}{12}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$, then x =								
	(1) 2	(2) 3	(3) 4	(4) 6					
16.	Determine the upper	limit of the modal clas	s of the following frequence	cy distribution :					
	Class 0-5	6-11 12-17	18-23 24-29						
	Frequency 13	10 15	8 11						
	(1) 16	(2) 19.5	(3) 18	(4) 17.5					
17.	If x tan $60^\circ \cos 60^\circ =$	$= \sin 60^\circ \cot 60^\circ$, then y	x =						
	(1) $\cos 30^\circ$	(2) $\tan 30^\circ$	(3) sin30°	(4) $\cot 30^{\circ}$					
18.	A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that $OQ = 12$ cm. Then, the length of PQ is								
	(1) $\sqrt{119}$ cm	(2) 16 cm	(3) 15 cm	(4) $\sqrt{211}$ cm					
19.	Assertion (A) : Two	similar triangles are al	ways congruent.						
	Reason (R) : Two si	milar triangles are said	d to be congruent if their a	areas are equal.					
	(1) Both Assertion (A) and Reason (R) are true	e and Reason (R) is the corre	ect explanation of Assertion (A).					
	(2) Both Assertion (A)	and Reason (R) are true	but Reason (R) is not the com	rect explanation of Assertion (A).					
	(3) Assertion (A) is	true but Reason (R) is	false.						
	(4) Assertion (A) is	false but Reason (R) is	s true.						
	24 7/	our Hard Work Lea	ds to Strong Foundatio	n					

CLASS - X STANDARD (CBSE SAMPLE PAPER)

MATHEMATICS



20. Assertion (A) : If the value of mode and mean is 60 and 66 respectively, then the value of median is 64.

Reason (**R**) : Median = Mode + 2 Mean.

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

21. Find how many integers between 200 and 500 are divisible by 8.

OR

Find the sum of first 8 multiples of 16.

- **22.** Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6.
- **23.** A rectangular sheet of paper 40 cm × 22 cm is rolled to form a hollow cylinder of height 40 cm. Find the radius of cylinder.
- 24. Show that 6^n can never end with digit 0 for any natural number n.

OR

Find the HCF and LCM of 90 and 144 by the method of prime factorization.

25. Find a relation between x and y such that the point P(x, y) is equidistant from the points A(-5, 3) and B(7, 2).

SECTION-C

26. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in fig. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.



A heap of rice is in the form of a cone of base diameter 24 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap?

		Your Hard Work Leads to Strong Foundation	25
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27. The table below shows the salaries of 280 persons :

Salary (In thousand ₹)	Number of Persons
5 - 10	49
10 – 15	133
15 – 20	63
20 - 25	15
25 - 30	6
30 - 35	7
35 - 40	4
40 - 45	2
45 - 50	1

Calculate the median salary of the data.

28. In the given figure, the boundary of shaded region consists of four semicircular arcs, two smallest being equal. If diameter of the largest is 14 cm and that of the smallest is 3.5 cm, calculate the area of

the shaded region.
$$\left[\text{Use } \pi = \frac{22}{7} \right]$$



In the given figure, ABC is a right triangle right angled at A. Find the area of shaded region if AB = 6 cm, BC = 10 cm and O is the centre of the incircle of \triangle ABC. [Take π = 3.14]



- **29.** A sum of Rs.700 is to be used to give seven cash prizes to students of school for their overall academic performance. If each prize is Rs.20 less than its preceding prize, find the value of each of the prizes.
- **30.** Prove the following : $(1 + \cot A \csc A) (1 + \tan A + \sec A) = 2$
- **31.** In the given figure, AB is a chord of length 24 cm (see figure). The tangents at A and B intersect at point P. If the radius of circle is 13 cm. Find the length of PA.





SECTION-D

- **32.** ABC is triangle in which AB = AC and D is a point on AC such that $BC^2 = AC \times CD$. Prove that BD = BC.
- **33.** A train takes 2 hours less for a journey of 300 km if its speed is increased by 5 km/h from its usual speed. Find the usual speed of the train.

OR

Solve for x : $\frac{1}{(a+b+x)} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $[a \neq 0, b \neq 0, x \neq -(a+b)]$.

- **34.** The angle of elevation of a cloud from a point 60 m above the surface of the water of a lake is 30° and the angle of depression of its shadow from the same point in water of lake is 60°. Find the height of the cloud from the surface of water.
- 35. Represent the following pair of equations graphically and write the coordinates of points where the lines intersect y-axis : x + 3y = 6; 2x 3y = 12.

OR

The sum of the numerator and the denominator of a fraction is 4 more than twice the numerator. If 3 is added to each of the numerator and denominator, their ratio becomes 2 : 3. Find the fraction.



36. Case Study-1

To raise social awareness about, hazards of smoking a school decided to start 'No smoking' compaign 10 students are asked to prepare campaign banners in the shape of a triangle. The vertices of one of the triangle are P(-3, 4), Q(3, 4) and R(-2, -1) S,T and U are the midpoints of PQ, QR and PR respectively.



Based on this information, answer the following questions :

- (i) If S be the mid-point of line joining P and Q, then find the coordinates of S.
- (ii) If T be the mid-point of line joining R and Q, then find the coordinates of T.
- (iii) Find the coordinates of centroid of Δ PQR. Also find the coordinates of U.

OR

Find the coordinates of centroid of Δ STU.



37. Case Study-2

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.



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

OR

Expressed 36 as product of its primes.

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

38. Case Study-3

A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity.

After taking a ride in Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.



- (i) In the given figure find $\angle ROQ$
- (ii) Find ∠RSQ
- (iii) Find ∠RQP

OR

If SR $\|$ PQ, then find \angle SRO



SAMPLE PAPER - 4

TIME : 3 HRS.

MAX. MARKS: 80

General Instructions :

- >> All questions are compulsory.
- **>>** The question paper consists of 38 questions divided into five sections A, B, C, D and E.
- ➤ Section A contains multiple choice questions (Q.1 to Q.18) and Assertion-Reason based questions (Q.19 & Q.20) of one mark each, only the correct option is to be written in your answer sheet.

Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.

Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.

Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.

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.

- All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks sub-part of each question of Section E
- ➤ There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- >> Use of calculators and cell-phones are not permitted in the Examination Hall.

SECTION-A

1.	On simplification $\frac{2\sqrt{45}}{2\sqrt{25}}$	$\frac{-3\sqrt{20}}{\sqrt{5}}$ we get		
	(1) 6	(2) $\sqrt{5}$	(3) 0	(4) None of these
2.	If one zero of $p(x) = 4x^2$	– 8kx + 8k – 9 is negati	ve of other, then k is	
	(1) 0	(2) 1	(3) –1	(4) 2
3.	The 8 th term of an A.P. is	s 17 and its 14 th term is 29	D. The common difference	of the A.P. is
	(1) 3	(2) 2	(3) 5	(4) 4
4.	Ratio in which line segm	nent joining the points (1,	-3) and $(4, 5)$ is divided	by x-axis is
	(1) 3 : 5	(2) 2 : 1	(3) 5 : 3	(4) 1 : 2
5.	If $\cos A = \frac{4}{5}$ then the va	lue of tanA is		
	(1) $\frac{3}{5}$	(2) $\frac{3}{4}$	(3) $\frac{4}{3}$	(4) $\frac{5}{3}$
6.	Distance between two pa	rallel tangents of a circle	of radius 7 cm is	
	(1) 7 cm	(2) 14 cm	(3) 11 cm	(4) 5 cm

PRE-NURTURE & CAREER FOUNDATION DIVISION MATHEMATICS

7. The graph of $y = x^3 - 4x$ cuts x-axis at (-2, 0), (0, 0) and (2, 0). The zeroes of x^3-4x

- (1) 0,0,0 (2) -2,2,2 (3) -2,0,2 (4) -2,-2,2
- **8.** A card is drawn from a well shuffled deck of 52 playing cards. The probability that the card will not be an ace is

(1)
$$\frac{1}{13}$$
 (2) $\frac{1}{4}$ (3) $\frac{12}{13}$ (4) $\frac{3}{4}$

9. In figure O is centre of circle, area of sector OAPB is $\frac{5}{18}$ of the area of the circle. Then x is



(4) 70°

10. A die is thrown once, the probability of getting a number more than 3 is

 $(2) 100^{\circ}$

(1) $\frac{1}{4}$ (2) $\frac{3}{4}$ (3) $\frac{1}{2}$ (4) None of these

11. A vertical stick 12 m long casts a shadow 8 m long on the ground. At the same time a tower casts the shadow 40 m long on the ground. The height of the tower is

(1)
$$40 \text{ m}$$
 (2) 70 m (3) 60 m (4) 50 m

12. The least positive integer which is divisible by first five natural numbers is

- (1) 240 (2) 120 (3) 60 (4) 140
- **13.** Two vertices of a triangle are (3, 5),(-2, 4). If centroid is (5, 6), the coordinate of third vertex is

 (1) (14, 9)
 (2) (9, 3)
 (3) (-14, -9)
 (4) (-9, -3)
- 14. Completing the missing entries in the following factor tree. Find the value of x and y respectively.



15. If x = 2 and x = 3 are roots of the equation $3x^2 - 2kx + 2m = 0$, find the value of k and m.

(1) $\frac{15}{2}$,9 (2) 5, 3 (3) 5, 2 (4) 7, 1

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 $(1) 20^{\circ}$



CLASS - X STANDARD (CBSE SAMPLE PAPER)

MATHEMATICS

- **16.** Find the common difference of the A.P. $\frac{1}{p}$, $\frac{1-p}{p}$, $\frac{1-2p}{p}$
 - (1) 1 (2) -1 (3) 0 (4) 4
- 17. Write the formula used for calculating the median of a grouped frequency distribution.

(1)
$$\ell + \frac{\frac{N}{2} - cf}{f} \times h$$
 (2) $\frac{N}{2}$ (3) $\frac{N}{2}(\ell + cf)$ (4) $\frac{\ell + cf}{f}$

18. The nature of the quadratic equation $2x^2 + x + 4 = 0$ is

(1) no real roots (2) real roots (3) equal roots (4) None of these

19. Assertion (A) : The ordinate of a point A on y-axis is 5 and B has coordinates (-3, 1). Then the length of AB is 5 units.

Reason (R) : The point A(2, 7) lies on the perpendicular bisector of line segment joining the points P(6, 5) and Q(0, -4).

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.
- **20.** Assertion (A) : If a die is thrown, the probability of getting a number less than 3 and greater than 2 is zero.

Reason (**R**) : Probability of an impossible event is zero.

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
- (3) Assertion (A) is true but Reason (R) is false.
- (4) Assertion (A) is false but Reason (R) is true.

SECTION-B

- 21. Savita and Hamida are friends. What is the proabability that both will have
 - (i) the same birthday?
 - (ii) different birthdays? (ignoring a leap year).
- **22.** In an A.P., the sum of first n terms is $\frac{3n^2}{2} + \frac{5n}{2}$. Find its 25th term.

OR

Find the sum of sixteen terms of an A.P. -1, -5, -9,

23. Prove that $\frac{\sin^4 \theta + \cos^4 \theta}{1 - 2\sin^2 \theta \cos^2 \theta} = 1$



24. In figure, ABCD is a rectangle. Find the values of x and y.



Determine the value of k for which the given system of equations has a unique solution : x - ky = 2

3x + 2y = -5

25. In the given figure, O is the centre of circle. Find $\angle AQB$, given that PA and PB are tangents to the circle and $\angle APB = 75^{\circ}$.



26. In $\triangle ABC$, AB = AC. If the interior circle of $\triangle ABC$ touches the sides AB, BC and CA at D, E, F respectively. Prove that E bisects BC.

OR

A circle is inscribed in a \triangle ABC, with sides AC, AB and BC as 8 cm, 10 cm and 12 cm respectively. Find the length of AD, BE and CF.



27. Show graphically that the system of equations 2x + 4y = 10 3x + 6y = 12has no solution.

28. If A(5, -1), B(-3, -2) and C(-1, 8) are the vertices of triangle ABC, find the length of median through A and the coordinates of the centroid.

OR

If P and Q are two points whose coordinates are (at², 2at) and $\left(\frac{a}{t^2}, \frac{2a}{t}\right)$ respectively and S is the point

(a, 0). Show that
$$\frac{1}{SP} + \frac{1}{SQ}$$
 is independent of t.

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- **29.** Prove that : $(\csc \theta + \cot \theta)^2 = \frac{\sec \theta + 1}{\sec \theta 1}$.
- **30.** The sum of two numbers is 27 and their product is 50. Find the number.
- **31.** If p is a prime number, then prove that \sqrt{p} is irrational.

SECTION-D

32. In the figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X'Y' at B.



Prove that $\angle AOB = 90^{\circ}$.

33. The angle of elevation of a jet plane from a point A on the ground is 60°. After a flight of 30 seconds, the angle of elevation changes to 30°. If the jet plane is flying at a constant height of $3600\sqrt{3}$ m, find the speed of the jet plane.

OR

Two ships are approaching a light house from opposite directions. The angle of depression of two ships from top of the light house are 30° and 45° . If the distance between two ships is 100 m, find the height of light-house.

- 34. A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of icecream. The ice-cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice-cream.
- 35. Find mean, median of the following data and find mode using empirical formula :

Class	0 - 50	50 - 100	100 – 150	150 – 200	200 - 250	250 - 300	300 - 350	
Frequency	2	3	5	6	5	3	1	
OR								

On annual day of a school, 400 students participated in the function. Frequency distribution showing their ages is as shown in the following table:

Ages (in years)	05 - 07	07 – 09	09 – 11	11 – 13	13 – 15	15 – 17	17 – 19
Number of students	70	120	32	100	45	28	5

Find the mean and median of the above data.

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SECTION-E

36. Case Study-1

Selvi is setting up a water purifier system in her house which includes setting up an overhead tank in the shape of a right circular cylinder. This is filled by pumping water from a sump (underground tank) which is in the shape of a cuboid.

The underground water tank (sump) is a sturdy single moulded piece built to with stand underground pressure and is available in the storage capacity of 2000 L



These, along with hassle-free installation and minimum maintenance needs make it the ideal water storage solution.

Dimensions (sump) 1.57 m \times 1.44 m \times 95 cm.

Dimensions (overhead tank) Radius is 60 cm and Height is 95 cm





MATHEMATICS



Water flow conditions at the required overload capacity should be checked for critical pressure drop to ensure that valves are adequately sized.

- On the basis of the above information, answer the following questions :
- (i) Find the ratio of the capacity of the sump to the capacity of the overhead tank.
- (ii) If overhead tank (ignoring top and bottom) need to be painted to save it from corrosion, how much area need to be painted?
- (iii) If water is filled in the overhead tank at the rate of 20 litre per minute, the tank will be completely filled in how much time?

OR

If the amount of water in the sump, at an instant is 1500 litres, then find the water level in the sump at that instant?

37. Case Study-2

On the roadway, Points A and B, which stand in for Chandigarh and Kurukshetra, respectively, are located nearly 90 kilometres apart. At the same time, a car departs from Kurukshetra and one from Chandigarh. These cars will collide in 9 hours if they are travelling in the same direction, and in 9/7 hours if they are travelling in the opposite direction. Let X and Y be two cars that are travelling at x and y kilometres per hour from places A and B, respectively.



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

(i) When both cars move in the same direction, then find the linear equation by which the situation can be represented algebraically.

OR

When both cars move in the opposite direction, then find the linear equation by which the situation can be represented algebraically.

- (ii) Find the speed of car X.
- (iii) Find the speed of car Y.

38. Case Study-3

Google maps cartography team is working on improving the scalability quality of maps when you use the app on your phones to zoom in using 4 fingers. They are using a proprietary tool called 'MapMaker' to figure out scalability factors. A mathematical model is created for a type of object (below crosssection) to test its scalability on maps app.





In the diagram, AC = 8 cm, CE = 4 cm. Another enlargement with centre E, maps \triangle EBC onto \triangle EFA, BC = 3.6 cm.



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

- (i) An enlargement, with centre A, maps $\triangle ABC$ onto $\triangle ADE$, then find the scale factor of the enlargement.
- (ii) Find the length of AF.
- (iii) An enlargement, with centre A, maps $\triangle ABC$ onto $\triangle ADE$, then find the length of DE

OR

Find the value of $\frac{AB}{BD}$