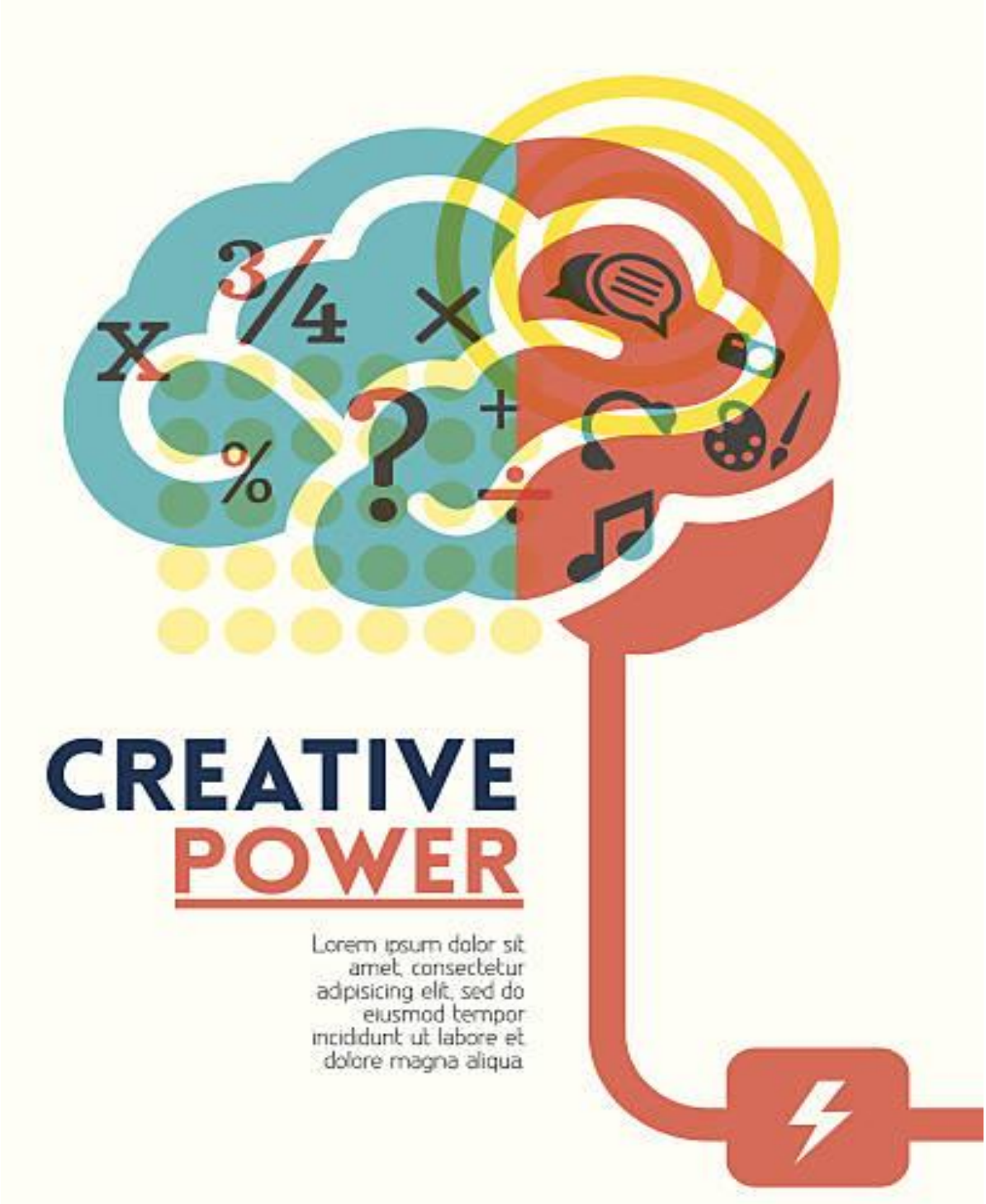
DAV INSTITUTIONS, ODISHA ZONE

SUPPORT MATERIAL

MATHEMATICS

CLASS-X



PREFACE

In view of the approaching AISSE (CBSE Board Examination)-2023, DAV Institutions, Odisha Zone has designed "SUPPORT MATERIAL" in MATHEMATICS for the students of class-X.

The content of these learning resources is embedded with FIFTEEN SETS of Sample Papers out of which there are three sets of Marking Schemes inclusive of CBSE released SQP(s) and MS(s). Besides, the booklet contains the RATIONALISED CBSE SYLLABUS & THE DELETED PORTION for the CBSE BOARD EXAMINATION,2023.All possible care has been taken in the process of preparation to make the study materials error free, persuasive and effective, accelerating the self-confidence of the examinees by solving the Assertion-Reasoning, Competency Based & Case Based Questions and supporting their pedagogical ground work.

"Confidence, Belief and Practice can help you crack any examination"

Content

SYLLABUS (2022 – 23)

UNIT I: NUMBER SYSTEMS

1. REAL NUMBER

Fundamental Theorem of Arithmetic - statements after reviewing work done earlier and after illustrating and motivating through examples, Proofs of irrationality of

UNIT II: ALGEBRA

1. POLYNOMIALS

Zeros of a polynomial. Relationship between zeros and coefficients of quadratic polynomials.

2. PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

Pair of linear equations in two variables and graphical method of their solution, consistency/inconsistency. Algebraic conditions for number of solutions. Solution of a pair of linear equations in two variables algebraically - by substitution, by elimination. Simple situational problems.

3. QUADRATIC EQUATIONS

Standard form of a quadratic equation $ax2 + bx + c = 0$, $(a \neq 0)$. Solutions of quadratic equations (only real roots) by factorization, and by using quadratic formula. Relationship between discriminant and nature of roots. Situational problems based on quadratic equations related to day to day activities to be incorporated.

4. ARITHMETIC PROGRESSIONS

Motivation for studying Arithmetic Progression Derivation of the nth term and sum of the first n terms of A.P. and their application in solving daily life problems.

UNIT III: COORDINATE GEOMETRY

1. COORDINATE GOMETRY

Review: Concepts of coordinate geometry, graphs of linear equations. Distance formula. Section formula (internal division).

UNIT IV: GEOMETRY

1. TRIANGLES

Definitions, examples, counter examples of similar triangles.

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

2. (Motivate) If a line divides two sides of a triangle in the same ratio, the line is parallel to the third side.

3. (Motivate) If in two triangles, the corresponding angles are equal, their corresponding sides are proportional and the triangles are similar.

4. (Motivate) If the corresponding sides of two triangles are proportional, their corresponding angles are equal and the two triangles are similar.

5. (Motivate) If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are proportional, the two triangles are similar.

2. CIRCLES

Tangent to a circle at, point of contact

1. (Prove) The tangent at any point of a circle is perpendicular to the radius through the point of contact.

2. (Prove) The lengths of tangents drawn from an external point to a circle are equal.

UNIT V: TRIGONOMETRY

1. INTRODUCTION TO TRIGONOMETRY

Trigonometric ratios of an acute angle of a right-angled triangle. Proof of their existence (well defined); motivate the ratios whichever are defined at 0o and 90o. Values of the trigonometric ratios of 300 , 450 and 600 . Relationships between the ratios.

2. TRIGONOMETRIC IDENTITIES

Proof and applications of the identity $\sin^2 A + \cos^2 A = 1$. Only simple identities to be given.

3. HEIGHTS AND DISTANCES

Angle of elevation, Angle of Depression. Simple problems on heights and distances. Problems should not involve more than two right triangles. Angles of elevation / depression should be only 30°, 45°, and 60°.

UNIT VI: MENSURATION

1. AREAS RELATED TO CIRCLES

Area of sectors and segments of a circle. Problems based on areas and perimeter / circumference of the above said plane figures. (In calculating area of segment of a circle, problems should be restricted to central angle of 60°, 90° and 120° only.

2. SURFACE AREAS AND VOLUMES

Surface areas and volumes of combinations of any two of the following: cubes, cuboids, spheres, hemispheres and right circular cylinders/cones.

UNIT VII: STATISTICS AND PROBABILITY

1. STATISTICS

Mean, median and mode of grouped data (bimodal situation to be avoided).

2. PROBABILITY

Classical definition of probability. Simple problems on finding the probability of an event.

Rationalised Portion (Addition/ Deletion)
CBSE Mathematics Syllabus (2022- 23)

Unit/ Chapter	Rationalised Portion (Addition/ Deletion)
Real Number	DELETED • Euclid's Division lemma(Exercise1.1) • Decimal representation of rational numbers in terms of terminating /non-terminating recurring decimal (Ex- 1.4)
Polynomials	DELETED • Statements and simple problems on division algorithm for polynomials with real coefficients (Exercise 2.3 & 2.4)
Pair of Linear Equations in Two Variables	DELETED • Solution of a pair of linear equations algebraically – by cross multiplication method.(Some Questions of Exercise 3.5) • Simple problems on equations reducible to linear equations. (Exercise 3.6)
Quadratic Equations	DELETED • Solution of quadratic equations by completing square method. ADDED • Situational problems on equations reducible to quadratic equation. (Deleted in 2021-22, but Added in 2022-23)
Arithmetic Progressions	ADDED • Application in solving daily life problems based on sum of n terms.(Deleted in 2021-22, but Added in 2022-23)
TRIANGLES	DELETED • (motivate) If a perpendicular is drawn from the vertex of the right angle of the right angle to the hypotenuse, the triangles on side of the perpendicular are similar to the whole triangle and with each other. • (prove) The ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.(Exercise 6.4) • (Prove) In a right triangle , the square on the hypotenuse is equal to the sum of the squares on the other two sides.(Exercise 6.5) • (Prove) In a triangle, if the square on one side is equal to the sum of the squares on the other two sides, the angle opposite to the first side is a right angle.

COORDINATE GEOMETRY	DELETED • Area of triangle (Exercise 7.3)
INTRODUCTION TO TRIGONOMETRY	ADDED • Motivate the ratios whichever are defined at 0° and 90°(Deleted in 2021-22, but Added in 2022-23) DELETED • Proofs of values of 30°, 45° and 60° • Trigonometric ratios of complementary angles (Exercise 8.3)
SOME APPLICATIONS OF TRIGONOMETRY	No Deletion
CIRCLES	No Deletion
CONSTRUCTION	ENTIRE CHAPTER DELETED
AREAS RELATED TO CIRCLES	DELETED • Plane figures involving triangles, simple quadrilaterals and circles(combination of plane figures)(Exercise 12.3) ADDED • Problems on central angle of 120° (Deleted in 2021-22, but Added in 2022-23)
SURFACE AREAS AND VOLUMES	DELETED • Problems involving converting one type of metallic solid into other and other mixed problems (Exercise 13.3) • Frustum of a cone (Exercise 13.4)
STATISTICS	ADDED Step deviation method for finding the mean • (Deleted in 2021-22, but Added in 2022-23) DELETED • Cumulative Frequency Graph(Exercise 14.4)
PROBABILITY	No Deletion

SAMPLE PAPER-1

CLASS –X

SUBJECT: MATHEMATICS (STANDARD-041)

Time Allowed:3 Hrs Maximum Marks:80

General Instructions:

1. This Question Paper has 5 Sections A-E.

2. Section A has 20 MCQs carrying 1 mark each

3. Section B has 5 questions carrying 02 marks each.

4. Section C has 6 questions carrying 03 marks each.

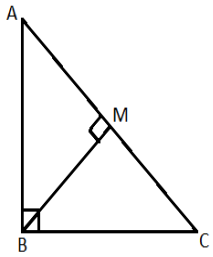
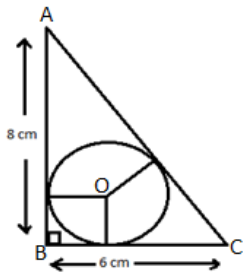
5. Section D has 4 questions carrying 05 marks each.

6. Section E has 3 case based integrated units of assessment (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.

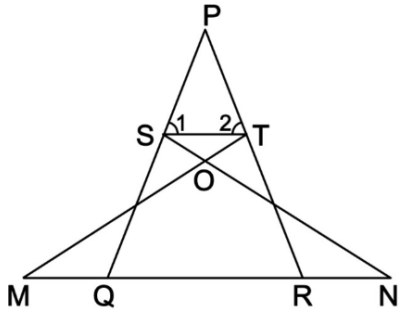
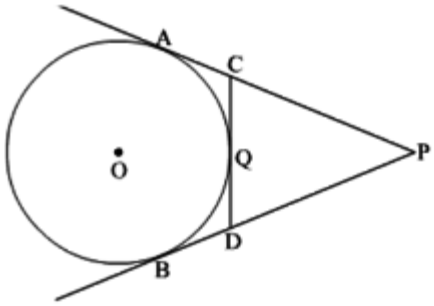
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E

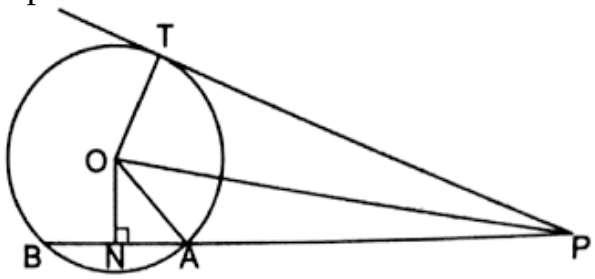
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION A		
	Section A consists of 20 questions of 1 mark each.	
Sl.No.		**Marks**
1.	Given $p^n = (a \times 5)^n$. For p^n to end with the digit zero $a =$ _____ for any natural number *n*. a) Any natural number b) even number c) odd number d) none of these	**1**
2.	If α and β are the zeroes of the quadratic polynomial $x^2 - 5x + a$ and $2\alpha + 3\beta = 18$ then the value of a is a) 5 b) 24 c) – 18 d) – 24	**1**
3.	The area of the triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with the coordinate axes is a) ab b)$2ab$ c) $\frac{1}{2}ab$ d)$\frac{1}{4}ab$	**1**
4.	If the difference of roots of the quadratic equation $x^2 + kx + 12 = 0$ is 1, the positive value of k is a) – 7 b) 7 c) 4 d) 8	**1**
5.	If p($\frac{a}{3}$,4) is the mid-point of the line segment joining the points Q (- 6 ,5) and R (- 2,3), then the value of a is a) – 4 b) – 12 c) 12 d)– 6	**1**

6.	$\Delta ABC \sim \Delta DEF$. If AP and DQ are medians of ΔABC and ΔDEF respectively and $BC^2 : EF^2 = 9 : 25$, then AP : DQ a) 5 : 3 b)81 : 625 c) 9 : 25 d)3 : 5	**1**
7.	If $6cot\theta + 2cosec\theta = cot\theta + 5cosec\theta$, then $cos\theta$ is a) $\frac{4}{5}$ b)$\frac{5}{3}$ c)$\frac{3}{5}$ d)$\frac{5}{4}$	**1**
8.	If $4\ tan\theta = 3$, then $\frac{4\sin\theta - \cos\theta}{4\sin\theta + \cos\theta}$ is equal to a) $\frac{2}{3}$ b)$\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$	**1**
9.	D,E and F are respectively the mid points of side AB,BC and AC of ΔABC. If $\frac{1}{2}$ (perimeter of ΔDEF) = 12 m, then perimeter of ΔABC is a) 24 m b) 6 m c)48 m d)12 m	**1**
10.	As shown in figure in a right triangle ABC, $\angle B = 90^0$. If BM ⊥ AC such that AB = 6 cm and AC = 9 cm,then value of AM is  a) 4 cm b)9cm c)18cm d)$3\sqrt{5}$cm	**1**
11.	As shown in fig, a circle of centre O is inscribed inside a right angled triangle ABC whose two sides other than hypotenuse are 6 cm and 8 cm. Then radius of incircle is  a) 2 cm b) 3 cm c) 4 cm d) cannot be determined	**1**
12.	A piece of wire 20 cm long , bent into the form of an arc of a circle , subtends an angle of 60^0 at its centre. The radius of the circle is a) $\frac{60}{\pi}$ b) $\frac{30}{\pi}$ c) $\frac{20}{\pi}$ d) $\frac{40}{\pi}$	**1**

<table>
<tr><td>13.</td><td>The volume of the largest right circular cone that can be cut out from a cube of edge 4.2 cm is
a) 9.7 cm^3 b) 77.6 cm^3 c)58.2 cm^3 d)19.4 cm^3</td><td>1</td></tr>
<tr><td>14.</td><td>If Mode of a series exceeds its Mean by 21, then Mode exceeds its Median by
a) 12 b) 14 c) 10 d) 21</td><td>1</td></tr>
<tr><td>15.</td><td>The area of a circle that can be inscribed in a square of side 14 cm is
a) 154 cm^2 b) 160 cm^2 c) 150cm^2 d) 256 cm^2</td><td>1</td></tr>
<tr><td>16.</td><td>Consider the following frequency distribution
<table>
<tr><td>Classes</td><td>0-5</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td></tr>
<tr><td>F</td><td>13</td><td>10</td><td>14</td><td>8</td><td>11</td></tr>
</table>
The upper limit of the median classis
a) 5 b)10 c)15 d)20</td><td>1</td></tr>
<tr><td>17.</td><td>The probability that a number selected at random from the numbers 1,2,3,……15 is a multiple of 4 is
a) $\frac{4}{15}$ b)$\frac{2}{15}$ c)$\frac{1}{5}$ d)$\frac{1}{3}$</td><td>1</td></tr>
<tr><td>18.</td><td>If $p = a\ sinA, q = b\cos A$, then the value of $b^2p^2 + a^2q^2$ is
a) ab b) a^2b^2 c) a^4b^4 d) $a^2 + b^2$</td><td>1</td></tr>
<tr><td>19.</td><td>DIRECTION: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option
Statement A (Assertion): The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.
Statement R (Reason): If a and b are two positive integers, then H.C.F. × L.C.M. = a × b
(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 and 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.</td><td>1</td></tr>
<tr><td>20.</td><td>Statement A (Assertion):If three vertices of a parallelogram taken in order are (- 1 ,- 6), (2,- 5) and (7,2), then its fourth vertex is (4,1).
Statement R (Reason):Diagonals of a parallelogram bisect each other.
(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 and 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.</td><td>1</td></tr>
</table>

	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	The angles of a triangle are x, y and 40^0. The difference between the two angles x and y is 30^0. Find x and y.	**2**
22.	In the given figure, if $\angle 1 = \angle 2$ and $\Delta NSQ \cong \Delta MTR$, then prove that $\Delta PTS \sim \Delta PRQ$. 	**2**
23.	In figure, PA and PB are tangents to the circle from an external point P. CD are another tangent touching the circle at Q. If PA = 12 cm, QC = QD = 3 cm, then find PC + PD. 	**2**
24.	Area of a sector of a circle of radius 36 cm is 54π cm^2. Find the length of the corresponding arc of the sector. OR A circular park is surrounded by a road 21 m wide. If the radius of the park is 105 m, find the area of the road.	**2**
25.	Find the value of x, if $\sqrt{3}\tan 2x = \cos 60^0 + \sin 45^0 \cos 45^0$ OR Prove that $(\sin\alpha + \cos\alpha)(\tan\alpha + \cot\alpha) = \sec\alpha + \text{cosec}\,\alpha$.	**2**
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26.	Prove that $\sqrt{5}$ is not a rational number.	**3**
27.	If one of the zeroes of the quadratic polynomial $p(x) = 14x^2 - 42k^2x - 9$ is negative of the other, find the value of k.	**3**
28.	The age of the father is twice the sum of the ages of his two children. After 20 years, his age will be equal to the sum of the ages	**3**

	of his children. Find the age of the father. OR The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.	
29.	Prove that: $\sqrt{\frac{1+\sin\theta}{1-\sin\theta}} + \sqrt{\frac{1-\sin\theta}{1+\sin\theta}} = 2\sec\theta$	**3**
30.	In the given figure, from an external point O, a tangent PT and a line segment PAB is drawn to a circle with centre O. ON is perpendicular on the chord AB. Prove that PA.PB = PT^2.  **Or** AB is a diameter and AC is a chord of a circle with centre O such that $\angle BAC = 30^0$. The tangent at C intersects extended AB at a point D. Prove that BC = BD.	**3**
31.	Two different dice are thrown together. Find the probability that the number obtained : (i) have a sum less than 7. (ii) have a product less than 16. (iii) is a doublet of odd numbers.	**3**
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	
32.	Two pipes running together can fill a tank in $11\frac{1}{9}$ minutes. If one pipe takes 5 minutes more than the other to fill the tank separately, find the time in which each pipe would fill the tank separately. OR A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?	**5**
33.	Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR.. Prove that $\Delta\, ABC \sim \Delta\, PQR$.	**5**

34. A rocket is in form of a right circular cylinder closed at the lower end and surmounted by a cone with the same radius as that of the cylinder. The diameter and height of the cylinder are 6 cm and 12 cm respectively. If the slant height of the conical portion is 5 cm, find the total surface area and volume of the rocket.(Use $\pi = 3.14$) **5**

OR

A cylindrical vessel with internal diameter 10 cm and height 10.5 cm is full of water. A solid cone of base diameter 7 cm and height 6 cm is completely immersed in water. Find the volume of

(i) water displaced out of the cylindrical vessel?

(ii) water left in the cylindrical vessel?

35. The median of the following data is 27. Find the value of x & y, if the total frequency is 68. **5**

CI	0-10	10-20	20-30	30-40	40-50	50-60
F	5	x	20	14	y	8

SECTION E

Case study based questions are compulsory.

36.

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1, 18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month, answer the followings :

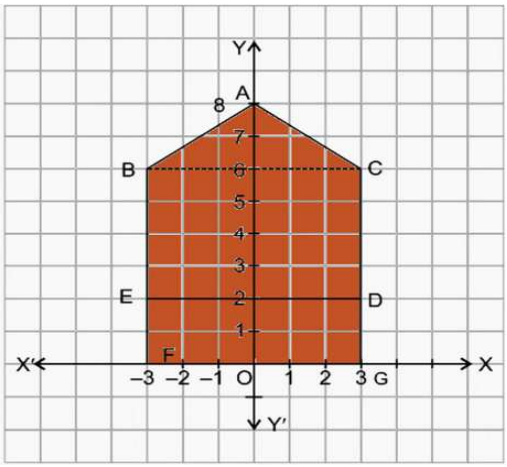
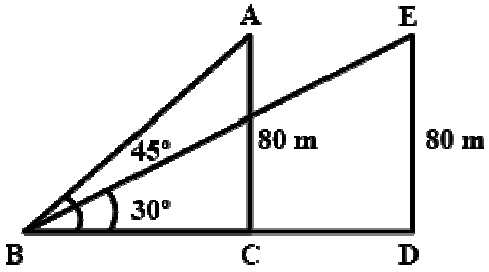
(i) Find the amount paid by him in 25^{th} instalment. **1**

(ii) Find the amount paid by him in the 30 instalments. **2**

OR

What amount does he still have to pay after 30^{th} instalment?

(iii) If total instalments are 40, then find the amount paid in the last instalment. **1**

37.	Aditya asked carpenter to make front door of his guest house. The carpenter suggested him a design which is plotted in the graph as shown in the figure below:  (i) What is the length of the line segment AB? (ii) Find the coordinates of the centroid of Δ ABC. (iii) If we join BD, then in which ratio the y-axis divides BD? OR Taking into account the coordinates of the vertices, find the area of the door.	**1** **1** **2**
38	 In figure, a tower is shown of height 80 m. A bird is sitting on the top of the tower as shown at point A. After 2 seconds the bird flies away horizontally, but remains at constant height. Now, the angle of elevation from observation point B changes from 45^0 to 30^0as shown. Answer the following questions based on above data. (i) Find the distance BD. (ii) Find the distance flied by the bird. (iii) Find the speed of bird, when flies from point A to E. OR If bird covers distance AE in 5 seconds, then find the speed of bird.	**1** **1** **2**

SAMPLE PAPERS - 1		
SUBJECT: MATHEMATICS, CLASS : X		
MARKING SCHEME		
QSTN NO	Value Points Section A	Marks Allotted
1	b. even number	1
2	d. – 24	1
3	c. $\frac{1}{2}ab$	1
4	b. 7	1
5	b. – 12	1
6	d. 3 : 5	1
7	c. $\frac{3}{5}$	1
8	c. $\frac{1}{2}$	1
9	c. 48 m	1
10	a. 4 cm	1
11	a. 2 cm	1
12	a. $\frac{60}{\pi}$	1

13	d. 19.4 cm^3	1
14	b. 14	1
15	a.154 cm^2	1
16	c. 15	1
17	c.$\frac{1}{5}$	1
18	a.a^2b^2	1
19	b. Assertion (A) is false but reasons (R) is true.	1
20	a.Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	1
	Section B	
21	ATQ, $x + y + 40^0 = 180^0$ (by A.S.P) $\Rightarrow x + y = 140^0$----------(1) &$x - y = 30^0$----------(2) Adding (1) & (2), $2x = 170^0 \Rightarrow x = 85^0$ And $y = 140^0 - 85^0 = 55^0$	1 1
22	$\Delta NSQ \cong \Delta MTR$ (given) So, $\angle SQN = \angle TRM$ (by CPCT) $\Rightarrow \angle PQR = \angle PRQ$ $\Rightarrow PQ = PR$ .....(1) As $\angle 1 = \angle 2$	1

	$\Rightarrow PS = PT$ .....(2) $\Rightarrow \frac{PS}{PQ} = \frac{PT}{PR}$ .....(1) Now in ΔPTS & ΔPRQ, $\frac{PS}{PQ} = \frac{PT}{PR}$ and $\angle P$ is common angle. Hence, $\Delta PTS \sim \Delta PRQ$ (by SAS criteria)	1
23	In the given fig, PA = PC + CA =PC+CQ(CA=CQ tangents drawn from an external points are equal) $\Rightarrow$12=PC + 3 $\Rightarrow$ PC = 9 cm $\because$ PA = PB $\Rightarrow$PA – AC = PB – BD $\Rightarrow$ PC = PD $\therefore$ PC + PD = 9 + 9 = 18 cm	1 1
24	Let the central angle be θ. ATQ, $\frac{\theta\pi(36)^2}{360} = 54\pi$ $\Rightarrow \theta$ = 15 $\therefore$ Length of corresponding arc = $\frac{\theta}{360}2\pi r = \frac{15}{360}2\pi 36$ = 3 π cm OR Radius of the circular park= r = 105 m Width of the road = 21 m So, outer radius = R = 105 + 21= 126 m Now, area of road= area of (outer circle – inner circle) = $\pi \times 126^2 - \pi \times 105^2 = \pi(126^2 - 105^2)$	1 1 1 1

	$= \frac{22}{7} \times (126 + 105)\,(126 - 105) = 15246\ m^2$	
25	$\sqrt{3}\tan \quad 2x = \frac{1}{2} + \frac{1}{\sqrt{2}} \times \frac{1}{\sqrt{2}} = \frac{1}{2} + \frac{1}{2} = 1$ $\Rightarrow \tan \quad 2x = \frac{1}{\sqrt{3}} = \tan 30^0$ $\Rightarrow 2x = 30^0$ $\Rightarrow x = 15^0$ OR L.H.S = $(\sin\alpha + \cos\alpha)(\frac{sin\alpha}{cos\alpha} + \frac{cos\alpha}{sin\alpha})$ $= (\sin\alpha + \cos\alpha)(\frac{sin^2\alpha + cos^2\alpha}{sin\alpha.cos\alpha})$ $= \frac{sin\alpha}{sin\alpha.cos\alpha} + \frac{cos\alpha}{sin\alpha.cos\alpha} = \frac{1}{cos\alpha} + \frac{1}{sin\alpha}$ $= sec\alpha + cosec\alpha$ = R.H.S	1 1 1 1
	Section C	
26	Proof of $\sqrt{5}$ is like $\sqrt{2}$ is irrational. For correct proof	3
27	One zero is negative of other so, let one zero is α then other will be $-\alpha$ Sum of zeroes = - $\frac{b}{a}$ $\alpha - \alpha = \frac{42k^2}{14}$ $0 = \frac{42k^2}{14}$ $k = 0$	0.5 0.5 1 1
28	Let age of father be *x* years and sum of ages of two children be *y* years. Atq , $x = 2y$ ……(1) After 20 yrs, fathers age will be ($x + 20$) Age of two children will be ($y + 40$) Now	1

	$(x + 20) = (y + 40)$ $x - y = 20$ ……..(2) After solving these two equations $x = 40$ (father's age) **Or** Let of number of rows be x and number of students in a row be y Total number of students xy Case -1 Total number of students = $(x-1)(y+3)$ $(x-1)(y+3) = xy$ $3x - y = 3$…….(1) Case-2 Total number of students = $(x+2)(y-3)$ $(x+2)(y-3) = xy$ $3x - 2y = -6$ …….(2) On solving these two equations $x=4$ and $y= 9$ Hence, the no. of students in the class = $4 \times 9 = 36$	1 1 1 1 1 1
29	LHS = $\sqrt{\frac{1+sinA}{1-sinA}} + \sqrt{\frac{1-sinA}{1+sinA}}$ $= \sqrt{\frac{(1+sinA(1+sinA)}{(1-sinA)(1+sinA)}} + \sqrt{\frac{(1-sinA)(1-sinA)}{(1+sinA)(1-sinA)}}$ $= \sqrt{\frac{(1+sinA)^2}{1-sin^2A}} + \sqrt{(\frac{1-sinA)^2}{1-sin^2A}}$	1

	$= \frac{1+sinA}{cosA} + \frac{1-sinA}{cosA}$	1
	$= \frac{2}{cosA}$	
	=2secA= RHS	1
30	Proof: PA =PN-AN PB=PN + BN	
	PA×PB=(PN-AN)(PN+BN)	1
	Since ON⊥AB Now, PA×PB=(PN-AN)(PN+AN) =PN^2 - AN^2 Again ON⊥PN, so	
	PN^2 - AN^2= $(OP^2$ - $ON^2)$ - $AN^2 = OP^2 - (ON^2$ + $AN^2)$ =OP^2 - OA^2	1
	OA=OT=Radius OP^2 - OA^2 = OP^2 - OT^2 PN^2 - AN^2 = OP^2 - OT^2 OP^2 - OA^2 = PT^2	
	PA×PB = PT^2	1
	OR	
	Correct figure, Construction	1
	Correct Proof	2
31	Total number of outcomes 36 i)Number of outcomes where sum is equal to 7 (3,4)(4,3)(5,2)(2,5)(1,6)(6,1)	

	Required probability $=\frac{6}{36}=\frac{1}{6}$ ii)Number of outcomes where product is less than 10 (1,1)(1,2)(2,1)(2,2)(2,3)(3,2),(3,3) (1,6)(6,1)(3,1)(1,3)(1,4)(4,1) (1,5)(5,1)(4,2)(2,4) Required probability $=\frac{17}{36}$ iii)Doublet of odd numbers (1,1)(3,3)(5,5) Required probability$=\frac{3}{36}=\frac{1}{12}$	1 1 1
32	Two pipes together fill the tank in $\frac{100}{9}$ mins Let one pipe takes x mins, then other will take (x+5) mins Atq ,$\frac{1}{x}-\frac{1}{x+5}=\frac{100}{9}$ $9x^2 - 155x - 500 = 0$ On solving the equation x= 20min Other tank will take 25mins **Or** Let original speed be x kmph Original time to cover 63km is $\frac{63}{x}$ h Time taken to cover a distance of 72km is $\frac{72}{x+6}$ h Atq, $\frac{63}{x}+\frac{72}{x+6}=3$ $x^2 - 39x - 126 = 0$ on solving	1 2 2 1 2

	x= 42kmph	2
33	Given, To prove, Correct Figure & Construction Correct Proof	2 3
34	Given diameter 6cm radius 3cm height 12cm Slant height 5cm For cylinder radius 3cm height 12cm For cone slant 5cm, radius 3cm Height = $\sqrt{5^2 - 3^2}$ = 4cm Now volume of the rocket= vol. of cylinder + vol. of cone $= \pi r^2(\mathrm{H} + \frac{h}{3})$ = 3.14x9(12+$\frac{4}{3}$) =376.8cm^3 Total surface area of rocket= CSA of cylinder + CSA of cone+ area of base of cylinder πr(2H +l +r) =301.44cm^2 OR Internal diameter=10cm, height= 10.5cm Solid cone base diameter = 7cm, height 6cm i)Volume of water displaced out of cylinder = Vol.of cone=$\frac{1}{3}\ \pi r^2$h	1 2 2 2.5

<table>
<tr><td></td><td>= 77cm^3
Vol of cylinder = 825cm^3
Vol. Of water left =825 – 77 = 748cm^3</td><td>2.5</td></tr>
<tr><td>35</td><td>
<table>
<tr><td>CI</td><td>F</td><td>C_f</td></tr>
<tr><td>0 - 10</td><td>5</td><td>5</td></tr>
<tr><td>10 - 20</td><td>x</td><td>5+x</td></tr>
<tr><td>20 - 30</td><td>20</td><td>25+ x</td></tr>
<tr><td>30 - 40</td><td>14</td><td>39 + x</td></tr>
<tr><td>40 - 50</td><td>4</td><td>39 + x + y</td></tr>
<tr><td>50- - 60</td><td>8</td><td>47 + x + y</td></tr>
</table>
Total number = 68
47+x+y = 68, x+ y = 21
Median 27 , median class 20 – 30, l =20 , c_f = 5+x , f =20
Median = l+ $\frac{\frac{n}{2}- c_f}{f} x\ h$
On solving we got x =15
Y = 6</td><td>1.5
0.5
2
1</td></tr>
<tr><td>36</td><td>A.P : 1000, 1100,1200.....
(i) a_{25} = 1000 + 24 × 100 = 1000 + 2400 = Rs 3400
(ii) S_{30}= 15 (2 × 1000 + 29 × 100)
= 15 × (2000 + 2900) = 15 × 2900
= Rs 73 500
OR
S_{30} = 73 500</td><td>1
2</td></tr>
</table>

	Amount still he has to pay = 1 18 000 – 73500 = Rs 44 500 (iii) a_{40} = 1000 + 39 ×100 = 1000 + 3900 = Rs 4900	1
37	(i)Coordinates are : A(0,8) and B(– 3,6) By Distance formula, AB = $\sqrt{3^2 + 2^2} = \sqrt{13}$ unit (ii) Coordinates are : A(0,8), B(– 3,6) and C(3,6) Coordinates of Centroid are = $(\frac{0-3+3}{3}, \frac{8+6+6}{3})$ = (0, $\frac{20}{3}$) (iii) Let the ratio be m : n. The point of division on y-axis be (0, y). By section formula, 0 = $\frac{3m-3n}{m+n}$ $\Longrightarrow 3m - 3n = 0$ $\Longrightarrow 3m = 3n$ $\Longrightarrow m:n$ = 1 : 1 OR Required area = Area (Rectangle EFGD+ Rectangle BEDC + ΔABC) = (6 × 2) + (6 ×4) + ($\frac{1}{2}$ ×6 ×2) = 12 + 24 + 6 = 42 sq.unit	1 1 2
38	(i) In ΔBDE, $tan30^0 = \frac{DE}{BD} \Longrightarrow \frac{1}{\sqrt{3}} = \frac{80}{BD}$ $\Longrightarrow$ BD = $80\sqrt{3}$ (ii) $tan45^0 = \frac{AC}{BC} \Longrightarrow 1 = \frac{80}{BC} \Longrightarrow$ BC = 80 m Distance flied= AE = BD – BC =$80\sqrt{3} - 80$ = 80 $(\sqrt{3} - 1)$ m (iii) Speed = $\frac{D}{t} = \frac{AE}{2} = \frac{80\,(\sqrt{3}-1)}{2}$ $= 40\ (\sqrt{3} - 1)$m/sec OR Required speed= $\frac{AE}{5} = \frac{80\,(\sqrt{3}-1)}{5}$	1 1 2

	$= 16\ (\sqrt{3} - 1)$ m/sec	

SAMPLE PAPER- 2

- Please check that this question paper contains 9 printed pages.
- Check that this question paper contains 36 questions.
- Write down the Serial Number of the question in the left side of the margin before attempting it.
- 15 minutes time has been allotted to read this question paper. The question paper will be distributed 15 minutes prior to the commencement of the examination. The students will read the question paper only and will not write any answer on the answer script during this period.

CLASS –X
SUBJECT:MATHEMATICS(STANDARD)

Time :3 Hours Maximum Marks:80

General Instructions:

1. This Question Paper has 5 Sections A-E.

2. Section A has 20 MCQs carrying 1 mark each

3. Section B has 5 questions carrying 02 marks each.

4. Section C has 6 questions carrying 03 marks each.

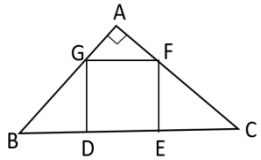
5. Section D has 4 questions carrying 05 marks each.

6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.

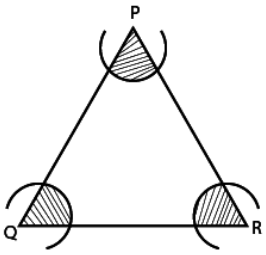
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E

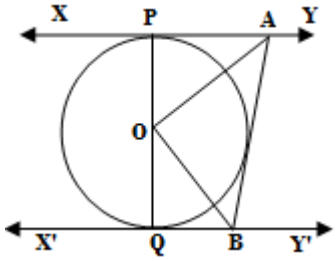
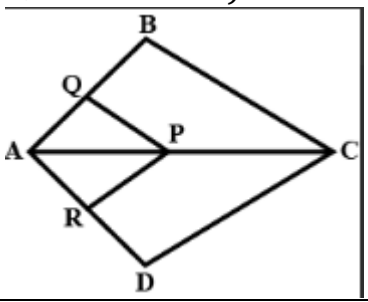
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

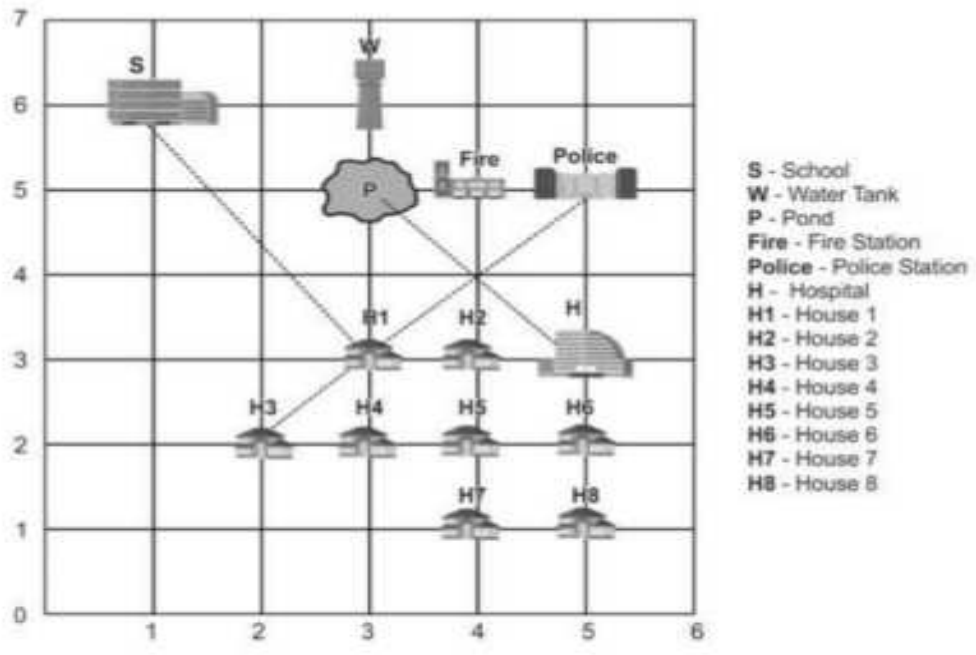
SECTION A		
	Section A consists of 20 questions of 1 mark each.	
Sl.no.		**Marks**
1.	If P= 2(4)(6)….(20) and Q = 1(3)(5)….(19), what is the HCF of P and Q? a. $3^3.5.7$ b. $3^4.5$ c.$3^4.5^2.7$ d. $3^3.5^2$	1
2.	The value of 'k' for which the system of equations has a unique solution $2x - 3ky + 2 = 0$ $x + 3y - 1 = 0$ a. Any real value other than 2 b. Any real value other than -2 c. 2 d. -2	1
3.	In $\Delta ABC, if\ E, F\ and\ D\ are\ the\ points\ on\ AC, AB\ and\ BC$ respectively and AF = 3cm, AE= 4 cm, BF= 2.4 cm, CE = 3.6cm, BD = 2 cm and CD = 2.5 cm, state which of the following is	1

	correct? a. $DE \parallel AB$ b. $FE \parallel CB$ c. $DF \parallel AC$ d. $None\ of\ these$	
4.	The x −coordinate of a point P is thrice its y- coordinate. If P is equidistant from Q(3,-5) and R(2,5), then the coordinates of P are a. $(1,3)$ b. $\left(\frac{3}{2},\frac{1}{2}\right)$ c. $(-\frac{15}{14},-\frac{5}{14})$ d. $(\frac{1}{2},\frac{3}{2})$	1
5.	If $tanA + cotA = 2$,the $\tan^{2n} A + \cot^{2n} A =$ a. 2^nb. 0 c. 2 d. 2n	1
6.	The zeroes of the quadratic polynomial $x^2 + kx + k, k \neq 0$, a. Cannot both be positive b. cannot both negative c. are always unequal d. are always equal	1
7.	In triangle ABC, $\angle B = 90°, AB = 20\ cm, AC + BC = 50cm,$ then $sinA =$ a. $1\frac{2}{5}$ b. $\frac{20}{21}$ c.$\frac{20}{29}$ d. $\frac{21}{29}$	1
8.	The integral value of k for which the equation $(k-12)x^2 + 2(k-12)x + 2 = 0$ possesses real and equal solutions is a. 12 b. 13 c.14 d. all of these	In 1
9.	The value of $\tan^2 A(cosec^2 A - 1)\ is$ a. $\tan^2 A$ b. $cosec^2 A$c. $\cot^2 A$ d.1	1
10.	If $\Delta ABC \sim \Delta EDF$, then which of the following is not true? a. BC.EF=AC.FD b. AB.EF=AC.DE b. BC.DE=AB.EF d. BC.DE=AB.FD	**1**
11.	PAB and PCD are two tangents to the inner circle from a point P lying on the outer circle of the two concentric circles such as that PC= 6cm then PB = a. 6cm b.$12cm$ c.3cm d. 4 cm	**1**
12.	In the given figure, DEFG is a square and $\angle BAC = 90°$. Which of the following is not true?  a. Δ AGF ~Δ DBG b. Δ AGF ~Δ EFC $\boldsymbol{c}$. Δ DBG ~Δ ECF d. $DE^2 = BD \times EC$	1
13.	One card is drawn from a well shuffled deck of 52 cards. Then the probability of getting a black king or a red queen is: a. 0 b. 1 c. 1/13 d. 2/13	1

14.	The number of rounds that a wheel of diameter $\frac{7}{11}$ m will make in going 4 km is a. 1000 b. 1700 c. 2000 d.2500	1
15.	If mode is 13.8 and mean is 12.5, then the median is a. 14.8 b. 13.27 c. 12.9 d. 16.8	1
16.	Consider the following frequency distribution Classes: 0-5 | 6-11 | 12-17 | 18-23 | 24-29 f: 13 | 10 | 13 | 8 | 11 The upper limit of the median class is a. 7 b. 17.5 c. 18 d. 18.5	1
17.	The circumference of a circle is 100 cm. The side of a square inscribed in the circle is $a. 50\sqrt{2}cm$ b. $\frac{100}{\pi}cm$ c. $\frac{50\sqrt{2}}{\pi}cm$ d. $\frac{100\sqrt{2}}{\pi}cm$	1
18.	A cone of height 7cm and base radius 3cm is carved from a rectangular block of wood of dimensions $10cm\ X\ 5cm\ X\ 2cm$. The percentage of wood wastage is (in %) a. 34 b. 46 c. 54 d. 66	1
19.	**DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option** Statement A (Assertion): If the product of two integers is 15 x 72 and their LCM is 360, then their HCF =3 Statement R (Reason): LCM x product of integers = HCF (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 and 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.	1
20.	Statement A (Assertion): Point P$(1,\frac{5}{2})$ is equidistant from the points A(-5,3) and B (7,2). Statement R (Reason): If a point P is equidistant from A and B, then AP = BP. (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 and 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.	1
	SECTION B	
	Section B consists of 5 questions of 2 marks each.	
21.	If $21x + 47y = 110\ and\ 47x + 21y = 162$,then find the value of $x - y$.	2

22.	Legs (sides other than the hypotenuse) of a right triangle are of lengths 16 cm and 8 cm. Find the length of the side of the largest square that can be inscribed in the triangle.	2
23.	If $\mathbf{d_1}, \mathbf{d_2}(\mathbf{d_1} < \mathbf{d_2})$ are the diameters of two concentric circles and chord of one circle oflength c is tangent to another circle, then prove that $\boldsymbol{d_2^2 = c^2 + d_1^2}$	2
24.	The short and long hands of a clock are 4 cm and 6 cm respectively. Find the sum of the distances travelled by this tips in two days (use $\pi = \frac{22}{7}$). . **Or** In the given figure, arcs have been drawn with radii 14cm each and with centre P, Q and R. Find the area of the shaded region.  	2
25.	Evaluate: $\frac{tan^2 60^0 + 4sin^2 45^0 + 3sec^2 30^0 + 5cos^2 90^0}{coses 30^0 + \sec 60^0 - cot^2 30^0}$ **OR** Prove the given identity: $\frac{tanA}{1+secA} - \frac{tanA}{1-secA}$ = 2 cosec A	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26.	Prove that $\sqrt{5}$ is not a rational number.	3
27.	If the sum of the zeroes of the polynomial $\mathbf{5x^2 - 3(3 + k)x + 7}$ is zero, then find the zero of the polynomial $\mathbf{2x^2 - 2(k + 11)x + 30}$	3
28.	Jamila sold a table and a chair for Rs 1050, thereby making a profit of 10% on the table and 25% on the chair. If she had taken a profit of 25% on the table and 10% on the chair, she would have got Rs 1065. Find the cost price of each. **Or** The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.	3
29.	Prove that: $\frac{tan\theta + sec\theta - 1}{tan\theta - sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$	3

30.	Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. **Or** In the given figure, XY & 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 $\angle AOB = 90°$ 	3
31.	A bag contains 24 balls which x are red, 2x are white and 3x are blue. A ball is selected at a random what is the probability that it is (a) Not red? (b) white?	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	
32.	A journey of 192 km between two cities takes 2 hours less by a fast train than by a slow train. If the average speed of the slow train is 16km/h less than that of a fast train. Find the average speed of each train. OR Out of a number of saras birds, one fourth the number are moving about in lotus plant: one-ninth coupled (along)with one-fourth as well as 7 times the square root of the number move on a hill : 56 birds remain in vakula trees. what is the total number of birds?	5
33.	Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in a distinct point, then the other two sides are divided in the same ratio. In the given figure, if PQ||BC and PR||CD. Prove that $\frac{AR}{AD} = \frac{AQ}{AB}$ (using the above theorem) 	5
34.	Due to sudden floods, some welfare associations jointly requested the government to get 100 tents fixed immediately and offered to contribute 50% of the cost. If the lower part of each tent is of the form	5

	of a cylinder of diameter 4.2 m and height 4 m with the conical upperpart of same diameter but of height 2.8 m and the canvas to be used costs Rs 100 per sq m. Find amount the associations will have to pay. OR A right triangle, whose sides are 15cm and 20cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed	
35.	The median of the following data is 28.5. find the value of x & y if the total frequency is 60 CI: 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 F: 5 | x | 20 | 15 | y | 5	5
	SECTION E	
	Case study based questions are compulsory.	
36.	Shown below is a town plan on a coordinate grid, where 1 unit = 1 km. consider the co-ordinates of each building to be the point of intersection of the respective grid lines  S - School W - Water Tank P - Pond Fire - Fire Station Police - Police Station H - Hospital H1 - House 1 H2 - House 2 H3 - House 3 H4 - House 4 H5 - House 5 H6 - House 6 H7 - House 7 H8 - House 8 *(Note: Consider the horizontal axis as the x-axis and the vertical axis as the y-axis.)* (i)What is the distance between the school and House 1 along the path shown? ii) Which pair of buildings are separated by the same distance as that of School and Police station? (iii)A well is dug at a point along the path joining the pond and the hospital. The ratio of the distance between the pond and the well to that of the well and the hospital is 4:1 respectively. What is the x-coordinate of the well?	1 1 2

	OR What is the ratio in which House 1 divides the path joining house 3 and the police station?	
37.	India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year: It produced 16000 sets in 6^{th} year and 22600 in 9^{th} year.  . (i) Find the difference of the production during 7^{th} year and 4^{th} year. **OR** Find the total production in during first 3 years (ii) Find the production during first year. (iii) In which year, the production is Rs 29200?	2 1 1
38	Trigonometry in the form of triangulation forms the basis of navigation, whether it is by land, sea or air. GPS a radio navigation system helps to locate our position on earth with the help of satellites.	

A guard, stationed at the top of a 240 m tower, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes(tilt). The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30°.

(i) Make a labelled figure on the basis of the given information. 1

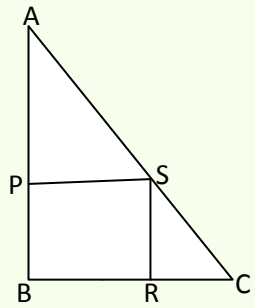
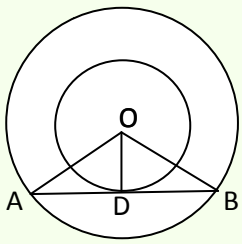
(ii) Calculate the distance of the boat from the foot of the observation tower. 1

(iii) After 10 minutes, the guard observed that the boat was approaching the tower and its distance from tower is reduced by $240(\sqrt{3} - 1)$ m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the observation tower? 2

Or

Suppose the guard standing on a 300m high tower observestwo boats in the same direction, their angle of depression are $\mathbf{60}°$ and $\mathbf{30}°$ respectively. Find the distance between the boats.

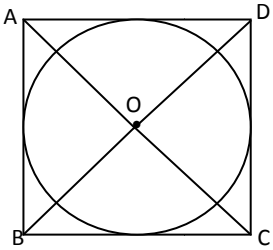
SAMPLE PAPER-2 MARKING SCHEME		
1	c	1
2	$\frac{a1}{a2} \neq \frac{b1}{b2}$ k$\neq -2$ b.any real number other than -2	1
3	c.	1
4	c. $(-\frac{15}{14}, -\frac{5}{14})$	1
5	c.2	1
6	a. Cannot both positive	1
7.	d. $\frac{21}{29}$	1
8.	c.	1
9	d.1	1
10.	c. BC.DE=AB.EF	1
11.	B.12 CM	1
12.	C. DBG$\sim ECF$	1
13.	C. 1/13	1
14.	C.2000	1
15.	C.12.9	1
16.	B. 17.5	1
17.	C. $\frac{50\sqrt{2}}{\pi}$	1
18.	A.34	1
19	C.	1
20.	A.	1
21	Adding both equation x+y =3 By subtracting x-y=2 By solving x=2.5 y=0.5	1 1
22.	Let ABC be the triangle where AB = 16cm and BC = 8cm PBSR is the largest square inscribed in triangle ABC Let the length of the side of the square be x	

	In $\triangle APS$ and $\triangle ABC$, $\angle A = \angle A$ $\angle APS = \angle ABC$ (Each 90°) So, $\triangle APS \sim \triangle ABC$ (AA similarly)  Therefore, $\frac{AP}{AB} = \frac{PS}{BC}$ or $\frac{16-x}{16} = \frac{x}{8}$ or $128 - 8x = 16x$ or $x = \frac{128}{24} = \frac{16}{3}$	1 1
23	In Δ OAB $\Rightarrow$ OA = OB .... radius of the outer circle Hence Δ OAB is an isosceles triangle As radius is perpendicular to tangent OD is perpendicular to AB OD is altitude from the apex and , in an isosceles triangle , the altitude is also the median Hence AD = DB = 2c Consider Δ ODB $\Rightarrow\angle$ ODB = 90∘ ...radius perpendicular to tangent Using Pythagoras theorem $\Rightarrow OD^2+BD^2=OB^2$ $\Rightarrow d_2^2+C_2=d_1^2$ Hence proved  	1 1
24	In 2 days, the short hand will complete 4 rounds. ∴ Distance moved by its tip = 4(circumference of a circle of radius 4 cm) =4×(2×722×4)cm=7704cm In 2 days, the long hand will complete 48 rounds.	

	∴ Distance moved by its tip = 48(circumference of a circle of radius 6 cm) =48×(2×722×6)cm=712.672cm Hence, sum of distances moved by the tips of two hands of the clock = 1910.85cm **OR** The area of the shaded region is equal to the sum of areas of three sectors of same radius but of different angles θ1,θ2 and θ3. ∠θ1+∠θ2+∠θ3=180∘ [Int. ∠s of Δ] ∴ Area of shaded region =$\frac{\boldsymbol{\theta 1+\theta 2+\theta 3}}{\mathbf{360}} \times \boldsymbol{\pi r^2}$ where r1=r2=r3=r=14cm =22×14=308cm2	1 1
25.	putting correct value $\frac{3+4\times\frac{1}{2}+3\times\frac{4}{3}+5\times 0}{2+2-3}$ calculation =9 OR (tanA−secAtanA – tanA – tan A secA)/(1- sec^{2}A) (2secA/tan A) = 2cosecA	1 1 1 1
26.	Let us consider √5 is rational. √5 = p/q. (where p and q are co-prime number and q ≠ 0) Squaring on both sides give, 5 = p²/q² 5q² = p² From this we can say that 5 divides p² so 5 will also divide p. So, 5 is one of the factor of p. So we can write,	1 1

	p = 5a Therefore, $5q^2 = (5a)^2$ $5q^2 = 25a^2$ $q^2 = 5a^2$ From this we can say that 5 divides q^2 so 5 will also divide q. So, 5 is one of the factor of q. As, we know p and q are co-prime so it cannot have common factor. But here a contradiction arise that 5 is factor of both p and q. So, by this we can say that √5 is not rational which means √5 is irrational.	1
27	Sum of zeroes = $\frac{-b}{a} = \frac{3(3+k)}{5}$ ATQ $\frac{3(3+k)}{5} = 0$ $9 + 3k = 0$ $k = -3$ Now $2x^2 - 2(k+11)x + 30 = 2x^2 - 2(-3+11)x + 30$ $= 2x^2 - 16x + 30$ $= x^2 - 8x + 15$ $= x^2 - 5x - 3x + 15$ $= (x - 3)(x - 5)$ Zeroes are 3, 5	1 1 1
28	Let The cost price of table be Rs x and The cost price of chair be Rs y. The selling price of the table, when sold at profit of 10% = $\frac{110x}{100}$ The selling price of the chair, when sold at profit of 25% = $\frac{125y}{100}$ According to question, $\frac{110x}{100} + \frac{125y}{100} = 1050$ $\frac{110y}{100} + \frac{125x}{100} = 1065$	1 1

	Solving the above equations we get i.e., $x+y=900$...(iii) and, $x-y=100$...(iv) Solving equation (iii) and (iv), we get $x=500, y=400$ Hence, the cost price of the table is Rs 500 and the cost price of the chair is Rs 400.	1
	OR	
	Let the number of rows be x and number of students in a row be y. Total students of the class= Number of rows × Number of students in a row $=x\times y=xy$	0.5
	Case 1 Total number of students $=(x-1)(y+3)$ $\Rightarrow xy=(x-1)(y+3)=xy-y+3x-3$ $\Rightarrow 3x-y-3=0$ $\Rightarrow 3x-y=3$..... (i)	0.5
	Case 2 Total number of students$=(x+2)(y-3)$ $\Rightarrow xy=xy+2y-3x-6$ $\Rightarrow 3x-2y=-6$..... (ii)	1
	Subtracting equation (ii) from (i), $\Rightarrow (3x-y)-(3x-2y)=3-(-6)$ $\Rightarrow -y+2y=3+6$ $\Rightarrow y=9$ By substituting value of y in (i), we get $\Rightarrow 3x-9=3$ $\Rightarrow 3x=9+3=12$ $\Rightarrow x=4$ Number of rows $=x=4$	
	Number of students in a row $=y=9$	0.5
	Number of total students in a class $=x\times y=4\times 9=36$	0.5

29	$= \frac{\sec\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1}$ $= \frac{\sec\theta + \tan\theta - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1} \quad \{\because \sec^2\theta - \tan^2\theta = 1\}$ $= \frac{(\sec\theta + \tan\theta)[1 - (\sec\theta - \tan\theta)]}{\tan\theta - \sec\theta + 1}$ $= \frac{(\sec\theta + \tan\theta)(1 - \sec\theta + \tan\theta)}{\tan\theta - \sec\theta + 1}$ $= \sec\theta + \tan\theta = \frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}$ $= \frac{1+sin\theta}{cos\theta}$ *proved*	1 1 1
30	Let ABCD be a quadrilateral circumscribing a circle with centre O. Now join AO, BO, CO, DO. From the figure, ∠DAO=∠BAO [Since, AB and AD are tangents] Let ∠DAO=∠BAO=1 Also ∠ABO=∠CBO [Since, BA and BC are tangents] Let ∠ABO=∠CBO=2 Similarly we take angles 3 and 4 the same way for vertices C and D Sum of the angles at the centre is 360^o Recall that sum of the angles in quadrilateral, ABCD = 360^o $=2(1+2+3+4)=360^o$ $=1+2+3+4=180^o$ In ΔAOB,∠BOA=180−(1+2) In ΔCOD,∠COD=180−(3+4) ∠BOA+∠COD=360−(1+2+3+4) $=360^o–180^o$ $=180^o$ Since AB and CD subtend supplementary angles at O. Thus, opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.  **OR** Consider the problem Let us join point O to C	1 1 1 0.5

	In $\Delta OPA and \Delta OCA$ OP=OC (Radii of the same circle) AP=AC (Tangent from point A) AO=AO (Common side) $\Delta OPA \cong \Delta OCA$ (SSS congruence criterion) Therefore, P↔C, A↔A, O↔O $\angle POA = \angle COA$.....(1) Similarly, $\angle QOB \cong \angle OCB$ $\angle QOB = \angle COB$.....(2) Since, POQ is a diameter of the circle, it is a straight line. Therefore, $\angle POA + \angle COA + \angle COB + \angle QOB = 180^\circ$ So, from equation (1) and equation (2) $2\angle COA + 2\angle COB = 180^\circ \angle COA + \angle COB = 90^\circ \angle AOB = 90^\circ$	1
31	Given, x + 2x + 3x = 24 6x = 24 x = 24/6= 4 Number of red balls = x= 4 Number of white balls = 2x = 2(4)= 8 Number of blue balls = 3x= 3(4)= 12 The probability of selecting a ball that is not red is given by 20/24 = 10/12 = 5/6 The probability of selecting a ball that is white is given by 8/24=1/3	1 1 1 .
32	Given, Total distance = 192 km Let the average speed of the faster train = x km/hr	

	So, average speed of the slower train = (x-16) km/hr Now, Time taken to cover 192 km by faster train (t1)= 192/x And, Time taken to cover 192 km by slower train (t2) = 192/(x-16) According to question, t2 - t1 = 2 192/(x-16) - 192/x=2 $x^2 - 16x - 1536 = 0$ x^2-48x+32x-1536=0 x(x-48)+32(x-48)=0 (x-48)(x+32)=0 x= 48 , -32 Speed can't be negative. So, x = 48 km/hr Therefore, speed of faster train = 48 km/hr And, speed of slower train = (48-16) = 32 km/hr **OR** Let the number of birds be x^2 Number of birds moving about lotus plant =x^2/4 Number of birds coupled along = x^2/9+x^2/4 Number of birds moves on hill =7x Number of birds remaining on trees = 56 Now, $x^2 + \frac{x^2}{4} + \frac{x^2}{9} + 7x + 56 = x^2$ $7x^2 - 136x - 1008 = 0$ => x^2 -18x -144 = 0 => x^2 - 24x +6x -144 = 0 => x(x-24) +6(x-24) = 0 => (x-24)(x+6) = 0 x = 24 or -6 so Number of birds = 24^2 = 576	1 1 1 1 1 1 1 1 1 1
33	Correct Given, to prove, construction Proof Using the theorem proving correctly	0.5x4 2 1

34	L= sq root[(2.1)^2 +(2.8) ^2] =2.5m Thus we got the slant height of the cone as 2.5m. The surface area of the canvas to be used = CSA of conical part + CSA of cylindrical part. We know that the curved surface area (CSA) of a cone is πrl Similarly, the CSA of a cylinder is 2πrH Thus, surface area of canvas = CSA of conical part + CSA of cylindrical part. = πrl+2πrH Let us substitute the values, r = 2.1m, l = 3.5m, H = 4m, SA of canvas =22/7[3.5×2.1+2×2.1×4] =22/7×2.1[3.5+8] =22/7[3.5×2.1+2×2.1×4] =22/7×2.1[3.5+8] =22/7×2.1×11.5 =75.9m2 =227×2.1×11.5=75.9m2 Total cost of canvas to be used for 75.9m2 = 75.9×10075.9×100 = Rs.75900 The association is willing to pay 50% of the cost. The amount that the association will have to pay for each tent = 50% of 7590 =50/100×7590 = Rs.3795. Thus for each tent the association will pay Rs.3795. So, the amount that the association will have to pay for 100 tents = Rs.3795 ×100 = Rs.379500.. OR Let ABC be the right angled triangle such that AB=15cm and AC=20cm Using Pythagoras theorem we have $\Rightarrow BC^2=AB^2+AC^2$ $\Rightarrow BC^2=15^2+20^2$ $\Rightarrow BC^2=225+400=625$ $\Rightarrow BC=25cm$ Let OB=x and OA=y Applying pythagoras theorem in triangles OAB and OAC we have	1 1 1 1 1 1 1

	$AB^2=OB^2+OA^2; AC^2=OA^2+OC^2$ $\Rightarrow 15^2=x^2+y^2; 202=y^2+(25-x)^2$ $\Rightarrow x2+y^2=225; (25-x)^2+y^2=400$ $\{(25-x)^2+y^2\}-\{x^2+y^2\}=400-225$ $\Rightarrow (25-x)^2-x^2=175\Rightarrow x=9$ Putting x=9 in x2+y2=225 we get $81+y^2=225\Rightarrow y^2=144\Rightarrow y=12$ Thus we have OA=12cm and OB=9cm Volume of the double cone = volume of cone CAA' + volume of cone BAA' $=31\pi\times(OA)^2\times OC+31\pi\times(OA)^2\times OB=31\pi\times122\times16+31\pi\times122\times9$ $=31\times3.14\times144\times253768 cm^3$ Surface area of the double cone = curved surface area of cone CAA′ + curved surface area of cone BAA′ $=\pi\times OA\times AC+\pi\times OA\times AB$ $=(\pi\times12\times20+\pi\times12\times15)\ cm^2$ $=420\pi\ cm^2=420\times\pi=420\times3.14$ $=1318.8 cm^2$	1 1 1
35	Now, we have $N=60$ $45+f_1+f_2=60$ $f_2=15-f_1$ .....(1) Also, $\frac{N}{2}=30$ Since the median = 28.5 so the median class is 20−30. Here, $l=20, f=20, F=5+f_1$ and $h=10$ We know that $\text{Median}=l+\left\{\frac{\frac{N}{2}-F}{f}\right\}\times h$ $28.5=20+\left\{\frac{30-(5+f_1)}{20}\right\}\times10$ $8.5=\frac{(25-f_1)\times10}{20}$	1 1 1

	$8.5\times 20=250-10f_1$ $10f_1=250-170$ $=80$ $f_1=8$ Putting the value of f_1 in (1), we get $f_2=15-8$ $=7$ Hence, the missing frequencies are 7 and 8.	1 1
36	i. $\sqrt{13}$ units ii. Water tank and house 3 iii. Ans (4,6) Or 1:2	1 1 2 1
37	i. 18200-11600=6600 Or 5000+7200+9400=21600 ii. Rs 5000 iii. 12	2 2 1 1
38	i. Correct diagram ii. $240\sqrt{3}$ m iii. 45° Or 346.4 m	1 1 2 2

SAMPLE PAPER-3

CLASS- X

SUB : MATHEMATICS

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

General Instructions :

1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required.

SECTION-A

(Section-A consists of 20 questions of one mark each. Each question has four options out of which one is correct. Write the correct option)

1. If $a = 2^3 \times 3, b = 2 \times 3 \times 5, c = 3^n \times 5$ and LCM $(a, b, c) = 2^3 \times 3^2 \times 5$, then $n =$

   (a) 1 (b) 2 (c) 3 (d) 4
2. The linear factors of the quadratic equation $x^2+kx+1=0$ are

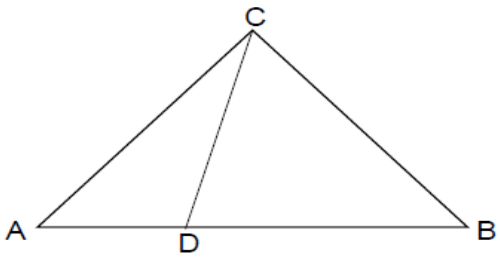
   (a) $k \geq 2$ (b) $k \leq 2$ (c) $k \geq -2$ (d) $k \geq 2$ and $k \leq -2$
3. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is –3, then the value of k is

   (a) $\frac{4}{3}$ (b) $-\frac{4}{3}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$
4. If a pair of linear equations is consistent, then the lines will be

   (a) parallel (b) always coincident

   (c) intersecting or coincident (d) always intersecting
5. The fourth vertex D of a parallelogram ABCD whose three vertices are A (–2, 3), B (6, 7) and C (8, 3) is

   (a) (0, 1) (b) (0, –1) (c)(–1, 0) (d)(1, 0)
6. In the figure, if ∠ACB = ∠CDA, AC = 6 cm and AD = 3 cm, then the length of side AB is



(a) 9cm (b) 18 cm (c) 10cm (d) 12 cm

7. sin 2A = 2 sin A is true when value A is

(a) 0° (b) 30° (c) 45° (d) 60°

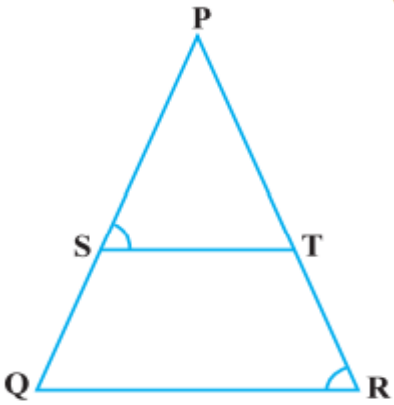
8. If $\sin A + \sin^2 A = 1$, then the value of the expression $(\cos^2 A + \cos^4 A)$ is

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

9. A vertical pole of length 6m casts a shadow of length 4m on the ground. The height of tower which casts a shadow of length 28m at the same time is

(a) 24m (b)42m (c)28m (d)None of these

10. In the following figure, if $\frac{PS}{SQ} = \frac{PT}{TR}$ and $\angle PST = \angle PRQ$, then triangle PQR is



(a) Equilateral (b)Isosceles (c)Scalene (d)Right angled

11. 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. Length PQ is:

(a) 12 cm (b) 13 cm (c) 8.5 cm (d) $\sqrt{119}$ cm

12. The largest triangle inscribed in a semi-circle of radius r, then the area of that triangle is

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

13. The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$cm and the length of its diagonal is $2\sqrt{3}$cm. The total surface area of the cuboid is

(a) 48 cm^2 (b) 72 cm^2 (c) 96 cm^2 (d) 108 cm^2

14. While computing mean of grouped data, we assume that the frequencies are

(a) evenly distributed over all the classes
(b) centred at the class marks of the classes
(c) centred at the upper limits of the classes
(d) centred at the lower limits of the classes

15. It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters 16 m and 12 m in a locality. The radius of the new park would be

(a) 10 m (b) 15 m (c) 20 m (d) 24 m

16. The weight of 35 students of a class are recorded as follows:

Weight(in kg)	Number of students
38-40	3
40-42	5
42-44	7
44-46	15
46-48	13
48-50	3
50-52	4

Class mark of the class preceding the median class is

(a) 41 b)45 c)43 d) none of these

17. A die is thrown twice. The probability that 5 will not come up either time is

(a) $\frac{11}{36}$ (b) $\frac{25}{36}$ (c)1 (d)0

18. The value of $\sin^6\theta + \cos^6\theta + 3\sin^2\theta \cos^2\theta$ is

(a) 3 (b) 2 (c) 1 (d) 0

DIRECTION: 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. **Statement A (Assertion):** HCF of two number is 27 and their LCM is 162. If one of the numbers is 54, then the other number is 81.

Statement R(Reason): HCF is always a factor of LCM

(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 and 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. **Statement A (Assertion): A(1,6),B(7,8),C(3,5) are not collinear .**

Statement R(Reason): If AB+BC=AC then the points are collinear

(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 and reason (R) is not the correct explanation of assertion (A)

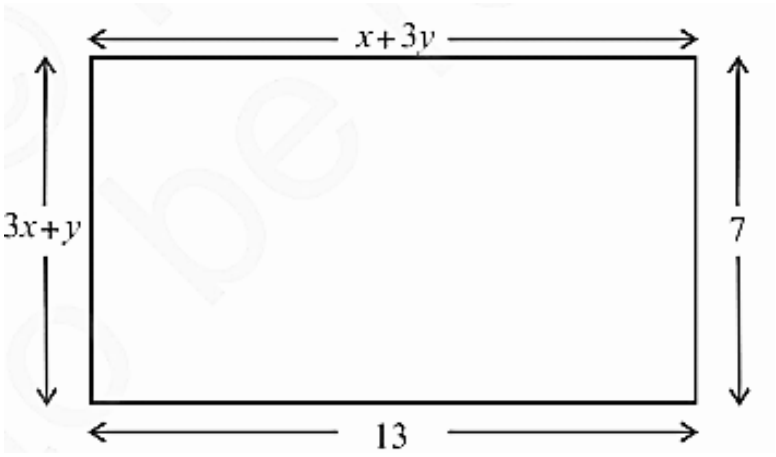
(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

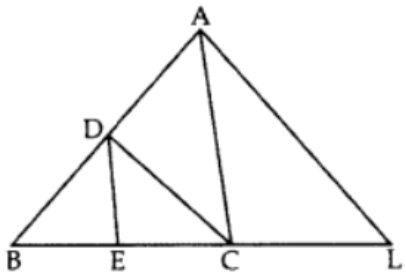
SECTION-B

Section B consists of 5 questions of 2 marks each.

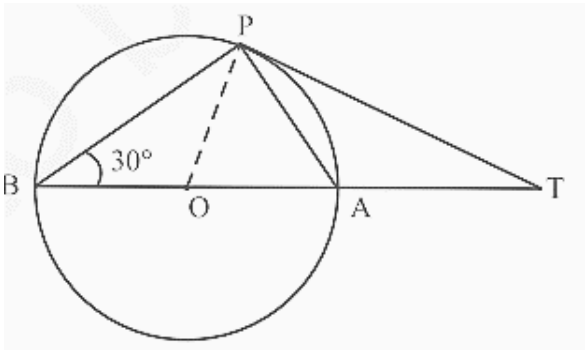
21. The following figure shows the sides of a rectangular garden in metre. Find the values of x and y in the following rectangle.



22. In the given figure, CD || LA and DE || AC. Find the length of CL if BE = 4 cm and EC = 2 cm.



23. In the following figure, BOA is a diameter of a circle and the tangent at a point P meets BA extended at T. If ∠PBO = 30°, then find the measure of ∠PTA.



24. Difference between the circumference and radius of a circle is 37 cm. Find the area of circle.

Or

Four cows are attached to four corners of a quadrilateral shaped field with ropes of 7m length each. Find the area grazed by the cows.

25. In a right angled triangle ABC, right angled at B, if tan A=1, then verify that 2sin A cos A=1.

Or

Evaluate: $\frac{\sin 30^0 + \tan 45^0 - cosec\ 60^0}{sec\ 30^0 + \cos 60^0 + cot\ 45^0}$

SECTION-C

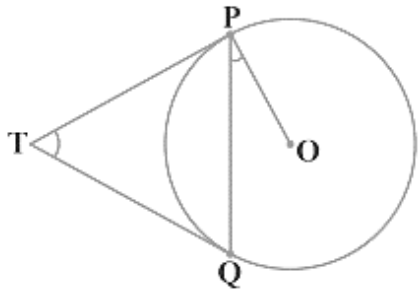
Section C consists of 6 questions of 3 marks each.

26. Given that $\sqrt{5}$is irrational, prove that $3+2\sqrt{5}$ is an irrational number.
27. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, find the value of p and q.
28. The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?

Or

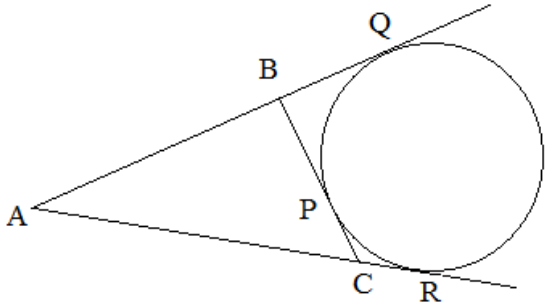
The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.

29. If $a \sin\theta + b \cos\theta = c$, then show that $a \cos\theta - b \sin\theta = \sqrt{a^2 + b^2 - c^2}$
30. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\ \angle OPQ$.



Or

If a circle touches the side BC of a triangle ABC at P and extended sides AB and AC at Q and R, respectively, show that AQ = $\frac{1}{2}$(BC + CA + AB).



31. Two dice are thrown simultaneously. Find the probability that the sum of the numbers appearing on the dice is

(i) 7? (ii) a prime number? (iii) 1?

SECTION-D

Section D consists of 4 questions of 5 marks each.

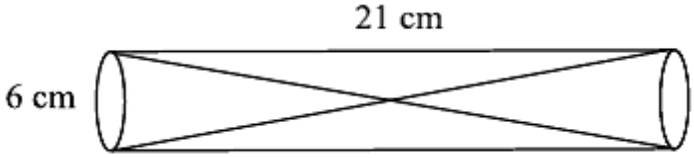
32. While boarding an aeroplane, a passenger got hurt. The pilot, showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late by 30 minutes. To reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hour. Find the original speed/hour of the plane.

Or

A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find the length and breadth of the rectangular park.

33. Through the mid-point 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.

34. Two solid cones A and B are placed in a cylindrical tube as shown in the figure. The ratios of their capacities are 2:1. Find the heights and capacities of cones. Also, find the volume of the remaining portion of the cylinder.



Or

A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 2 cm and the diameter of the base is 4 cm. Determine the volume of the toy. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. (Take $\pi = 3.14$)

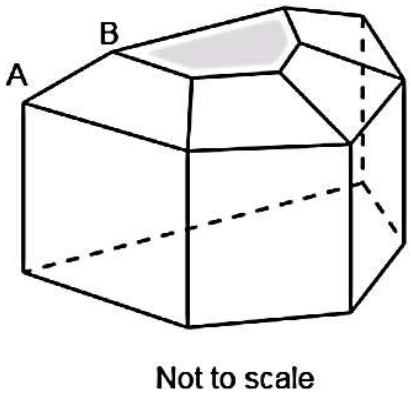
35. If the Median of the distribution given below is 28.5, find the values of x and y.

Class-interval	Frequency
0 – 10	5
10 – 20	x
20 – 30	20
30 – 40	15
40 – 50	y
50 – 60	5
Total	60

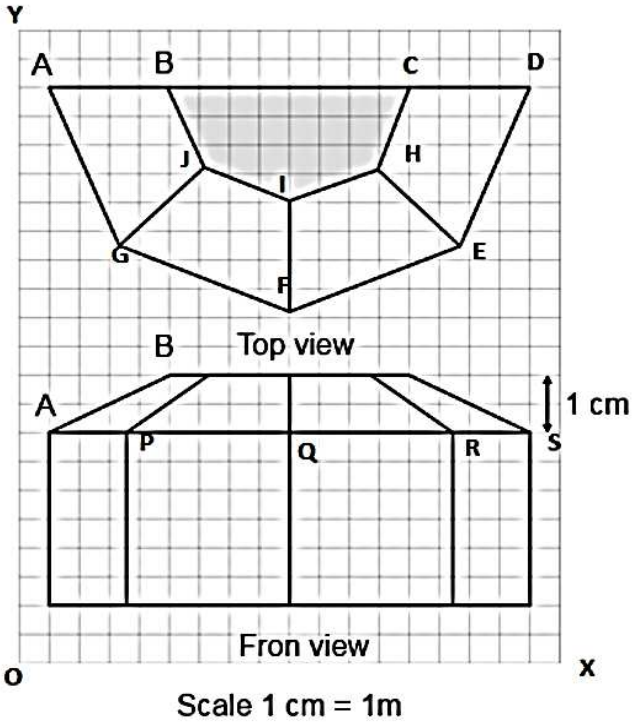
SECTION-E

Case study based questions are compulsory.

36. The diagrams show the plans for a sun room. It will be built onto the wall of a house. The four walls of the sunroom are square clear glass panels. The roof is made using
    - Four clear glass panels, trapezium in shape, all the same size
    - One tinted glass panel, half a regular octagon in shape.



Not to scale



Scale 1 cm = 1m

(i) Find the mid-point of the segment joining the points J(6, 17) and I(9, 16).

(ii) Find the distance of the point P(4,8) from the y-axis.

(iii) Find the co-ordinates of the point which divides the line segment joining the points A and B in the ratio 1:3 internally.

Or

If a point (x,y) is equidistant from the Q(9,8) and S(17,8),then find the relation between x and y.

37. Amit was playing a number card game. In the game, some number cards (having both +ve or -ve numbers) are arranged in a row such that they are following an arithmetic progression. On his first turn, Amit picks up 6^{th} and 14^{th}card and finds their sum to be -76. On the second turn he picks up 8^{th} and 16^{th}card and finds their sum to be -96.

Based on the above information, answer the following questions.

(i)What is the difference between the numbers on any two consecutive cards?

(ii) Find the number on first card.

(iii)Find the sum of the numbers on the 19^{th} card and 23^{rd} card?

Or

Find the sum of numbers on the first 15 cards.

38. Trigonometry in the form of triangulation forms the basis of navigation, whether it is by land, sea or air. GPS a radio navigation system helps to locate our position on earth with the help of satellites.

A guard, stationed at the top of a 240m tower, observed an unidentified boat coming towards it. A clinometer or inclinometer is an instrument used for measuring angles or slopes(tilt). The guard used the clinometer to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30°. (Lighthouse of Mumbai Harbour. Picture credits - Times of India Travel)

(i) Make a labelled figure on the basis of the given information

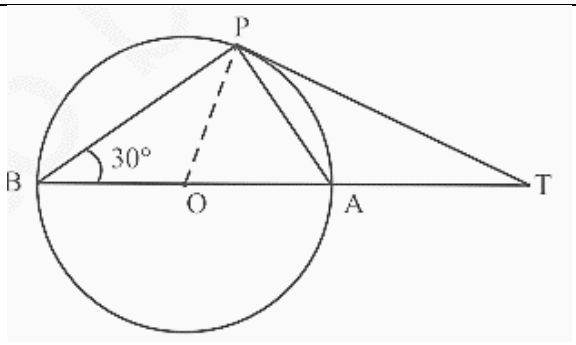
(ii) Calculate the distance of the boat from the foot of the observation tower.

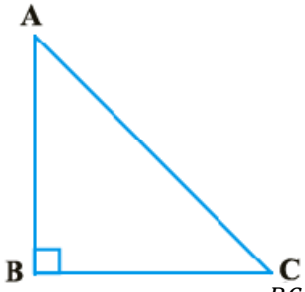
(iii) Again the guard observed another boat approaching the tower from the opposite direction and its distance from the tower was $80\sqrt{3}$m. find the angle of depression of this boat also find the distance between the two boats.

Or

After 10 minutes, the guard observed that the boat was approaching the tower and its distance from tower is reduced by $240(\sqrt{3} - 1)$ m. He immediately raised the alarm. What was the new angle of depression of the boat from the top of the observation tower?

SAMPLE PAPER-3 CLASS- X, SUB : MATHEMATICS MARKING SCHEME of SQP		
QSTN NO.	**VALUE POINTS**	**MARKS ALLOTTED**
1.	(b) 2	1
2.	(d) $k \geq 2$ and $k \leq -2$	1
3.	(a)$\frac{4}{3}$	1
4.	(c) intersecting or coincident	1
5.	(b)(0, –1)	1
6.	(d) 12cm	1
7.	(a)0°	1
8.	(a)1	1
9.	(b)42m	1
10.	(b) Isosceles	1
11.	(d) $\sqrt{119}$ cm	1
12.	(a) r^2	1
13.	(c) 96 cm^2	1
14.	(b) centred at the classmarks of the classes	1
15.	(a) 10 m	1
16.	(c)43	1
17.	(b)$\frac{25}{36}$	1
18.	(c)1	1
19.	(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)	1

20.	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	1
21.	x+3y=13 3x+y=7 Solving the above equations to get x= 1, y=4	 1 1
22.	In ΔABL, CD || LA $\frac{BD}{DA} = \frac{BC}{CL}$ ...(*i*) **[Thales' theorem** In ΔABC, DE || AC $\frac{BD}{DA} = \frac{BE}{EC}$ ...(*ii*) **[Thales' theorem** From (*i*) and (*ii*), we get $\frac{BC}{CL} = \frac{BE}{EC} \Rightarrow \frac{BE + EC}{CL} = \frac{BE}{EC}$ $\Rightarrow \frac{4+2}{CL} = \frac{4}{2}$ **...[BE = 4 cm, EC = 2 cm (Given)** $\Rightarrow$ 2CL = 6 $\therefore$ **CL = 3 cm**	 1 1
23.	 ∠BPA = 90°(angle in a semicircle) ∠PAB = ∠OPA = 60°. Also, OP⊥PT. Therefore, ∠APT = 30° and ∠PTA = 60° – 30° = 30°.	 1 1
24.	Given 2πr −r =37 Or, r(2π − 1) = 37 $r = \frac{37}{2\pi-1} = \frac{37}{2\times\frac{22}{7}-1} = \frac{37\times7}{37} = 7$ So, area of the circle=$\frac{22}{7} \times 7 \times 7 = 154\ cm^2$ Or	 1 1

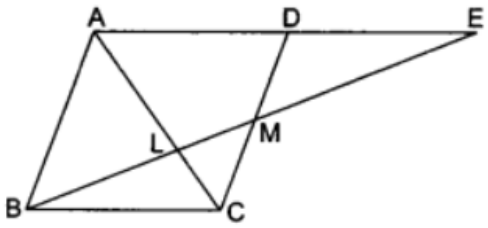
	Radius = 7m Sum of interior angles of a quadrilateral = 360° Required area= $\frac{360^0}{360^0}\times\frac{22}{7}\times7\times7=154m^2$	 1 1
25.	 In Δ ABC, tan A =$\frac{BC}{AB}$=1 i.e,BC=AB Let AB = BC = *k*, where *k* is a positive number. $AC^2 = AB^2+ BC^2=2k^2$ $AC=\sqrt{k^2+k^2} = k\sqrt{2}$ Therefore, sin A=$\frac{BC}{AC}=\frac{1}{\sqrt{2}}$ and cos A=$\frac{1}{\sqrt{2}}$ Hence, 2 sin A cos A=$2\times\frac{1}{\sqrt{2}}\times\frac{1}{\sqrt{2}}=1$ **Or** $\frac{\sin 30^0 + \tan 45^0 - cosec\ 60^0}{sec\ 30^0 + \cos 60^0 + cot\ 45^0}$ $=\frac{\left(\frac{1}{2}+1-\frac{2}{\sqrt{3}}\right)}{\left(\frac{2}{\sqrt{3}}+\frac{1}{2}+1\right)}$ $=\frac{\left(\frac{3}{2}-\frac{2}{\sqrt{3}}\right)}{\left(\frac{3}{2}+\frac{2}{\sqrt{3}}\right)}$ $=\frac{(3\sqrt{3}-4)^2}{(3\sqrt{3}+4)^2}$ $=\frac{43-24\sqrt{3}}{11}$	0.5 0.5 0.5 0.5 1 1
26.	Let us assume, to the contrary, that $3+2\sqrt{5}$ is rational. That is, we can find coprime *a* and *b* ($b\neq0$) such that $3+2\sqrt{5}=\frac{a}{b}$ Therefore, $2\sqrt{5}=\frac{a}{b}-3\ \Rightarrow\sqrt{5}=\frac{a-3b}{2b}$ Since *a* and *b* are integers, we get $\frac{a-3b}{2b}$is rational, and so $\sqrt{5}$ is	 1 1

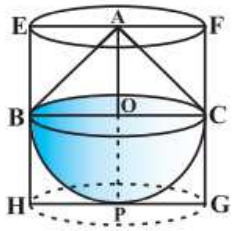
	rational. But this contradicts the fact that $\sqrt{5}$ is irrational. This contradiction has arisen because of our incorrect assumption that $3+2\sqrt{5}$ is rational. So, we conclude that $3+2\sqrt{5}$ is irrational.	1
27.	We have, $2x^2 - 5x - 3 = 0$ $= 2x^2 - 6x + x - 3$ $= 2x(x - 3) + 1(x - 3)$ $= (x - 3)(2x + 1)$ Zeroes are: $x - 3 = 0$ or $2x + 1 = 0$ $\Rightarrow x = 3$ or $x = -1/2$ Since the zeroes of required polynomial is double of given polynomial. Zeroes of the required polynomial are: 3×2, $(-1/2 \times 2)$, i.e., 6, -1 Sum of zeroes= 6 + (-1) = 5 Product of zeroes = $6 \times (-1) = -6$ Quadratic polynomial is : x^2 – (sum of zeros) x + Product of zeros $= x^2 - 5x - 6$ …(i) Comparing (i) with $x^2 + px + q$ p = -5, q = -6	1 0.5 1 0.5
28.	Let the ten's and the unit's digits in the first number be x and y, respectively. So, Original Number= 10 x + y Reversed number=10y + x ATQ, (10x + y) + (10y + x) = 66 i.e., 11(x + y) = 66 i.e., x + y = 6 ----------(1) We are also given that the digits differ by 2, therefore, either x – y = 2---------- (2) or y – x = 2---------- (3) If x – y = 2, then solving (1) and (2) by elimination, we get x =	1 0.5

	4 and y = 2. In this case, we get the number 42. If y – x = 2, then solving (1) and (3) by elimination, we get x = 2 and y = 4. In this case, we get the number 24. Thus, there are two such numbers 42 and 24 **Or** Let the number of rows be x and number of students in a row be y. Total number of students in the class = Number of rows x Number of students in a row = xy According to the question, Total number of students = (x – 1) (y + 3) $\Rightarrow$ xy = (x – 1) (y + 3) $\Rightarrow$ xy = xy – y + 3x – 3 $\Rightarrow$ 3x – y – 3 = 0 $\Rightarrow$ 3x – y = 3…… (1) Total number of students = (x + 2) (y – 3) $\Rightarrow$ xy = xy + 2y – 3x – 6 $\Rightarrow$ 3x – 2y = –6……. (2) Subtracting equation (2) from (1), we obtain: y = 9 Substituting the value of y in equation (1), we obtain: 3x – 9 = 3 $\Rightarrow$ 3x = 9 + 3 = 12 $\Rightarrow$ x = 4 Number of rows = x = 4 Number of students in a row = y = 9 Hence, Total number of students in a class = xy = 4×9=36	1 0.5 **Or** 1.5 1,5
29.	Given that, $a \sin\theta + b\cos\theta = c$ $(a \sin\theta + b \cos\theta)^2 = c^2$ (squaring both side) $a^2\sin^2\theta + b^2\cos^2\theta + 2ab\sin\theta.\cos\theta = c^2$ $a^2(1-\cos^2\theta) + b^2(1-\sin^2\theta) + 2ab\sin\theta.\cos\theta = c^2$ $a^2 - a^2\cos^2\theta + b^2 - b^2\sin^2\theta + 2ab\sin\theta.\cos\theta = c^2$ $a^2 + b^2 - c^2 = a^2\cos^2\theta + b^2\sin^2\theta - 2ab\sin\theta.\cos\theta$	1 1

	$a^2 + b^2 - c^2 = (a \cos\theta - b \sin\theta)^2$ $a \cos\theta - b \sin\theta = \sqrt{a^2 + b^2 - c^2}$	1
30.	Let ∠ PTQ = θ TP = TQ (tangents from an external point). So, TPQ is an isosceles triangle. Therefore, ∠ TPQ = ∠ TQP = $\frac{1}{2}(180° - \theta) = 90° - \frac{\theta}{2}$ Also, ∠ OPT = 90° So, ∠ OPQ = ∠ OPT – ∠ TPQ = $90° - (90° - \frac{\theta}{2}) = \frac{\theta}{2}$ ∠ PTQ ⇒ ∠ PTQ = 2 ∠ OPQ **OR** BQ = BP CP = CR, and AQ = AR (tangents drawn from an external point to a circle are equal in length) Now, 2AQ = AQ + AR = (AB + BQ) + (AC + CR) = AB + BP + AC + CP = (BP + CP) + AC + AB = BC + CA + AB i.e., AQ = $\frac{1}{2}$(BC + CA + AB).	1.5 1.5 **OR** 1 1 1
31.	Two dice are thrown simultaneously. [given] So, total number of possible outcomes = 36 (i)possible outcomes are (1,6),(2,5),(3,4),(4,3),(5, 2),(6,1) P(sum of numbers appearing on the dice is 7)= $\frac{6}{36} = \frac{1}{6}$ (ii)getting number of possible outcomes=15 P(sum of numbers appearing on the dice is prime number)= $\frac{15}{36} = \frac{5}{12}$ (iii) number of possible outcome=0 P(sum of numbers appearing on the dice is 1)= 0	0.5 1 1 0.5
32.	Let the original speed of the aeroplane = x km/hr The increased speed of the aeroplane = (x + 100) km/hr Given: Distance = 1500 km According to the Question,	0.5

	$\frac{1,500}{x} - \frac{1,500}{x+100} = \frac{30}{60}$	
	...[$\because$ Time = $\frac{\text{Distance}}{\text{Speed}}$, 30 min. = $\frac{30}{60} = \frac{1}{2}$ hr	1
	$\frac{1,500(x+100-x)}{x(x+100)} = \frac{1}{2}$	1
	$\Rightarrow x(x + 100) = 300000$	
	$\Rightarrow x^2 + 100x - 300000 = 0$	
	$\Rightarrow x^2 + 600x - 500x - 300000 = 0$	
	$\Rightarrow x(x + 600) - 500(x + 600) = 0$	1
	$\Rightarrow (x - 500)(x + 600) = 0$	
	$\Rightarrow x - 500 = 0$ or $x + 600 = 0$	0.5
	$\Rightarrow x = 500$ or $x = -600$ (rejected)	0.5
	Since speed cannot be negative.	0.5
	$\therefore$ Original speed of the aeroplane = 500 km/hr	
	Original time = Distance / Speed =1,500/500 = 3 hrs.	**Or**
	Or	0.5
	Let length of the rectangular park = x m,	
	breadth of the rectangular park = (x -3)m	
	$\therefore$ Area of the rectangular park = $x(x - 3)m^2$… (i)	
	Base of an isosceles triangle = (x – 3)m	
	Altitude of an isosceles triangle = 12 m	
	$\therefore$ Area of isosceles triangle	
	= 1/2 × base × altitude	
	= 1/2 × (x – 3) × 12	
	= 6(x – 3) …(ii)	
	According to the question,	
	Ar.(rectangle) – Ar.(isosceles Δ) = 4 m^2	1
	$\Rightarrow x(x - 3) - 6(x - 3) = 4$ … [From (i) & (ii)	
	$\Rightarrow x^2 - 3x - 6x + 18 - 4 = 0$	1
	$\Rightarrow x^2 - 9x + 14 = 0$	
	$\Rightarrow x^2 - 7x - 2x + 14 = 0$	
	$\Rightarrow x(x - 7) - 2(x - 7) = 0$	1
	$\Rightarrow (x - 2)(x - 7) = 0$	
	$\Rightarrow x - 2 = 0$ or $x - 7 = 0$	0.5
	$\Rightarrow x = 2$ or $x = 7$	
	When x = 2, breadth of rectangle becomes -ve, so this is not possible.	0.5
	$\therefore$ Length of the rectangular park, x = 7 m	0.5
	and Breadth = (x – 3) = 4 m.	

33.	 Given, to prove, figure Proof: In ΔBMC and ΔEMD, we have MC = MD [∵ M is the mid-point of CD] ∠CMB = ∠DME [Vertically opposite angles] and ∠MBC = ∠MED [Alternate angles] So, by AAS criterion of congruence, we have ΔBMC ≅ ΔEMD ⇒ BC = DE [CPCT] Also, BC = AD [∵ ABCD is a parallelogram] Now, in ΔAEL and ΔCBL, we have ∠ALE = ∠CLB [Vertically opposite angles] ∠EAL = ∠BCL [Alternate angles] So, by AA criterion of similarity of triangles, we have ΔAEL ~ ΔCBL $\Rightarrow \frac{EL}{BL} = \frac{AE}{CB}$ $\Rightarrow \frac{EL}{BL} = \frac{2BC}{BC}$ $\Rightarrow \frac{EL}{BL} = 2$ $\Rightarrow EL = 2BL$	1.5 1 1 1.5
34.	Height of cylinder=H=21 cm Radius of cones= radius of cylinder=6/2=3cm Let h_1 be the height of 1st cone and h_2 be the height of 2nd cone. ATQ, $\frac{volume of\ 1st\ cone}{volume\ of\ 2nd\ come} = \frac{2}{1}$	0.5

	$\Rightarrow \frac{\frac{1}{3}\pi r^2 h_1}{\frac{1}{3}\pi r^2 h_2} = \frac{2}{1} \Rightarrow \frac{h_1}{h_2} = \frac{2}{1} \Rightarrow h_1 = 2h_2$	2
	But, $h_1 + h_2 = 21 \Rightarrow h_2 = 7cm, h_1 = 14cm$ Volume of cylinder= $\pi r^2 H$=594 cm^3 Volume of 1st cone=$\frac{1}{3}\pi r^2 h_1$ =132 cm^3 Volume of 2nd cone=$\frac{1}{3}\pi r^2 h_2$ =66 cm^3	1.5
	Volume of remaining portion of the tube = volume of cylinder – (sum of volumeof the cones) =594 – (132+66) =594 –198= 396 cm^3	1
	Or  Let BPC be the hemisphere and ABC be the cone standing on the base of the hemisphere . The radius BO of the hemisphere (as well as of the cone) = 1/2 × 4 cm = 2 cm.	1 1
	So, volume of the toy = $\frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$ $= \left[\frac{2}{3} \times 3.14 \times (2)^3 + \frac{1}{3} \times 3.14 \times (2)^2 \times 2\right] cm^3 = 25.12\ cm^3$ Now, let the right circular cylinder EFGH circumscribe the given solid. The radius of the base of the right circular cylinder = HP = BO = 2 cm, and its height is EH = AO + OP = (2 + 2) cm = 4 cm So, the volume required = volume of the right circular cylinder – volume of the toy = (3.14 × 22 × 4 – 25.12) cm^3 = 25.12 cm^3 Hence, the required difference of the two volumes = 25.12 cm^3 .	1 1 1

35.		

Class interval	Frequency	Cumulative frequency
0 – 10	5	5
10 – 20	x	$5 + x$(c)
20 – 30	20(f)	$25 + x$
30 – 40	15	$40 + x$
40 – 50	y	$40 + x + y$
50 – 60	5	$45 + x + y$
Total	$n = 60$	

We have $45 + x + y = 60$ ...(i) [Given] — 1

$\because n = 60 \quad \therefore \frac{n}{2} = \frac{60}{2} = 30$

Since the median lies in the class interval (20 – 30), so the median class is (20 – 30). — 1

Hence, $l = 20, f = 20, cf = 5 + x$ and $h = 10$.

$$\text{Median} = l + \left(\frac{\frac{n}{2} - c_f}{f}\right) \times h$$ — 0.5

Substitute the values

$28.5=20+\left(\frac{30-5-x}{20}\right) \times 10$

$\Rightarrow 8.5 = \left(\frac{25-x}{2}\right)$

$\Rightarrow 17 = 25\text{-}x$

$\Rightarrow x = 8$ — 1.5

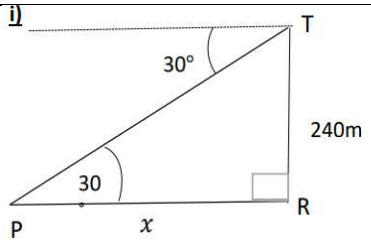
Now, substitute the value of x in (i), we get:

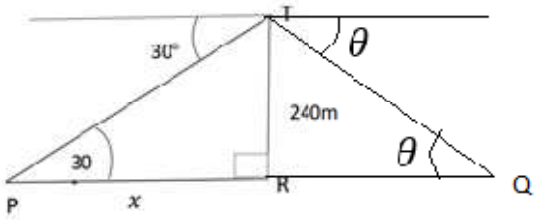
$45+8+y=60$

$\Rightarrow y = 7$

Therefore, the value of x = 8 and y = 7. — 1

36.	(i) Finding mid-point (15/2,33/2)	1
	(ii) Finding distance=4 units	1
	(iii) Finding the co-ordinates of the point which divides the line segment joining the points A and B in the ratio 1:3	2

	internally = (2.0,8.5) with proper step. Or Finding the relation x-13=0 with proper steps	2
37.	(i) (a+5d)+(a+13d)= -76 i.e 2a+18d= -76-------(1) similarly, 2a+ 22d= -96--------(2) solving(1) and (2) we get, The difference between the numbers on any two consecutive cards = common difference of the A.P. =d= -5 (ii) Putting d=-5 in equation (1), we get Firsy term a=7 i.e. Number on first card = a = 7 (iii) Number on 19th card = a + 18d = 7 + 18(-5) = -83 Number on 23rd card = a + 22d = 7 + 22(-5) = -103 Sum= -83 + -103 = -186 Or Sum of the numbers on first 15 cards= $S_{15} = \frac{15}{2}[2(7) + 14(-5)] = -420$	
38.	i)  ii) In ΔPTR, $\tan 30^o = \frac{240}{x} \Rightarrow x = 240\sqrt{3}\, m$ (iii)	1 1

	 Let Q be the position of the 2nd boat. RQ=80√3m In $\Delta QTR, \tan\theta = \frac{240}{80\sqrt{3}} = \sqrt{3}$, hence, $\theta = 60^0$ Distance between the boats= 240m+ $80\sqrt{3}$ =$80(3+\sqrt{3})$m Or Distance of boat from tower= $240\sqrt{3} - 240(\sqrt{3}-1) = 240m$ Let the angle of depression = θ $tan\theta = \frac{240}{240} = 1 \Rightarrow \theta = 45^o$	1.5 0.5 1 1

SAMPLE PAPER-4

Class-X, Subject-Mathematics (Standard)

TimeAllowed:3 Hrs. **Maximum Marks:80**

General Instructions:

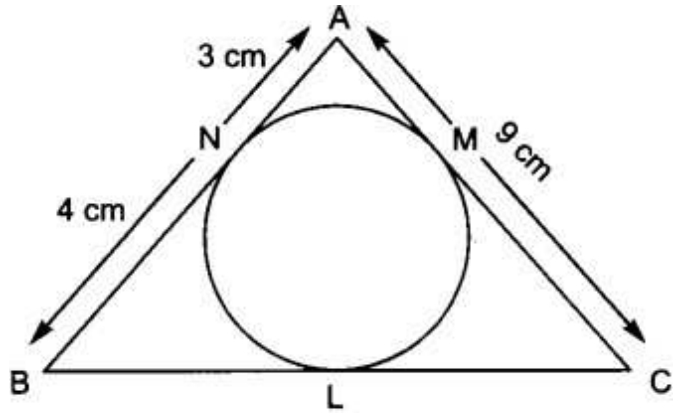
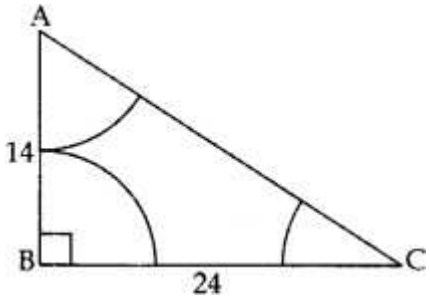
1. This question paper has 5 sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 questions carrying 5 marks each.
6. Section E has 3 cased based integrated units of assignment (04 marks each) with sub-parts of values of 1,1and 2 marks each respectively.
7. All questions are compulsory. However, an internal choice in 2 Qs of 5marks,2 Qs of 3 marks and 2 questions of 2marks has been provided. Aninternal choice has been provided in 2 marks questions of section E.

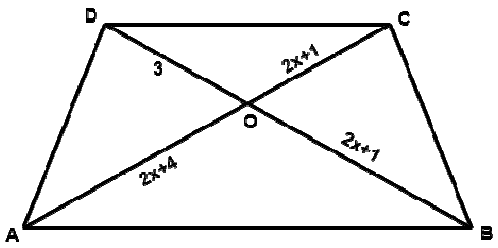
	SECTION A	
	Section A consists of 20 questions of 1 marks each	
S.NO		MARKS
1	If the sum of LCM and HCF of two numbers is 1260 and their LCM is 900 more than their HCF,then the product of the two numbers is: (a)203400 (b) 194400 (c)198400 (d)205400	1
2	If α,β are the zeroes of the polynomial $P(x)=x^2- p(x+1)- c$, such that $(\alpha +1)(\beta+1)=0$,then c is equal to: (a) 1 (b) 0 (c) -1 (d) 2	1
3	For what value of k,will the following system of equations has infinitely many solutions? $2x+3y=4,\ (k+2)x+6y=3k+2$ (a) 2 (b) -2 (c) 4 (d) – 4	1
4	If the sum of n terms of an A.P. is $3n^2+5n$, then which of its term is 164? (a)26^{th} (b) 27^{th} (c)28^{th} (d)29^{th}	1

5	The point which divides the line segment joining the points (7,-6) and (3,4) in the ratio 1:2 internally lies in the : (a) I quadrant (b) II quadrant (c) III quadrant (d) IV quadrant	1
6	.Δ ABC~Δ PQR. If AM and PN are the medians of Δ ABC and Δ PQR respectively, such that AM:PN=3:4, then $AB^2:PQ^2$= ? (a) 3:4 (b) 4:5 (c) 9:16 (d) 16:25	1
7	If $\sin A+\sin^2 A=1$, then the value of $(\cos^2 A+\cos^4 A)$ is equal to: (a) 4 (b) 3 (c) 2 (d)1	1
8	A pole 6m high casts a shadow $2\sqrt{3}$m long on the ground, then the Sun's elevation is: (a) 90° (b) 60° (c) 45° (d) 30°	1
9	.In Δ PQR ,X and Y are the points on PQ and PR such that XY is parallel to QR and $\frac{PX}{XQ}=\frac{PY}{YR}=\frac{1}{2}$,then which of the following is true? (a) XY=QR (b) XY=$\frac{1}{3}$ QR (c)XY=2QR (d)XY=$\frac{1}{2}$QR	1
10	The least number that is divisible by all the numbers from 1 to 10 is (a) 10 (b) 100 (c) 504 (d) 2520	1
11	From a point P which is at a distance of 13cm from the centre O of a circle of radius 5cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the PQOR is: (a) $60cm^2$ (b) $65cm^2$ (c) $30cm^2$ (d) $32.5cm^2$	1
12	Area enclosed between two concentric circles is $770cm^2$.If the radius of the outer circle is 21cm, then the radius of the inner circle is: (a) 12cm (b) 13cm (c) 14cm (d) 15cm	1
13	A solid is hemispherical at the bottom and conical above. If the surface areas of two parts are equal, then the ratio of its radius and height of its conical part is: (a) 1:3 (b) 1:$\sqrt{3}$ (c) 1:1 (d) $\sqrt{3}$:1	1

<table>
<tr><td>14</td><td>For the following distribution:
<table>
<tr><td>Class interval</td><td>0-5</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td></tr>
<tr><td>Frequency</td><td>10</td><td>15</td><td>12</td><td>20</td><td>9</td></tr>
</table>
What is the upper limit of the median class.

(a) 10 (b) 15 (c) 20 (d) 25</td><td>1</td></tr>
<tr><td>15</td><td>A bicycle wheel makes 5000 revolutions in moving 11km.The diameter of the wheel is:
(a) 60cm (b)68cm (c) 70cm (d) 72cm</td><td>1</td></tr>
<tr><td>16</td><td>For a grouped frequency distribution mean is 60.If the number of Observations in each class interval be doubled, the new mean will be:
(a) 30 (b) 45 (c) 60 (d) 120</td><td>1</td></tr>
<tr><td>17</td><td>The pair of tangents AP and AQ are drawn from an external point to a circle with centre O are perpendicular to each other and length of each tangent is 5 cm. then the radius of circle is
(a) 10cm (b)7.5cm (c) 5cm (d) 2.5cm</td><td>1</td></tr>
<tr><td>18</td><td>If $x=a\cos\theta$ and $y=b\sin\theta$, then $(b^2x^2+a^2y^2)$ is equal to:
(a) a^2+b^2 (b)a^2b^2 (c)ab (d) a^4b^4</td><td>1</td></tr>
<tr><td>19</td><td>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(A): The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.
Reason(R): If a and b are two positive integers, then H.C.F. × L.C.M. = a
× b.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is thecorrect explanation of Assertion (A) .
(b) Both Assertion (A) and Reason (R) are true but Reason (R) is not thecorrect
explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.</td><td>1</td></tr>
</table>

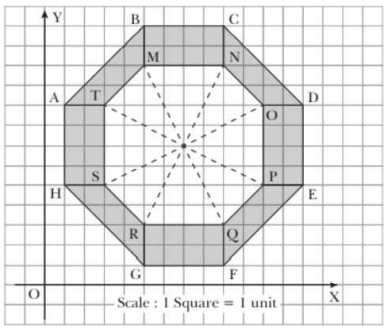
20	Assertion (A): The point (–1, 6) divides the line segment joining the points (–3, 10) and (6, –8) in the ratio 2 : 7 internally. Reason (R): Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct 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.	1
	SECTION=B	
21	If $ax + by = a^2 - b^2$ and $bx + ay = 0$, find the value of $(x + y)$.	2
22	A and B are respectively the points on the sides PQ and PR of a ΔPQR such that PQ = 12.5 cm, PA = 5 cm, BR = 6 cm, and PB = 4 cm. Is AB ‖ QR? Give reason.	2
23	Triangle ABC is circumscribing a circle. Find the length of BC.  **Fig. 8.8**	2
24	Area of a sector of a circle of radius 14 cm is 154 cm^2. Find the length of the corresponding arc of the sector. [Use π = 22/7] Or In Figure, ABC is a triangle right angled at B, with AB = 14 cm and BC = 24 cm. With the vertices A, B and C as centres, arcs are drawn, each of radius 7 cm. Find the area of the shaded region. (Use π = 22/7)  	2

25	If $\sin (x - 20)° = \cos (3x - 10)°$, then find the value of cot x. Or Prove that: $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2 \sec A.$	2
	SECTION-C	2
	Section-C consists of 6 questions of 3 mark each	
26	Prove that $3+2\sqrt{5}$ is irrational.	3
27	Find the quadratic polynomial whose sum & product of the zeroes . Are $(\sqrt{2}+1)$, $1/(\sqrt{2}+1)$ respectively. Also find its zeroes .	3
28	A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square meters more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m .Find its length and breadth.	3
29	A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.	3
30	If $\text{cosec}\theta + \cot\theta = p$, then prove that $\cos\theta = (P^2 - 1) / (P^2 + 1)$	3
31	AB is a diameter of a circle and AC is its chord such that $\angle BAC - 30°$. If the tangent at C intersects AB extended at D, then prove that BC = BD.	3
	SECTION-D	
32	32. A lotus is 2m above the water in a pond. Due to wind the lotus slides on the side and only the stem completely submerges in the water at a distance of 10m from the original position. Find the depth of water in the pond. OR A teacher on attempting to arrange the students for mass drill in the form of a solid square found that 24 students were left over. When he increased the size of the square by one student, he found he was short of 25 students. Find the number of students.	5
33	In the given figure, if AB || CD, then find x 	5

<table>
<tr><td>34</td><td>A right triangle, whose sides are 15 cm and 20 cm is made to revolve about its hypotenuse. Find the volume and surface area of the double cone so formed.

OR

A solid is in the form of a right circular cone mounted on a hemisphere. The radius of the hemisphere is 3.5 cm and the height of the cone is 4 cm. The solid is placed in a cylindrical tub, full of water, in such a way that the whole solid is submerged in water. If the radius of the cylindrical tub is 5 cm and its height is 10.5 cm, find the volume of water left in the cylindrical tub. Use $\pi = \frac{22}{7}$</td><td>5</td></tr>
<tr><td>35</td><td>Determine the median of the following data:
<table><tr><td>Mark</td><td>frequency</td></tr><tr><td>Less than 10</td><td>0</td></tr><tr><td>Less than 30</td><td>10</td></tr><tr><td>Less than 50</td><td>25</td></tr><tr><td>Less than 70</td><td>43</td></tr><tr><td>Less than 90</td><td>65</td></tr><tr><td>Less than 110</td><td>87</td></tr><tr><td>Less than 130</td><td>96</td></tr><tr><td>Less than 150</td><td>100</td></tr></table></td><td>5</td></tr>
</table>

	SECTION-E	
	Case study- based questions compulsory	
36	The top of a table is shown in the figure given below:   (i) Find the coordinates of the points H and G arerespectively (ii) What is the distance between the points A and B (iii) The coordinates of the mid point of line segment joining points M and Q are OR Which among the following have same ordinate?	4
37	India is competitive manufacturing location due to the low cost of manpower and strong technical and engineering capabilities contributing to higher quality production runs. The production of TV sets in a factory increases uniformly by a fixed number every year. It produced 16000 sets in 6th year and 22600 in 9th year.  i) In which year, the production is Rs 29,200. ii) Find the production during first year. iii) Find the difference of the production during 7th year and 4th year. OR Find the production during first 3 years.	4

38	A group of students of class X visited India gate on an education trip the teacher and students had interested in history as well. the narrate the India gate. Official name Delhi Memorial originally called All- India War Memorial, monumental sand stone arch in new Delhi dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that india gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway) is about 138 feet (42 metres) in height.  (i) if the altitude of the sun is at 600. then the height of the vertical tower that will cast a shadow of length 20 m is ? (ii) The ratio of the length of a Rod and its shadow is 1:1. The angle of elevation of the sun is? (iii) The angle formed by the line of sight with the horizontal when the object viewed is below the horizontal level is OR What is the angle of elevation if they are standing at a distance of 42m away from the monument?	4

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Sample Paper - 5
Class -X
Subject- Mathematics (Standard)

Time Allowed : 3 Hrs. **Maximum Marks:80**

General Instructions:

1. This Question paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 2 marks each.
4. Section C has 6 questions carrying 3 marks each.
5. Section D has 4 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 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 questions of Section E.

SECTION A

Section A consists of 20 questions of 1 mark each.

1. If $\alpha \text{ and } \beta \text{ are}$ the zeroes of the polynomial P(x)= $px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then the value of p is

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

2. If $\Delta PQR \sim \Delta XYZ, \angle Q = 50°$ and $\angle R = 70°$, then $\angle X + \angle Y$ is equal to

   (a) $70°$ (b) 110^0 (c)120^0 (d) 50^0

3. If two positive integers A and B are written as $A=ab^3$ and $B=a^3b^2$, a, b being prime numbers, then HCF (A, B) is

   (a) a^2b^2 (b) ab^2 (c) a^3b^3 (d) ab

4. If $bx+ay = a^2 + b^2$ and $ax - by =0$, then the value of x - y is

   (a) a- b (b) b-a (c) $a^2 - b^2$ (d) $b^2 + a^2$

5. The pair of linear equation $(3k +1)x + 3y - 5 =0$ and $2x -3y +5 =0$ have infinite number of solutions. Then the value of k is

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

6. If one zero of the polynomial $p(x) =5x^2 +13x - k$, is the reciprocal of the other, then

   (a) k =13 (b) k = 5 (c) k= -5 (d) k= - 13

7. The perimeter of a triangle with vertices (0,4) , (0,0) and (3,0) is

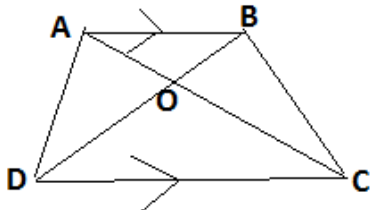
(a) 5 units (b) 12 units (c) 11 units (d) 7 units

8. The coordinates of a point on x-axis which lies on the perpendicular bisector of line segment joining the points (7,6) and (-3,4) are

(a) (0,2) (b) (3,0) (c) (0,3) (d) (2,0)

9. In trapezium ABCD, If AB ∥ DC, AB=9cm, DC=6cm and BD=12cm, then BO is equal to

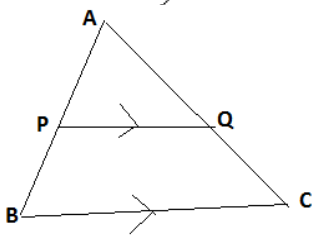
(a) 7.4 cm (b) 7cm (c) 7.5cm (d) 7.2 cm



10. In the given figure, PQ ∥ BC.

If $\frac{AP}{PB} = \frac{AQ}{QC} = \frac{1}{2}$,

then



(a) PQ=BC (b) $PQ^2 = BC^2$

(c) PQ= $\frac{BC}{3}$ (d) PQ= $\frac{BC}{2}$

11. At one end of a diameter PQ of a circle of radius 5cm, tangent XPY is drawn to the circle. The length of chord AB parallel to XY and at a distance of 8cm from P is

(a) 8cm (b) 6cm (c) 5cm (d) 7cm

12. If the diameters of two circles are 12cm and 16cm, then the diameter of the circle having area equal to the sum of areas of the two circles is

(a) 24 cm (b) 18cm (c) 20cm (d) 15cm

13. On increasing the diameter of a circle by 40% , its area is increased by

(a) 96% (b) 40% (c) 80% (d) 48%

14. If the difference of mode and median of a data is 24, then the difference of median and mean is

(a) 8 (b) 12 (c) 24 (d)36

15. The area of a ring shaped region enclosed between two concentric circles of radii 20cm and 15cm is

(a) 750 cm^2 (b) 250 cm^2 (c) 500cm^2 (d) 550cm^2

16. The mean of 11 observations is 30 . If the mean of the first 6 observations is 28 and that of the last 6 observations is 32 , then the 6th number is equal to

(a) 32 (b) 29 (c) 30 (d) 31

17. In a single throw of two dice, the probability of getting 6 as a product is

(a) $\frac{4}{9}$ (b) $\frac{2}{9}$ (c) $\frac{1}{9}$ (d) $\frac{5}{9}$

18. If $\text{cosec}\theta = 2, cot\theta = \sqrt{3}p,$ then the value of p is

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

DIRECTION: In the question number 19 and 20, statement of **Assertion (A)** is followed by a statement of **Reason(R).**

19. Choose the correct option.

Statement A(assertion): 3 X 5 X 17 + 19 is prime number

Statement B (Reason) : $\sqrt{3}$ is irrational.

(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 and reason (R) is false.

(d) Assertion (A) is false and reason (R) is true.

20. Choose the correct option.

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

Statement B (Reason) : Points A(3,1) , B (12,-2) and C(0,2) cannot be the vertices of a triangle**.**

(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 and reason (R) is false.

(d) Assertion (A) is false and reason (R) is true.

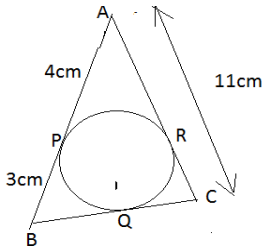
SECTION B

Section B consists of 5 questions of 2 marks each.

21. Write the value of k for which the system of equations x + ky = 0, $2x-y=0$, has unique solution.

22. If $\Delta ABC \sim \Delta DEF, \Delta AB = 4\ cm, DE = 6cm, EF = 9cm\ and\ FD = 12cm$, $find\ the\ perimeter\ of\ \Delta ABC.$

23. In the figure,ΔABC is circumscribing a circle, Find the length of BC.



24. Area of a sector of a circle of radius 36cm is 54 $\pi\ cm^2$. Find the length of the corresponding arc of the sector.

OR

A cow is tied with a rope of length 14m at the corner of a rectangular field of dimensions 20m X 16 m . Find the area of the field in which the cow can graze.

25. Prove that

SecA(1 – sinA)(secA + tanA) = 1

OR

If $\tan\theta = \frac{1}{\sqrt{3}}$ find $\text{cosec}^2\theta - \sec^2\theta$.

SECTION C

Section C consists of 6 questions of 3 marks each.

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

27. If the zeroes of the polynomial x^2 +px +q are double in value to the zeroes of the polynomial $2x^2$ - 5x -3, then find the values of p and q.

28. A train travels at a certain average speed for a distance of 63km and then travel a distance of 72km at an average speed of 6km/h more than its original speed. If it takes 3 hours to complete the total journey, what i it original average speed?

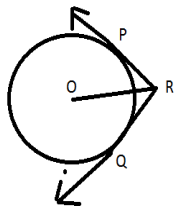
OR

At present Asha's age (in years) is 2 more than the square of her daughter Neha's age. When Nisha grows to her mother's present age,

Asha's age will be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

29. Prove that $\frac{\tan\theta}{1-\cot\theta}+\frac{\cot\theta}{1-\tan\theta}=1+\sec\theta.\cos ec\theta$

30. In the figure two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120°$, then prove that OR=PR+RQ



OR

Prove that parallelogram circumscribing a circle is a Rhombus

31. A bag contains cards numbered from 1 to 49. A card is drawn from the bag at random, after mixing the cards thoroughly. Find the probability that the number on the drawn card is:

(i) an Odd number

(ii) a multiple of 5

(iii) a perfect square

SECTION D

Section D consists of 4 questions of 5 marks each.

32. A railway half ticket costs half the full fare, but the reservation charges are the same on a half ticket as on a full ticket. One reserved first class ticket from the station A to B costs Rs. 2530. Also, one reserved first class ticket and one reserved first class half ticket from A to B costs Rs. 3810. Find the full first class fare from station A to B, and also the reservation charges for a ticket.

OR

A shopkeeper sells a saree at 8% profit and a sweater at 10% discount, thereby ,getting a sum Rs. 1008. If she had sold the saree at 10% profit and the sweater at 8% discount, she would have got Rs. 1028. Find the cost price of the saree and the list price (price before discount) of the sweater.

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

Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.

34. A hemispherical tank full of water is emptied by a pipe at the rate of $3\frac{4}{7}$ litre per second. How much time will it take to empty half the tank if it is 3m. in diameter ?

OR

A cylindrical bucket, 32cm high and with radius of base 18cm, is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24cm, then find the radius and slant height of the heap.

35. The mean of the following frequency distribution is 62.8 and the sum of frequencies is 50. Find the missing frequencies f_1 and f_2.

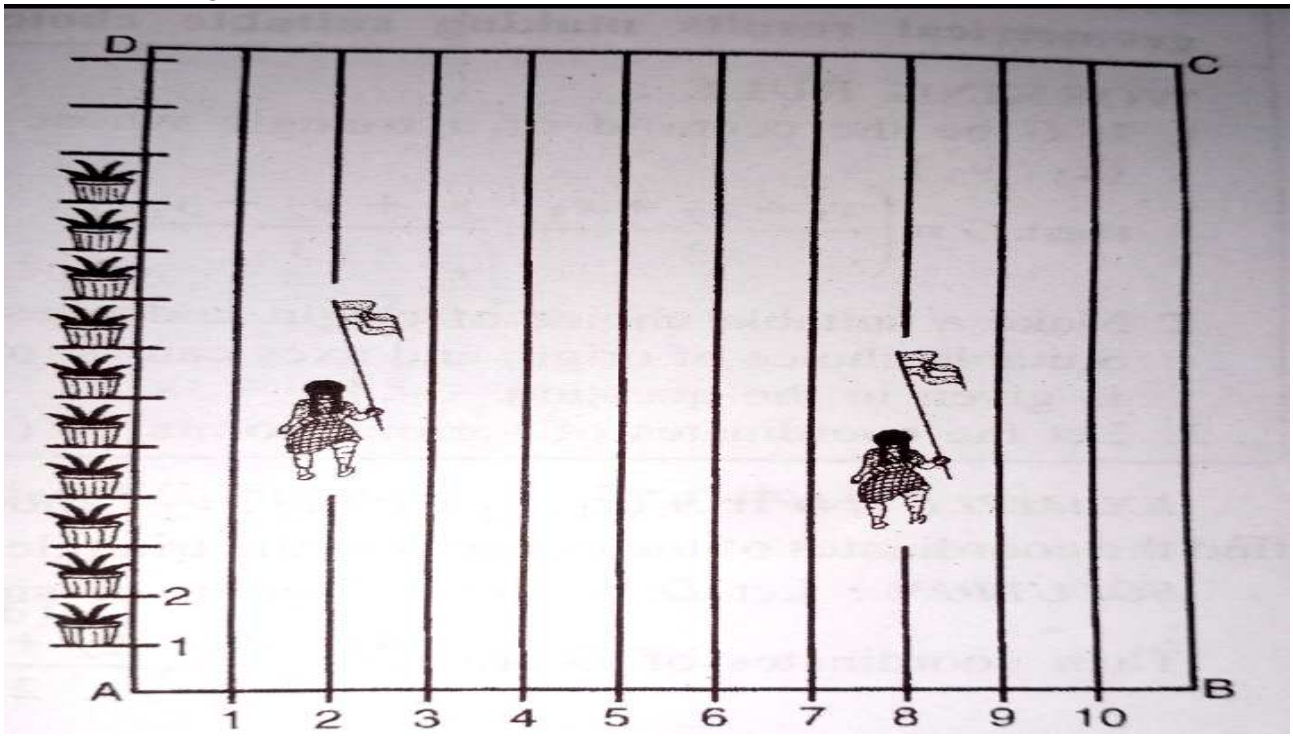
class	0-20	20-40	40-60	60-80	80-100	100-120
frequency	5	F_1	10	F_2	7	8

SECTION E

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.

36. To conduct sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1m from each other along AD, as shown in the 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 eighth line and posts a red flag.



(a) What are the coordinates of position of green colour flag and red colour flag?

(b) What is the distance between both the flags ?

(c) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag ?

OR

What is the distance of both green flag and red flag from the origin ?

37. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs. 1,18,000 by paying every month starting with the first instalment of Rs. 1000. If he increases the instalment by Rs.100 every month, answer the following:

(i) Find the amount paid by him in 30th instalment.

(ii) What is the amount paid by him in the 30 instalments?

(iii) If the total instalments are 40 , then what is the amount paid in the last instalment?

OR

Find the ratio of the 1st instalment to the last instalment?

38. A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, Official name Delhi Memorial, Originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the raja path (formerly called the kingsway), is about 138feet in height.

(i) What is the angle of elevation if they are standing at a distance of 42m away from the monument ?

(ii) They want to see the tower at an angle of 60^0. So, they want to know the distance where they should stand and hence find the distance.

(iii) If the altitude of the sun is at 60^0 , then find the height of the vertical tower that will cast a shadow of length 20m .

OR

If the ratio of the length of a rod and its shadow is 1:1, then find angle of elevation of sun.

SAMPLE PAPER-6

CLASS-X

SUBJECT: MATHEMATICS (STANDARD-041)

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

General Instructions:

1. This Question Paper has 5 Sections **A-E.**
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. 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 2marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

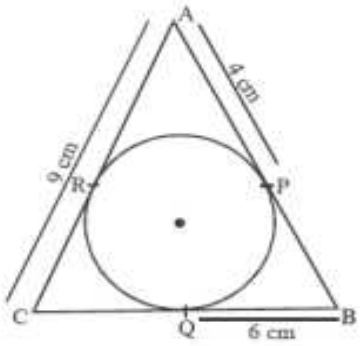
SECTION-A

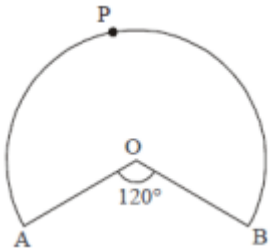
Section A consists of 20 questions of 1 mark each.

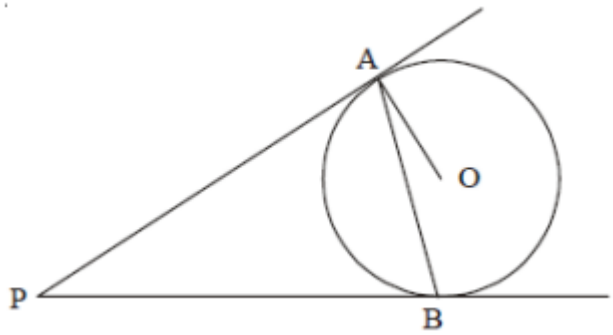
Q.NO		MARKS
1.	If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$; x and y are prime numbers. The HCF of a and b is (a) xy^2 (b) xy^3 (c)x^2y^2 (d) x^2y^3	**[1]**
2.	In a quadratic polynomial $x^2 - 5x - 1$ the zeroes are α and β. Then the value of $\alpha - \beta$ is (a)$\sqrt{2}$ (b) $\sqrt{17}$ (c)$\sqrt{29}$ (d) $\sqrt{15}$	**[1]**
3.	If triangles ABC and DEF are similar and AB=4cm, DE=6cm, EF=9cm and FD=12cm, then the perimeter of triangle ABC is (a) 16 (b) 18 (c) 20 (d) 22	**[1]**
4.	If the zeroes of the polynomial $3x^2 - 10x + k$ are reciprocal to each other	**[1]**

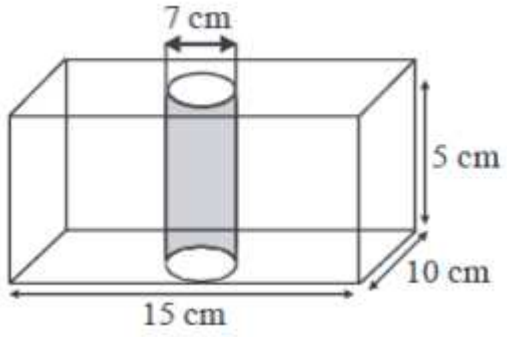
	then the value of k is (a) -3 (b) 2 (c)-2 (d) 3	
5.	If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, then the value of p is (a) 13 (b) 5 (c)6 (d) 7	**[1]**
6.	If $ax + by = a^2 - b^2$ and $bx + ay = 0$ then the value of $(x + y)$ is (a) $a + b$ (b) $a - b$ (c)$a^2 - b^2$ (d) $a^2 + b^2$	**[1]**
7.	In ΔABC , $XY \parallel BC$ and $AX: BX = 1: 3$. The length of XY(in cm) , if BC $= 24cm$ is (a) 1 (b) 5 (c) 6 (d) 8	**[1]**
8.	In ΔABC , D is on AB, $\angle ACB = \angle CDA, AC = 8\ cm\ and\ AD = 3\ cm$, then BD is equal to(in cm) (a) $\frac{49}{3}$ (b) $\frac{59}{3}$ (c) $\frac{29}{3}$ (d) $\frac{79}{3}$	**[1]**
9.	Find the value of$\frac{1+cot^2 45}{1-cot^2 45}$ (a) $\frac{49}{3}$ (b) $\frac{59}{3}$ (c) $\frac{29}{3}$ (d) Not defined	**[1]**
10.	If $sec\theta + tan\theta = 2$ then find the value of $sec\theta - tan\theta$ (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{5}{2}$ (d) $\frac{7}{3}$	**[1]**
11.	If θ is an acute angle and $tan\theta + cot\theta = 2$, then the value of $sin^3\theta + cos^3\theta$ is (a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{3}}$ (c) $\frac{1}{\sqrt{5}}$ (d) $\frac{7}{\sqrt{2}}$	**[1]**
12.	If the angle between two radii of a circle is$130°$, then the angle between	**[1]**

	the tangents at the end points of radii at their point of intersection is (a) $50°$ (b) $60°$ (c) $45°$ (d) $20°$	
13.	Mean of 100 items is 49. It was discovered that three items which should have been 60, 70, 80 were wrongly read as 40, 20, 50 respectively. Then the correct mean is (a) 30 (b) 36 (c) 50 (d) 20	**[1]**
14.	A steel wire when bent in the form of a square encloses an area of 121 cm^2. If the same wire is bent in the form of a circle, thenthe circumference of the circle in cm is. (a) 38 (b) 44 (c) 40 (d) 46	**[1]**
15.	The area 9 in ($sq.cm$) of quadrant of a circle if the perimeter of the semicircle is 252 cm (a) $\frac{1773}{2}$ (b) $\frac{4773}{2}$ (c) $\frac{2773}{2}$ (d) $\frac{3773}{2}$	**[1]**
16.	If the mean of first n natural numbers is 3n/5, then the value of n is: (a) 5 (b) 4 (c) 7 (d) 9	**[1]**
17.	The probability of getting 53 Wednesdays in a leap year is (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{7}$ (d) $\frac{2}{7}$	**[1]**
18.	Two identical solid cubes of side a are joined end to end. Thenthe total surface area of the resulting cuboid is (a) $9a^2$ (b) $10a^2$ (c) $12a^2$ (d) a^2	**[1]**
19.	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option **Statement A (Assertion):**$3 \times 5 \times 7 + 7$ is a composite number. **Statement R(Reason) :**A composite number has factors one, itself and any othernatural number. (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 and 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.	**Statement A (Assertion):**In the $\Delta ABC, AB = 24\ cm, BC = 10\ cm$ and $AC = 26\ cm$, then ΔABC is a right angle triangle **Statement R(Reason) :** If in two triangles, their corresponding angles are equal, then the triangles are similar. (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 and 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.	If $x = a, y = b$ is the solution of the pair of equations $x - y = 2\ and\ x + y = 4$ then find the value of $\frac{3}{a} + \frac{4}{b}$	**2**
22.	Show that two congruent triangles are similar.	**2**
23.	In the given fig. AP = 4 cm, BQ = 6 cm and AC = 9 cm. Find the semi perimeter of ABC.  	**2**
24.	If $7sin^2\theta + 3cos^2\theta = 4$, prove that $\tan\theta = \frac{1}{\sqrt{3}}$	**2**

Or,	Prove that :$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.	**2**
25.	In fig, OAPB is a sector of a circle of radius 3.5 cm with the centre at O and ∠AOB = 120°. Find the length of OAPBO. 	**2**
Or,	The length of the minute hand of a clock is 5 cm. Find the area swept by the minute hand during the time period 6:05 am to 6:40 am.	**2**
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26.	Three alarm clocks ring at intervals of 4, 12 and 20 minutes respectively. If they start ringing together, after how much time will they next ring together?	**3**
27.	If α and β are zeroes of $p(x) = kx^2 + 4x + 4$, such that $\alpha^2 + \beta^2 = 24$, find k.	**3**
28.	A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two digit number (ii) a perfect square number (iii) a number divisible by 5	**3**
29.	Prove the following thatIfsinA + cosA = √3 , then prove that tanA + cotA = 1	**3**
30.	Prove that tangents drawn from external point to a circle are equal in length.	**3**
Or,	Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that ∠APB = 2 ∠OAB	**3**

		
31.	The owner of a taxi company decides to run all the taxis on CNG fuel instead of petrol/diesel. The taxi charges in city comprises of fixed charges together with the charge for the distance covered. For a journey of 13 km, the charge paid is Rs. 129 and for a journey of 22 km, the charge paid is Rs. 210. What will a person have to pay for travelling a distance of 32 km?	
Or,	A two digit number is seven times the sum of its digits. The number formed by reversing the digits is 18 less than the given number. Find the given number.	
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	
32.	While boarding an aeroplane, a passenger got hurt. The pilot, showing promptness and concern, made arrangements to hospitalise the injured and so the plane started late by 30 minutes. To reach the destination, 1500 km away in time, the pilot increased the speed by 100 km/hour. Find the original speed/hour of the plane.	**5**
Or,	A shopkeeper buys some books for 80. If he had bought 4 more books for the same amount, each book would have cost Rs. 1 less. Find the number of books he bought.	**5**
33.	In ΔABC and ΔPQR , CM and RN are the medians. Show that i. $\Delta AMC \sim \Delta PNR$ ii. $\frac{CM}{RN} = \frac{AB}{PQ}$	**5**
34.	In the given figure, from a cuboidal solid metalic block of dimensions $15\ cm \times 10\ cm \times 5\ cm$ a cylindrical hole of diameter 7 cm is drilled out. Find the surface area of the remaining block.	**5**

<table>
<tr><td></td><td> 
</td><td></td></tr>
<tr><td>Or,</td><td>The difference between outer and inner curved surface areas of a hollow right circular cylinder, 14 cm long is 88 cm^2. If the volume of the metal used in making the cylinder is 176 cm^3. Find the outer and inner diameters of the cylinder.</td><td>5</td></tr>
<tr><td>35.</td><td>If the mean of the following frequency distribution is 65.6, find the missing frequencies f_1 and f_2.

<table>
<tr><td>Class</td><td>10-30</td><td>30-50</td><td>50-70</td><td>70-90</td><td>90-110</td><td>110-120</td><td>Total</td></tr>
<tr><td>frequency</td><td>5</td><td>8</td><td>f_1</td><td>20</td><td>f_2.</td><td>2</td><td>50</td></tr>
</table></td><td>5</td></tr>
<tr><td></td><td>SECTION- E</td><td></td></tr>
<tr><td></td><td>Case study based questions are compulsory.</td><td></td></tr>
<tr><td>36.</td><td>To raise social awareness about hazards of smoking, a school decided to start 'No smoking' campaign. 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).</td><td></td></tr>
</table>

Based on the above information, answer the following questions.

(i) Find the coordinates of centroid of ΔPQR **2**

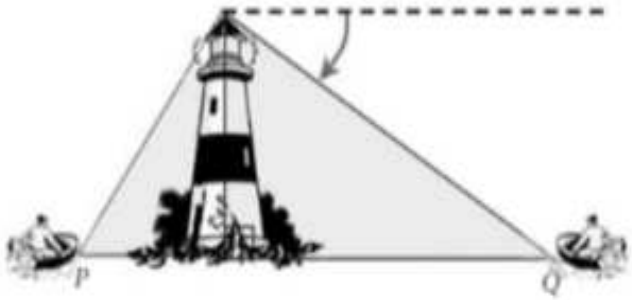
Or,

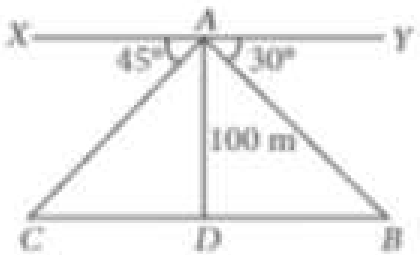
Find the length of the median through the vertex P

(ii) If S be the mid-point of line joining P and R, then find coordinates of S . **1**

(iii) Find a point on PQ which divides it internally at the ratio of 1: 2 **1**

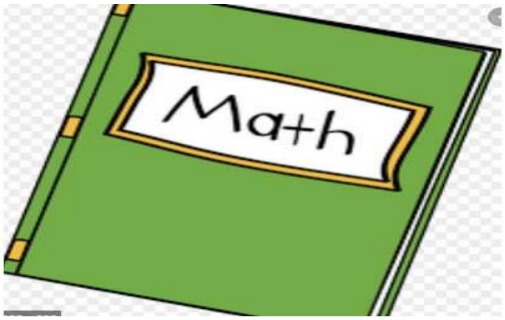
37. A boy is standing on the top of light house. He observed that boat P and boat Q are approaching to light house from opposite directions. He finds that angle of depression of boat P is 45° and angle of depression of boat Qis 30°. He also knows that height of the light house is 100 m.





Based on the above information, answer the following questions.

(i) If ∠YAB=30°, then ∠ABD is also 30", Why?

	(ii) Find the Length of CD (iii) Find the length of BD OR Find the length of AC.	**1** **1** **2**
38.	Elena had a test on monday in her school of maths subject. So, she was solving her maths guide on weekend and found a sequence of numbers in a topic whose general term was $T(n) = 4n + 5$. Using this information, calculate the answers for the questions given below.  (i) What is the fifth term in the sequence? (ii) Calculate the value of n when the value ofthe term is 97. (iii)Find the sum between the fourth and ninth term. OR Find the sum between the fifth and 11th term. 112	

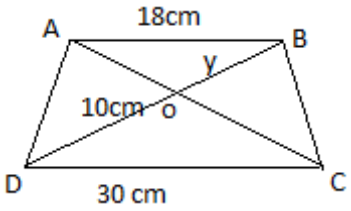
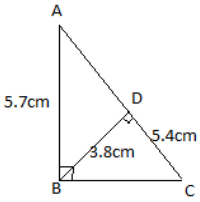
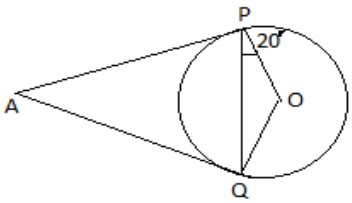
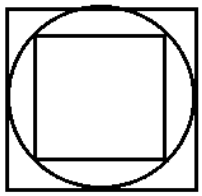
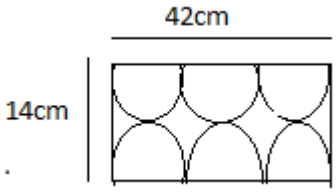
SAMPLE PAPER - 7
Class- X
Subject- Mathematics (Standard)

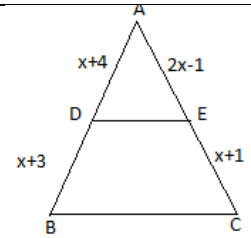
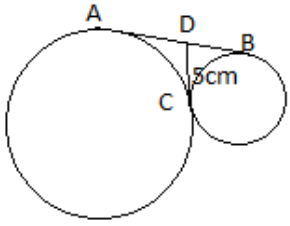
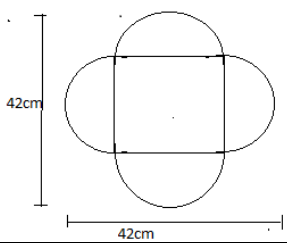
Time Allowed: 3 Hrs. **Maximum Marks: 80**

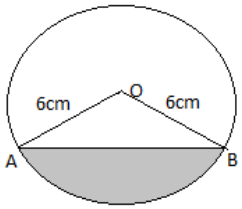
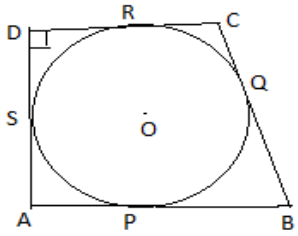
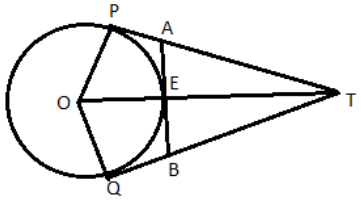
General Instructions:

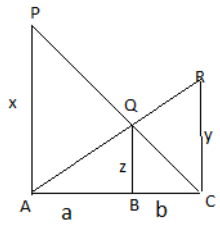
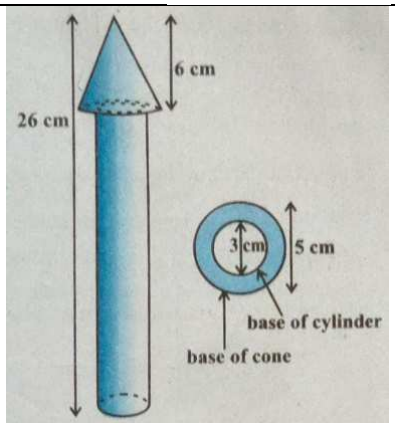
1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not Stated.

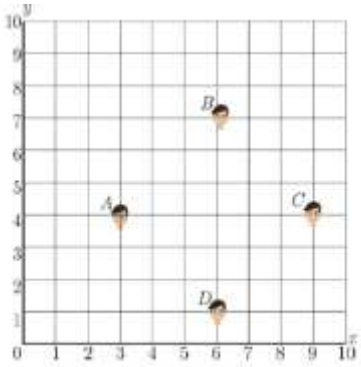
	SECTION – A	
S. no.	Section A consists of 20 questions of 1 mark each.	**Marks**
1.	A rectangular Veranda is of dimensions 18 m 72 cm x13 m 20cm. Square tiles of the same dimensions are used to cover it. What is the least number of such tiles? (a) 4290 (b) 4540 (c) 4620 (d) 4230	1
2.	The equation $9x^2 (m+3) + 6(m-3)x + (m+3) = 0$, where m is real, has real roots then (a) $m<0$ (b) $m>0$ (c) $m \leq 0$ (d) $m \geq 0$	1
3.	The quadratic polynomial $p(x) = ax^2 + bx + c$ has real zeroes m and n.If a,b and c are real numbers and of the same sign then (a) $m>0, n<0$ (b) $m>0, n>0$ (c) $m<0, n>0$ (d) $m<0, n<0$	1
4.	The system of linear equations $5x + my=10$ and $4x+ny = 8$ has infinitely many solutions, where m and n are positive integers, then the least possible values of m + n is (a) 9 (b) 5 (c) 6 (d) 10	1
5.	AOBC is a rectangle whose vertices are A (0,3), O(0,0), and B(5,0).What is the length of the diagonal OC ? (a) 5 (b) 3 (c) $\sqrt{34}$ d)16	1
6.	It is given that Δ ABC ~ ΔDEF ,$\angle A = 30^0$, $\angle C = 50^0$, AB = 5cm, AC = 3cm and DF = 7.5cm then DE =? (a) 4cm (b) 6cm (c) 12.5cm (d)10.5cm	1

7.	Value of $(\sin^2 30^0 + 4\cot^2 45^0 - \sec^2 60^0)(\text{cosec}^2 45° . \sec^2 30°)$ (a) $\frac{3}{2}$ (b) $\frac{3}{4}$ (c) $\frac{4}{7}$ (d) $\frac{2}{3}$	1
8.	If $\sin\theta + \cos\theta = \sqrt{2}$, then value of $\tan\theta + \cot\theta$ is (a)4 (b) $\sqrt{2}$ (c) $2\sqrt{2}$ (d) 2	1
9.	If diagonals AC and BD of a trapezium ABCD with AB ll CD intersect each other at O and AB = 18cm, DC = 30 cm, OB =ycm , OD = 10cm, then the value of y is  (a) 4cm (b) 6cm (c) 12cm (d) 10cm	1
10.	In the given figure <ABC = 90^0 and BD perpendicular to AC. If AB=5.7cm, BD =3.8cm and CD = 5.4cm then BC=  (a) 8.1cm (b) 9.2cm (c) 3.6cm (d) 10.4cm	1
11.	In the given figure centre of the circle is O. AP and AQ are tangents of the circle. If $\angle OPQ = 20^0$, then $\angle PAQ$ =  (a) 60^0 (b) 80^0 (c)40^0 (d)50^0	1
12.	In the given figure area of smaller square is 100 cm^2. Then area of larger square is  (a)$100\sqrt{2}$ cm^2 (b)100 cm^2 (c) 200 cm^2 (d)$220\sqrt{2}$ cm^2	1
13.	A 6m side cube is cut into 1cm side cubes, then total surface area of all the small cubes will be (a) 196cm^2 (b)216cm2 (c)336cm2 (d) 1296cm^2	1
14.	The most frequently occurring observation is called (a)Mean (b) mode (c) median (d) dispersion	1
15.	The area in the given rectangle excluding the six identical semi circle is  (a)144cm^2(b)126 cm^2 (c) 195 cm^2 (d)243 cm^2	1
16.	The mode of a data is 45, mean is 27 then median is a) 30 b) 27 c) 23 d) none of these	1
17.	Which of the following can be the probability of an event a)-0.02 b) 1.4 c) 25/26 d) 5/4	1

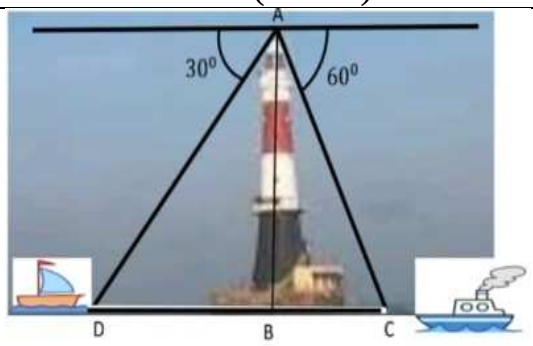
18.	If cosecθ =2, then cotθ + $\frac{sin\theta}{1+cos\theta}$ is equal to (a) 4 (b) 2 (c) 6 (d) 5	1
	DIRECTION: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option	1
19.	**Assertion**: If the least prime factor of a composite number 'a' is 3 and the least prime factor of another composite number 'b' is 7 then least prime factor of a + b is 2 **Reason**: 'a' is an odd number and 'b' is also an odd number so a + b is an even number whose least prime factor is 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 and 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	1
20.	**Assertion**: the point P(- 3,-7) lies in the third quadrant **Reason** :both abscissa and ordinate have same sign. (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 and 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.	1
	SECTION – B	
21.	If x= a , y = b is the solution of the equations x-y=2 and x+y=4 then find the value of a and b	2
22.	In the given figure if DE ll BC, then find the value of x 	2
23.	AB and CD are two common tangents of two circles which touch each other at C. If D lies on AB and CD =5cm, then find the length of AB. 	2
24.	Find the area of the figure in which four semi circles are attached to a square. OR 	2

	Find the area of the shaded region (take $\pi = \frac{22}{7}$, $\sqrt{3} = 1.732$) 	
25.	If sinx = $\frac{1}{2}$, then find the value of $3\cos x - 4\cos^3 x$ OR If x= cosec A + cos A, y= cosec A – cosA , then find the value of $(\frac{2}{x+y})^2 + (\frac{x-y}{2})^2$	2
	SECTION - C	
26.	If HCF of numbers 408 and 1032 can be expressed in the form $1032x - 408 \times 5$, then find the value of x.	3
27.	Given that $\sqrt{2}$ is irrational , show that $5-3\sqrt{2}$ is irrational	3
28.	When a bucket is half filled, the weight of the bucket and the water is 10 kg. If the bucket is two-thirds filled, the total weight is 11 kg. Find the total weight, in kg, when the bucket is completely filled. OR Ram Niranjan tells his daughter Anupama, "seven years ago, I was seven times as old as you were then. Also three years from now, I shall be three times as old as you will be". If present age of Anupama and Ram Niranjan are x and y respectively, represent this situation algebraically and find their present ages.	3
29.	Prove that $\frac{\sin\theta}{\cot\theta + \operatorname{cosec}\theta} = 2 + \frac{\sin\theta}{\cot\theta - \operatorname{cosec}\theta}$	3
30.	In the given figure, ABCD is a quadrilateral in which $\angle D = 90^0$. A circle C(O,r) touches the sides AB, BC, CD and DA at P,Q,R,S respectively. If BC= 38cm, CD=25cm and BP = 27cm, find radius of the circle.  OR In the given figure, O is the centre of a circle of radius 5cm. T is a point such that OT= 13cm and OT intersects the circle at E. If AB is a tangent to the circle at E. Find the length of AB where TP and TQ are tangents to the circle. 	3

31.	A box contains 90 discs which are numbered from 1 to 90. If one discs is drawn at random from the box, find the probability that it bears i) A two digit number ii) A perfect square number iii) A number divisible by 5	3
	SECTION - D	
32.	If Reshma were younger by 5 years than what she really is, then the square of her age (in years) would have been 11more than five times her age. Find her present age. OR In the centre of a rectangular lawn of dimensions 50m x 40m, a rectangular pond has to be constructed so that the area of the grass surrounding the pond would be 1184 m^2. Find the length and breadth of the pond.	5
33.	In the given figure PA, QB and RC are perpendicular to AC. If AP=x, QB=z, RC=y, AB=a and BC =b then show that $\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$ 	5
34.	A wooden toy rocket is in the shape of a cone mounted on a cylinder, as shown in figure. The height of the entire rocket is 26cm, while the height of the conical part is 6cm. The base of the conical portion has a diameter of 5cm, while the base diameter of cylindrical portion is 3cm. If the conical portion to be painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of theses colours (take π= 3.14)  OR Sapna's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (an underground tank) which is in the shape of a cuboid. The sump has dimensions 1.57m x 1.44m x 95cm . The overhead tank has its radius 60cm and height 95cm. Find the height of the water left in the sump after the overhead tank has been completely filled with water from the sump which had been full. Compare the capacity of the tank with that of the sump (take π= 3.14)	5

<table>
<tr><td>35.</td><td>The following table shows the ages of the patients admitted in a hospital during a year
<table>
<tr><td>Age(in years)</td><td>5-15</td><td>15-25</td><td>25-35</td><td>35-45</td><td>45-55</td><td>55-65</td></tr>
<tr><td>No. of patients</td><td>6</td><td>11</td><td>21</td><td>23</td><td>14</td><td>5</td></tr>
</table>
Find the median of the above data</td><td>5</td></tr>
<tr><td></td><td>SECTION - E</td><td></td></tr>
<tr><td>36.</td><td> 
Morning assembly is an integral part of school’s schedule. Almost all the schools conduct morning assemblies which include prayers, information of latest happening, inspiring thoughts, speech, national anthem etc. A good school is always particular about their morning assembly schedule. Morning assembly is important for child’s development. It is essential to understand that morning assembly is not just standing in long queues and singing prayers or national anthem, but it’s something beyond just prayers. All the activities carried out in morning assembly by the school staff and students have great influence in every point of life. The positive effects of attending school assemblies can be felt throughout life. Have you noticed that in school assembly you always stand in row and column and this makes a coordinate system. Suppose a school have 100 students and they all assemble in prayer in 10 rows as shown in the adjoining picture. Here A, B,C and D are four friends Amitabh, Basant, Cathy and David


i)What is the distance between Amitabh and Basant ? (1mark)
ii)Find the mid point of line segment AC and BD. Are they same points ?
OR
Check whether or not ABCD is a square (2marks)
iii)How far is Basant from David ? (1mark)</td><td>4</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

37.	While playing a treasure hunt game, some clues (numbers) hidden in various spots collectively form an AP. If the number on the n^{th} spot is 5n-1, then answer the following questions to help the player in spotting the clues.  i) Which number is on the 24^{th}spot ?(1mark) ii) Find the sum of first 10 terms of the AP OR Find an expression for sum of first n terms of this AP (2marks) iii) Which spot is numbered as 119 ? (1mark)	4
38.	A lighthouse is a tall tower with light near the top. These are often built on islands, coasts or on cliffs. Lighthouses on water surfaces act as a navigational aid to the mariners and send warning to boats and ships for dangers. Initially wood, coal would be used as illuminators. Gradually it was replaced by candles, lanterns, electric lights. Nowadays they are run by machines and remote monitoring.  Prongs reef lighthouse of Mumbai was constructed in 1874-75. It is approximately 40m high and its beam can be seen at a distance of 30km.A ship and a boat are come towards the lighthouse from opposite directions. Angles of depression of flash light from the lighthouse to the boat and the ship are 30^0 and 60^0 respectively. i) What is the angle between two lines of sight ? (1mark) ii) Find the time taken by the boat to reach the lighthouse if it is moving at the speed of 2km/hr (2marks) OR Which of the two, boat or ship is nearer to the light house. Find its distance from the light house. iii) What is angle of elevation of the top of light house at the ship ? (1mark)	4

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SAMPLE PAPER - 8

CLASS-X

SUBJECT- MATHEMATICS (STANDARD)

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

General Instructions:

1. *This Question Paper has 5 Sections A-E.*
2. *Section A has 20 MCQs carrying 1 mark each*
3. *Section B has 5 questions carrying 02 marks each.*
4. *Section C has 6 questions carrying 03 marks each.*
5. *Section D has 4 questions carrying 05 marks each.*
6. *Section E has 3 case based integrated units of assessment (04 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 5 marks,2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E*
8. *Draw neat figures wherever required. Take* $\pi = 22/7$ wherever required if not stated

SECTION -A

1. Find the HCF of two consecutive even numbers.

   (a)1 (b) 2 (c) 0 (d)None of these

2. $(x^2+1)^2 - x^2 = 0$ has :

   (a) four real roots (b) two real roots (c) no real roots (d) one real root

3. For what value of k, (–4) is a zero of the polynomial $x^2 - x - (2k+2)$?

   (a) 9 (b) -9 (c) 1 (d)5

4. Two lines are given to be parallel. The equation of one of the lines is

   $3x - 2y = 5$. The equation of the second line can be :

   (a) $9x + 8y = 7$ (b) $-12x - 8y = 7$ (c) $-12x + 8y = 7$ (d) $12x + 8y = 7$

5. The point which lies on the perpendicular bisector of the line segment joining the points A (-2, -5) and B(2,5) is -

(a) (0,0) (b) (0,2) (c) (2,10) (d) (-2,0)

6. If Δ A B C ~ Δ E D F and Δ A B C is not similar to Δ D E F, then which of the following is not true?

a) BC. EF = A C. FD b) AB. EF = AC. DE

c) BC. DE = AB. EF d) BC. DE = AB. FD

7. If $sin\alpha = 0.5\ and\ cos\beta = 0.5$ then find the value of $\frac{\alpha\beta}{2\alpha+\beta}$

(a) 15^0 (b) 45^0 (c) 65^0 (d)90^0

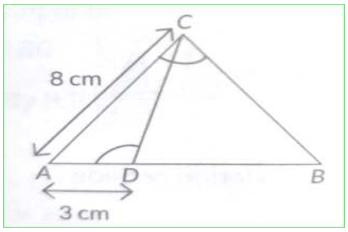
8. If $sin\theta = cos\theta$ then find the value of $2tan\theta + cos^2\theta$

(a)$\frac{10}{4}$ (b) $\frac{20}{6}$ (c)$\frac{2}{5}$ (d) $None\ of\ these$

9. In the given figure,$\angle$ACB = $\angle$ CDA, AC=8cm, AD = 3cm, then BD is

a) 22/3cm b) 26/3cm c) 55/3cm

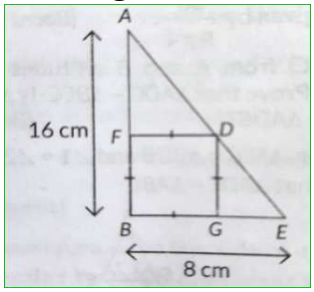
d) 64/3cm



10. Side AB and BE of a right triangle , right angled at B are of lengths 16cm and 8cm respectively. The length of the side of largest square FDGB that can be inscribed in the triangle ABE is

a) 32/3cm b) 16/3cm c) 8/3cm

d) 4/3cm



11**.** If two tangents inclined at an angle of 60^0 are drawn to a circle of radius 3cm, then the length of each tangent is equal to :

(a) $\frac{3\sqrt{3}}{2}$ cm (b) 6cm (c) 3cm (d) $3\sqrt{3}$ cm

12. It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters 16 m and 12 m in a locality. The radius of the new park would be

(a) 10 m (b) 15 m (c) 20 m (d) 24 m

13. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r.

(a) $3\pi r^2$ (b) $\frac{\pi r^3}{3}$ (c) $\frac{\pi r^2}{3}$ (d) $3\pi r^3$

14.What is the empirical relationship between mean, median and mode ?

(a) 3mean = mode + 2median (b)2mean = mode + 3median
(c) 3median = 2mean + mode (d)3mode = mean + 2median

15. The wheel of a motorcycle is of radius 70 cm. The number of revolutions per minute must the wheel make so as to keep a speed of 66 km/hr will be

(a) 50 (b) 150 (c) 250 (d) 1000

16. Consider the following distribution:

class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
frequency	10	15	12	20	8

Find the upper limit of median class.

(a) 5 (b) 10 (c) 15 (d) 20

17. A die is thrown once. Find the probability of getting number divisible by 2.

(a) 1/3 (b) 1/2 (c) 2/3 (d) 1/6

18. If $tanx + sinx = m \; and \; tan\, tanx - sin\, sinx = n$, then $m^2 - n^2$ is

equal to

a. $\sqrt{16mn}$ b. $n\sqrt{mn}$ c. $\sqrt{mn}$ d. $\sqrt{4mn}$

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

Assertion (A): $\sqrt{3}$ is an Irrational number.

Reason (R) : The square of a prime number is irrational.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A).
b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation for Assertion (A).
c) Assertion (A) is true and Reason (R) is false.
d) Assertion (A) isfalse and Reason (R) is true.

20. Assertion (A):The point(-1,6) divide the line segment joining the points(-3,10) and(6,8) in the ratio 2:7 internally.

Reason(R): The x coordinate of the point on y axis is zero.

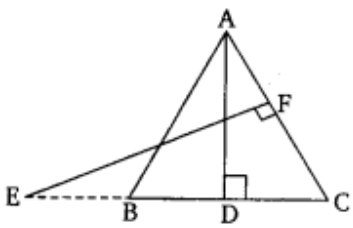
a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation for Assertion (A).
b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation for Assertion (A).
c) Assertion (A) is true and Reason (R) is false.
d) Assertion (A) isfalse and Reason (R) is true.

SECTION - B

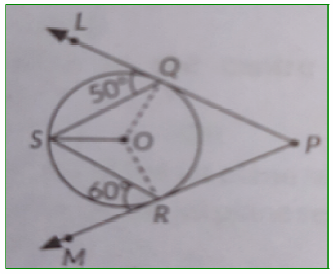
21. For what value(S) of k will the pair of equation

Kx + 3y = k – 3 ; 12x + ky = k have no solution?

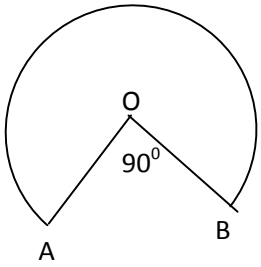
22. In the given figure, E is a point on side CB produced of an isosceles triangle ABC with AB = AC. If AD ⊥ BC and EF ⊥ AC, prove that ΔABD ~ ΔECF.



23. In the given figure ,PQL and PRM are tangents to the circle with centre O at the point Q and R, respectively and S is a point on the circle such that $\angle SQL = 50^0$ and $\angle SRM = 60^0$. Then find the measure of $\angle SQR$



24 Find the perimeter of the given figure, where 'O' is the centre of the given sector of radius 42cm.



OR

Area of a sector of central angle 200^0 of a circle is 770 cm^2. Find the length of the corresponding arc of this sector.

25. Prove that $1 + \frac{cot^2 x}{1+cosecx} = cosecx$

OR

If $tanA = \frac{3}{4}$, find the value of $\frac{5}{7}\left(\frac{1}{sinA} + \frac{1}{cosA}\right)$

SECTION-C

26. Prove that $\left(3 + 2\sqrt{5}\right)^2$ is an irrational number.

27. If one root of the quadratic polynomial $4x^2$ -8kx+8x-9 is negative of the other , then find zeros of kx^2+3kx +2.

28. Some amount is distributed equally among some students. If there are 8 students less, everyone will get Rs10 more. If there are 16 students more, everyone will get Rs10 less. What is the number of students? How much does each get ? What is the total amount distributed?

OR

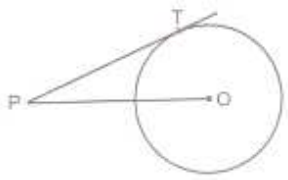
A 90% acid solution is mixed with a 97% acid solution to obtain 21 litres of a 95% solution. Find the quantity of each of the solutions to get the resultant mixture.

29. If $sin\theta + cos\theta = p \ \ and \ sec\theta + cosec\theta = q$, show that $q(p^2 - 1) = 2p$.

30. In fig PQ is a chord of length 8cm of a circle of radius 5cm.The tangents at P and Q meet at a point T.Find the length of TP.

OR

In the given fig.Point P is 26cm away from the centre O of a circle and the length PT of the tangent drawn from P to the circle is 24cm. Then, find the radius of the circle.



31. A card is drawn from a well-shuffled pack of 52 cards. Find the probability of drawing:
    (a) a red face card
    (b) either a king or a queen
    (c) a card of spade or an ace.

SECTION-D

32. Some students planned a picnic. The budget of food was Rs.240.But 4 of them failed to go and then cost of food for each member is increased by Rs 5. How many students attended the picnic?

OR

A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work separately.

33. ABC is an isosceles triangle with AB = AC and D is a point on AC such that $BC^2 = AC \times CD$. Prove that BD=BC.

34. A tent is in the form of a cylinder of diameter 20m and height 2.5m, surmounted by a cone of equal base and height 7.5m. Find the capacity of the tent and cost of the canvas required to make it at Rs.100 per square metre.(Take $\pi = 3.14$)

OR

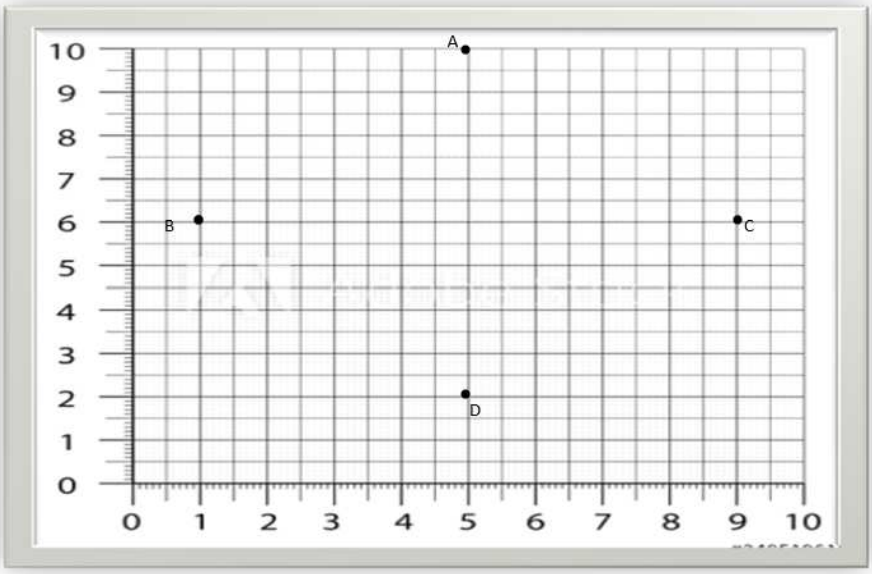
A right triangle whose sides are 3cm and 4cm (other than hypotenuse) is made to revolve about hypotenuse. Find the volume and surface are of the double cone so formed. (Take $\pi = 3.14$)

35. Find the missing frequencies f_1 and f_2,if mean of 50 observations given below is 38.2 :

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	4	4	f_1	10	f_2	8	5

36.CASE STUDY -1

Mr. Mohanlal purchased a land which is in the shape of a quadrilateral. Its four corner points are given in the graph.



I. Find the distance between point A and point D

II. What type of quadrilateral formed after joining A, B, C and D

OR

If (1,2), (4, y), (x,6) and (3,5) are the vertices of the given parallelogram taken in order then find the value of x and y .

III. Find the co-ordinate of intersecting point of the diagonals .

37. CASE STUDY -2

Your friend Veer wants to participate in a 200m race. He can currently run that distance in 51seconds and with each day of practice it takes him 2 seconds less. He wants to do in 31seconds –

I. Find the time taken to cover the distance on 4^{th} day.

II. What is the minimum number of days he needs to practice till his goal is achieved –

III. If nth term of an AP is given by $a_n = 2n + 3$ then find the common difference of the AP

OR

Find the value of x, for which 2x, x+ 10, 3x + 2 are three consecutive terms of an AP

38. A group of students of class X visited India gate on an educational trip. The teacher and the students had interest in history as well. The teacher narrated that the India gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914-1919.The teacher also said that India gate which is located at the Eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42m) in height.

i. What is the angle of elevation if they are standing at a distance of $21\sqrt{12}$m away from the monument?

ii. If they want to see the tower top at an angle of 60^0, then what will be the distance from the foot of tower from which they can view?

($\sqrt{3} = 1.732$)

OR

If the altitude of the sun is at 30^0, then what will be the height of vertical tower that will cast a shadow of length 20m?($\sqrt{3}$=1.732)

iii. Determine the angle of elevation if the ratio of length of rod and its shadow is 1.732:1

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SAMPLE PAPER-9

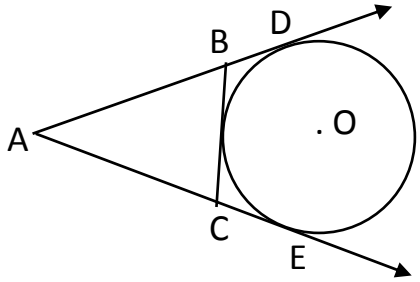
Subject- Mathematics (Standard)

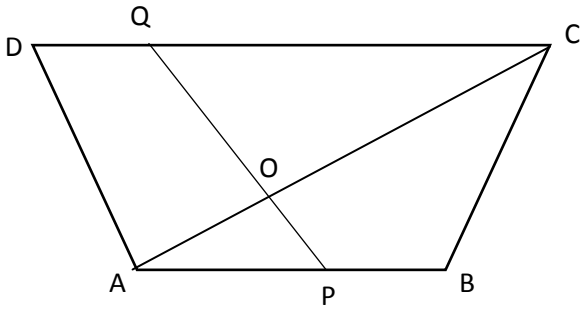
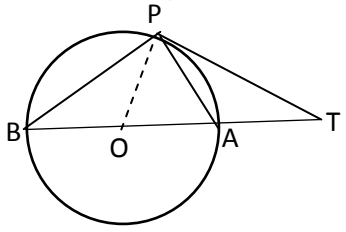
Time Allowed: 3 Hrs. Maximum Marks: 80

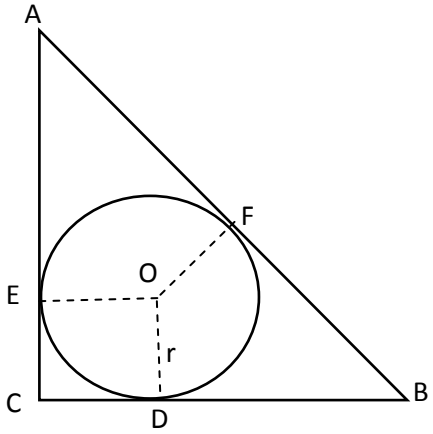
General Instructions:

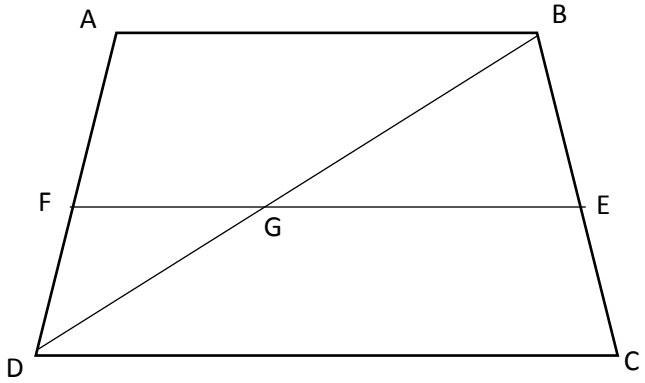
1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 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 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks 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.	
Sl. No.		Marks
1	If n is any natural number, then $6^n - 5^n$ always ends with (a)1 (b)3 (c)5 (d) 7	1
2	If the equation $x^2 - b\,x + 1 = 0$ does not possessreal roots, then $(a) -3 < b < 3$ (b)$-2 < b < 2$ (c)$b > 2$ (d)$b < -2$	1
3	The zeroes of the quadratic polynomial $x^2 + 99x + 127$ are (a) both positive (b) both negative (c)one positive and one negative (d) both equal	1
4	The value of c for which the pair of equations $cx - y = 2$ and $6x - 2y = 4$ will have infinitely many solutions is (a) 3 (b) – 3 (c) – 12 (d) no value	1
5	If A $(3, \sqrt{3})$, B (0, 0) and C (3,k) are the three vertices of an equilateral triangle ABC, then the value of k is (a) 2 (b) – 3 (c) $-\sqrt{3}$ (d)$-\sqrt{2}$	1
6	ΔABC~ΔPQR. If AM and PN are medians of ΔABC and ΔPQR respectively and BC^2: QR^2 = 9:16, then AM: PN = (a) 3:2 (b) 81:256 (c) 16:9 (d) 3:4	1
7	If $\sqrt{3}sin\theta - cos\theta = 0$ and $0° < \theta < 90°$, then value of θ is (a) 30° (b) 45° (c) 60° (d) 90°	1
8	If $sec\theta + tan\theta = p, then\ tan\theta\ is$ (a) $\frac{p^2+1}{2p}$ (b)$\frac{p^2-1}{2p}$ (c) $\frac{p^2+1}{p^2-1}$ (d) $\frac{p^2-1}{p^2+1}$	1
9	XY is drawn parallel to the base BC of a Δ ABC cutting AB at X and AC at Y. If AB = 4 BX and YC = 2 cm, then AY =	1

	(a) 2 cm (b) 4 cm (c) 6 cm (d) 8 cm	
10	In the given fig., if AD, AE and BC are tangents to the circle at D, E and F respectively, then (a) AD = AB + BC + CA (b) 2AD = AB + BC + CA (c) 3AD = AB + BC + CA (d) 4AD = AB + BC + CA 	1
11	In triangles ABC and DEF, $\angle B = \angle E, \angle F = \angle C$ and AB = 3 DE. Then, the two triangles are (a) congruent but not similar (b) similar but not congruent (c) neither congruent nor similar (d) congruent as well as similar	1
12	If the circumference of a circle and the perimeter of a square are equal, then (a) Area of the circle = Area of the square (b) Area of the circle $>$ Area of the square (c) Area of the circle $<$ Area of the square (d) Nothing definite can be said about the relation between the areas of circle and square.	1
13	Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is (a) 3:4 (b) 4:9 (c) 9:16 (d) 16:9	1
14	The minute hand of a clock is 84 cm long. The distance covered by the tip of minute hand from 10:10 am to 10:25 am is (a) 44 cm (b) 88 cm (c) 132 cm (d) 176 cm	1
15	If x_i's are the mid points of the class intervals of grouped data, f_i's are the corresponding frequencies and $\bar{x}$ is the mean, then $\Sigma(f_i x_i - \bar{x})$ is equal to (a) 0 (b) – 1 (c) 1 (d) 2	1
16	The mean of n observations is $\bar{x}$. If the first observation is increased by 1, the second by 2, the third by 3, and so on, then the new mean is (a) $\bar{x}$ +(2n + 1) (b) $\bar{x} + \frac{n+1}{2}$ (c) $\bar{x}$ + (n + 1) (d) $\bar{x} - \frac{n+1}{2}$	1
17	A number x is chosen randomly from the numbers – 3, - 2, - 1, 0, 1, 2, 3 the probability that $\lvert x \rvert < 2$ is (a) $\frac{5}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{1}{7}$	1
18	If 8 tan x = 15, then sin x – cos x is (a) $\frac{8}{17}$ (b) $\frac{17}{7}$ (c) $\frac{1}{7}$ (d) $\frac{7}{17}$	1
	DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason** (R). Choose the correct option	1

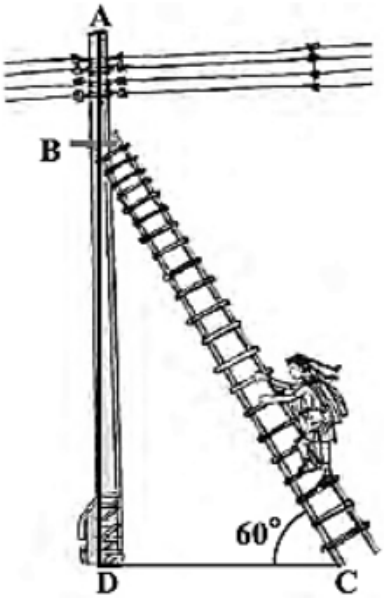
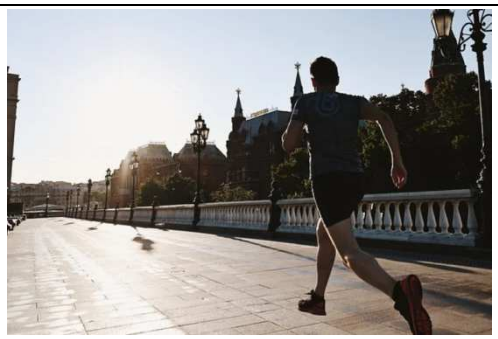
19	**Statement A (Assertion):** $\sqrt{3}$is an irrational number. **Statement R(Reason):**The decimal expansion of an irrational number is non terminating and non-repeating.. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and 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	**Statement A (Assertion):** The point (–1, 6) divides the line segment joining the points (–3, 10) and (6, –8) in the ratio 2: 7 internally. **Statement R(Reason):**Given three points, i.e. A, B, C form an equilateral triangle, then AB = BC = AC. (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 and 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.	1
	SECTION-B	
	Section B consists of 5 questions of 2 marks each.	
Sl. No.		Marks
21	If 2x+y=23 and 4x-y=19, find the value of $\frac{y}{x} - 2$.	2
22	In the given figure, if $AB \parallel DC$ and AC and PQ intersect each other at the point O, then prove that OA.CQ=OC.AP.  	2
23	In the given figure, BOA is a diameter of a circle and the tangent at a point P meets BA extended at T. If ∠PBO = 30°, then find ∠PTA.  	2
24	A paper is in the form of a rectangle ABCD in which AB = 20 cm and BC = 14	2

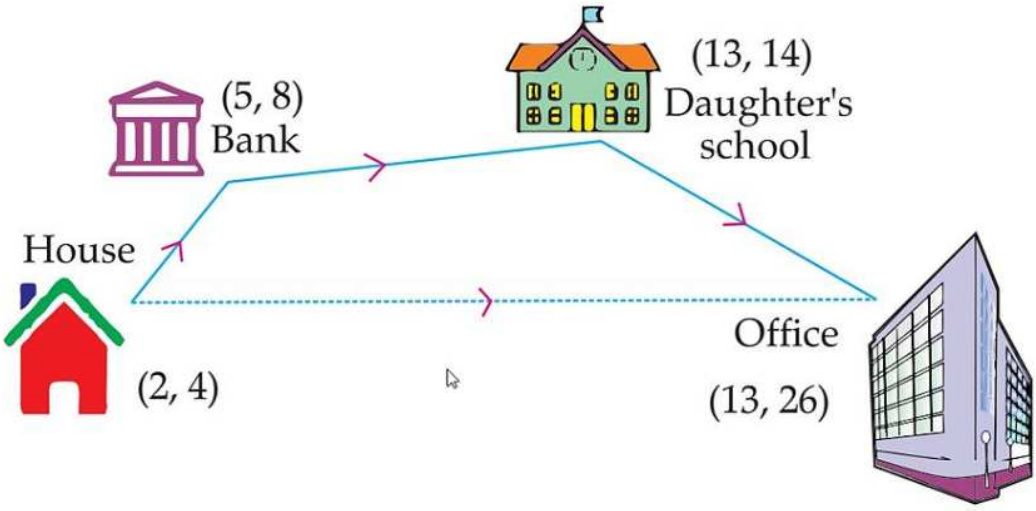
	cm. A semi-circular portion with BC as diameter is cut off. Find the area of the remaining part. Or A pendulum swings through an angle of 30° and describes an arc 8.8 cm in length, Find the length of the pendulum.	
25	If angles A, B and C of a Δ ABC in an AP, then find $sinB$. Or Find acute angles A and B, if sin(A+2B) = $\frac{\sqrt{3}}{2}$ and cos(A + 4B) = 0, A>B.	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
Sl. No.		Marks
26	Prove that √3 is an irrational number.	3
27	If the squared difference of the zeroes of the quadratic polynomial $f(x) = x^2 + p\,x + 45$ is equal to 144, find the value of p.	3
28	An aeroplane takes 1 hour less for a journey of 1200 km if its speed is increased by 100 km/hr from its usual speed. Find its usual speed. Or The perimeter of a right triangle is 60 cm. Its hypotenuse is 25 cm. Find the area of the triangle	3
29	Prove that: $\frac{1}{secA + tanA} - \frac{1}{cosA} = \frac{1}{cosA} - \frac{1}{secA - tanA}$	3
30	In the given figure, if a, b, c are the sides of a right triangle where c is the hypotenuse, prove that the radius r of the circle which touches the sides of the triangle is given by $r = \frac{a + b - c}{2}$ 	3

	Or Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the center.	
31	Two dice are thrown simultaneously. Find the probability of getting: (i) A doublet of even number ? (ii) The sum as a prime number ? (iii) A total of at least 10 ?	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each.	
Sl. No.		Marks
32	The total cost of a certain length of a piece of cloth is Rs 200. If the piece was 5 m longer and each meter of cloth costs Rs 2 less, the cost of the piece would have remained unchanged. How long is the piece and what is its original rate per meter ? Or A train travels at a certain average speed for 63 km and then travels for72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original average speed ?	5
33	In the figure ABCD is a trapezium, $AB \parallel DC \text{ and } AB = \frac{1}{2}DC. EF \parallel AB,$ where E and F lie on BC and AD respectively such that $\frac{BE}{EC} = \frac{4}{3}$. Diagonal DB intersects EF at G. Prove that, 7 EF = 11 AB.  	5
34	Daily wages of 110 workers, obtained in a survey, are tabulated below: Compute the mean daily wages and modal daily wages of these workers.	5

Daily Wages(Rs)	100 - 120	120 - 140	140 - 160	160 - 180	180 - 200	200 - 220	220 - 240
No. of Workers	10	15	20	22	18	12	13

35	A pen stand made of wood is in the shape of a cuboid with four conical depressions and a cubical depression to hold the pens and pins, respectively. The dimension of the cuboid is 10 cm, 5 cm,and 4 cm. The radius of each of the conical depressions is 0.5 cm, and the depth is 2.1 cm. The edge of the cubical	5

	depression is 3 cm. Find the volume of the wood in the entire stand. Or A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the conical top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs. 500 per m^2. (Note that the base of the tent will not be covered with canvas.)	
	SECTION E	
	Case study-based questions are compulsory.	
36	An electrician has to repair an electric fault on the pole of height 5 m.He needs to reach a point 1.3 m below the top of the pole to undertake the repair work (see figure).  (i) What is the length of BD ? (ii) What is the value of$\angle B$? (iii) What is the length of ladder , when inclined at an angle of 60°to the horizontal ? Or If the horizontal angle is changed to 30°, then what should be the length of ladder ?	1 1 2
37	Your friend Veer wants to participate in a 200-meter 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.  (i) Form an AP from the above situation ? (ii) What is the minimum number of days he needs to practice till his goal is achieved ?	1 1

	(iii) If n^{th} term of an AP is given by $a_n = 2n + 3$ then find the common difference of the AP. Or Find the value of x for who is 2x, x + 10, 3x + 2 are three consecutive terms of an AP.	2
38	Aayush starts walking from his house to office. Instead of going to the office directly, he goes to a bank first, from there to his daughter's school and then reaches the office. (Assume that all distances covered are in straight lines). If the house is situated at (2,4), bank at (5,8), school at (13,14) and office at (13,26) and coordinates are in kilometer.  (i) find the distance between house and bank.	1
	(ii) what is the total distance travelled by Aayush to reach the office? Or Find the co-ordinates of mid-point of the line segment joining office to school.	2
	(iii) what is the extra distance travelled by Aayush ?	1

***

SAMPLE PAPER-10

Class – X **Max Mark – 80**

Subject – Mathematics **Time – 3 Hours**

General Instructions:

1.This Question Paper has 5 Sections A-E.
2.Section **A** has 20 MCQs carrying 1 mark each
3.Section **B** has 5 questions carrying 02 marks each.
4.Section **C** has 6 questions carrying 03 marks each.
5.Section **D** has 4 questions carrying 05 marks each.
6.Section **E** has 3 case based integrated units of assessment (04 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 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8.Draw neat figures wherever required. Take π =22/7 wherever required if not stated

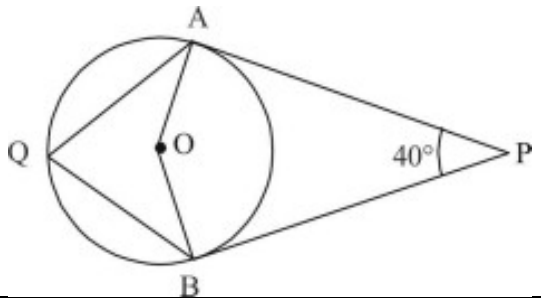
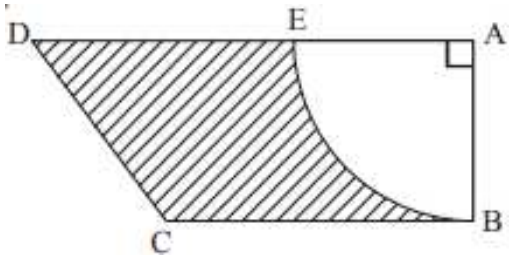
SECTION - A		
Section A consists of 20 questions of 1 mark each.		
Q. No.	**Questions**	**Marks**
1	Which of these numbers always ends with the digit 6 , where n is natural (a) 4^n (b) 2^n (c) 6^n (d) 8^n	1
2	If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and – 3, then (a) a = – 7, b = – 1 (b) a = 5, b = – 1 (c) a = 2, b = – 6 (d) a = 0, b = – 6	1

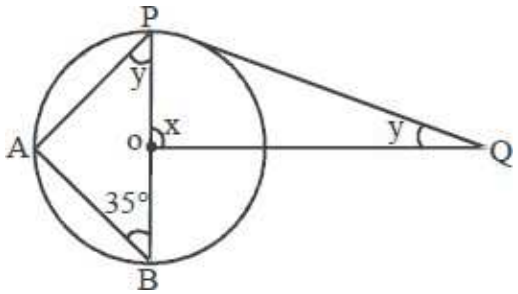
3	A pair of linear equations which has a unique solution x = 2 and y = – 3 is (a) x + y = 1 and 2x – 3y = – 5 (b) 2x + 5y = – 11 and 2x – 3y = – 22 (c) 2x + 5y = – 11 and 4x + 10y = – 22 (d) x – 4y – 14 = 0 and 5x – y – 13 = 0	1
4	If ½ is a root of $x^2 + px - 5/4 = 0$ then value of p is (a) 2 (b) –2 (c)1/4 (d)1/2	1
5	A vertical pole of length 3 m casts a shadow of 7 m and a tower casts a shadow of 28 m at a time. The height of tower is (a) 10 m (b) 12 m (c) 14 m (d) 16 m	1
6	The median and mode respectively of a frequency distribution are 26 and 29. Then, its mean is (a) 27.5 (b) 24.5 (c) 28.4 (d) 25.8	1
7	The perimeters of two similar triangles are 12 cm and 9 cm. If one median of the first triangle is 16 cm, length of corresponding median of the second triangle is (a) 9 cm (b) 27 cm (c) 12 cm (d) 16 cm	1

8	. If $sin\theta = cos\theta$ then find the value of $2tan\theta + cos^2\theta$ (a)$\frac{10}{4}$ (b) $\frac{20}{6}$ (c)$\frac{2}{5}$ (d) $None\ of\ these$	1
9	If A and B are acute angles such that A > B, then (a) sin A > sin B (b) cos A > cos B (c) sin A = sin B (d) cos A = cos B	1
10	If θ and 2θ – 45° are acute angles such that sin θ = sin (2θ – 45°) then tan θ is (a) 1 (b) – 1 (c) √3 (d) 1/√3	1
11	The length of the shadow of a tower on the plane ground is √3 times the height of the tower. The angle of elevation of the Sun is : (a) 45° (b) 30° (c) 60° (d) 90°	1
12	A ladder leaning against a wall makes an angle of 60° with the horizontal. If the foot of the ladder is 2.5 m away from the wall, the length of the ladder is — (a) 3 m (b) 4 m (c) 5 m (d) 6 m	1

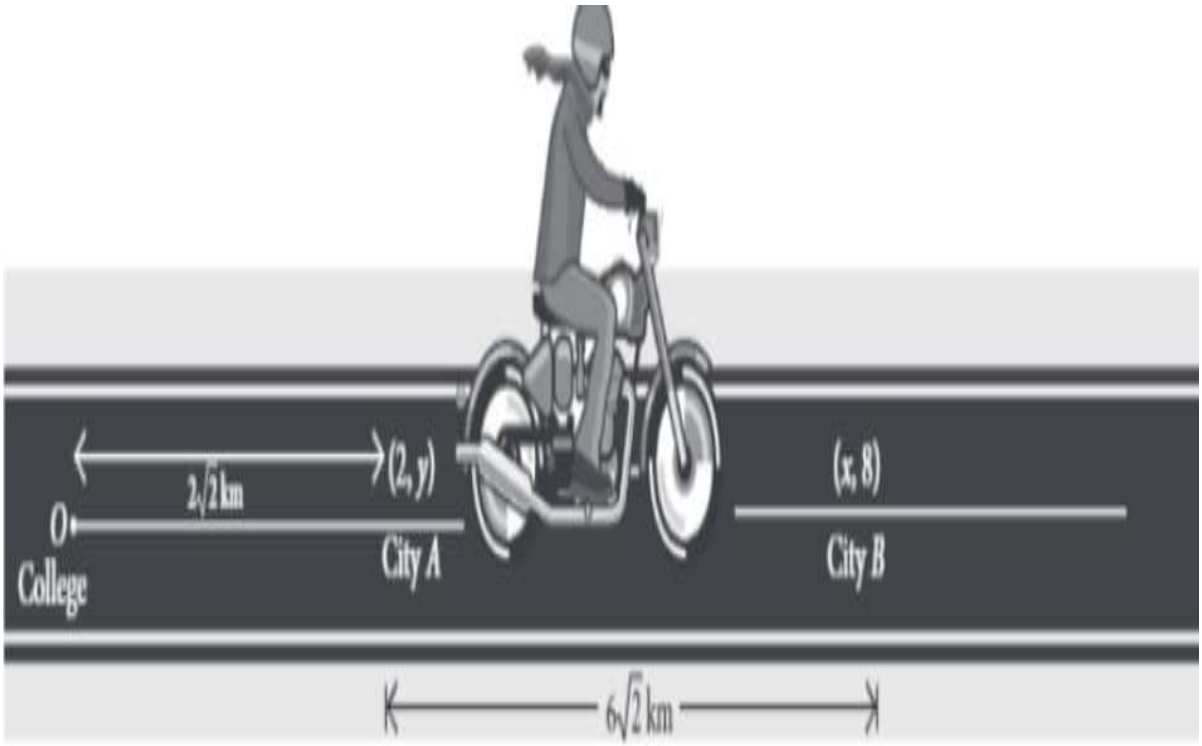
13	A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Length PQ is (a) 12 cm (b) 13 cm (c) 8.5 cm (d) √119 cm	1
14	If the diameter of a semi-circular protractor is 14 cm, then find its perimeter. (a) 58 (b) 51 (c) 36 (d) 88	1
15	A solid piece of iron in the form of a cube of edge 14 cm, contains a solid sphere exactly. The total surface area of the sphere is (a) 616 cm^2 (b) 2464 cm^2 (c) 616 cm (d) 2464 cm	1
16	If the distance between P(4, 0) and Q(0, x) is 5 units, the value of x will be: (a) 2 (b) 3 (c) 4 (d) 5	1
17	The volume and the surface area of a sphere are numerically equal, then the	1

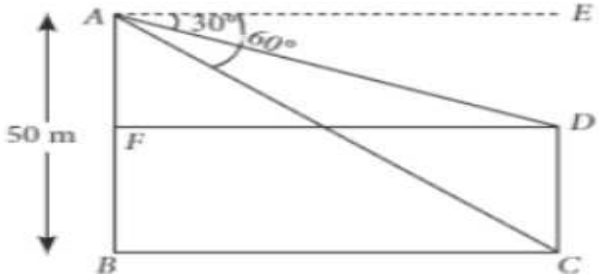
	radius of sphere is (a) 0 units (b) 1 unit (c) 2 units (d) 3 units	
18	Which of the following cannot be the probability of an event? (a) 0.7 (b) 2/3 (c) – 1.5 (d) 15%	1
19	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option **Assertion (A) :** The HCF of two numbers is 18 and their product is 3072. Then their LCM = 169. **Reason (R) :** If a, b are two positive integers, then HCF x LCM = a x b. (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 and 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.	1
20	**Assertion (A) :** The point (-1, 6) divides the line segment joining the points (-3, 10) and (6, -8) in the ratio 2 : 7 internally. **Reason (R) :** Three points A,B and C are collinear if AB + BC = AC	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.	
SECTION – B		
Section B consists of 5 questions of 2 marks each.		
Q. No.	**Questions**	**Marks**
21	For what value of p the pair of linear equations $(p + 2)x – (2p + 1)y = 3(2p – 1)$ and $2x – 3y = 7$ has a unique solution.	2
22	If the corresponding altitudes of two similar triangles are in the ratio 5 : 7. Then find the ratio of their sides.	2
23	In the given figure, O is the centre of the circle, PA and PB are tangents to the circle then find AQB.  	2
24	Figure ABCD is a trapezium of area 24.5 cm^2, In it AD||BC, DAB = 90 °, AD = 10 cm, BC= 4cm. If ABE is a quadrant of a circle. Find the area of the shaded region.  **OR** In a circle with centre O and radius 4 cm, AOB is an arc of angle 30°. Find the area of minor sector and major sector AOB. (Use = 3.14)	2

25	If $\sin\theta + \sin^2\theta = 1$, prove that $\cos^2\theta + \cos^4\theta = 1$ OR Prove that : $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$	2
	SECTION C	
	Section C consists of 6 questions of 3 marks each.	
26	Prove that $\sqrt{3} + \sqrt{5}$ is irrational	3
27	If zeros of the polynomial $ax^2 + bx - c$, a is not equals to 0 are additive inverse of each other then what is the value of b?	3
28	In an AP prove $S_{12} = 3(S_8 - S_4)$ where Sn represent the sum of first n terms of an A.P. **OR** The sum of first 20 terms of an A.P. is one third of the sum of next 20 term. If first term is 1, find the sum of first 30 terms of this A.P.	3
29	If $a\cos A + b\sin A = m$ and $a\sin A - b\cos A = n$. Prove that : $a^2 + b^2 = m^2 + n^2$.	3
30	Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segment joining the points of contact at the centre. **OR** In the given fig. PQ is tangent and PB is diameter. Find the values of angles x and y.  	3
31	A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears	

<table>
<tr><td></td><td>(i) a two digit number
(ii) a perfect square number
(iii) a number divisible by 5.</td><td></td></tr>
<tr><td colspan="3">SECTION D</td></tr>
<tr><td colspan="3">Section D consists of 4 questions of 5 marks each.</td></tr>
<tr><td>32</td><td>A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8 gm mass. (Use $\pi = 3.14$)</td><td>5</td></tr>
<tr><td>33</td><td>Find the sum of first 16 terms of an Arithmetic Progression whose 4th and 9th terms are –15 and –30 respectively.</td><td>5</td></tr>
<tr><td>34</td><td>The largest hemispherical portion is curved out from a cube of edge 7cm. Find the surface area of the resulting solid.
OR
A solid toy is the form of a right circular cylinder with a hemispherical shape at one end and a cone at the other end. Their diameter is 4.2 cm and the heights of the cylindrical and conical portions are 12 cm and 7 cm respectively. Find the volume of the toy.</td><td>5</td></tr>
<tr><td>35</td><td>The mean of the following frequency distribution is 18. The frequency f in the
<table><tr><td>Class Interval</td><td>11–13</td><td>13–15</td><td>15–17</td><td>17–19</td><td>19–21</td><td>21–23</td><td>23–25</td></tr><tr><td>Frequency</td><td>3</td><td>6</td><td>9</td><td>13</td><td>f</td><td>5</td><td>4</td></tr></table>class interval 19-21 is missing. Determine f.</td><td>5</td></tr>
<tr><td colspan="3">SECTION E</td></tr>
<tr><td colspan="3">Case study based questions are compulsory.</td></tr>
<tr><td>36</td><td>A person is riding his bike on a straight road towards East from his college to city A and then to city B. At some point in between city A and city B, he</td><td>4</td></tr>
</table>

	 suddenly realises that there is not enough petrol for the journey. Also, there is no petrol pump on the road between these two cities. Based on the above information, answer the following questions. (i) Find the value of y. (ii) Find the value of x. (iii) If M is any point exactly in between city A and city B, then coordinates of M are **OR** The ratio in which A divides the line segment joining the points O and M is	
37	Amit was playing a number card game. In the game, some number cards (having both +ve or -ve numbers) are arranged in a row such that they are following an arithmetic progression. On his first turn, Amit picks up 6th and 14th card and finds their sum to be -76. On the second turn he picks up 8th and 16th card and finds their sum to be -96.	4

	Based on the above information, answer the following questions. (i) What is the difference between the numbers on any two consecutive cards? (ii) The number on first card is, (iii) What is the number on the 19th card? **OR** What is the number on the 23rd card?	
38	There are two temples on each bank of a river. One temple is 50 m high. A man, who is standing on the top of 50 m high temple, observed from the top that angle of depression of the top and foot of other temple are 30° and   60° respectively. (Take √3 = 1.73) Based on the above information, answer the following questions. (i) Measure of ADF is equal to (ii) Measure of ACB is equal to (iii) Width of the river is **OR** Height of the other temple is.	4

SAMPLE PAPER-11
CLASS-X
SUB: MATHEMATICS (041)

Time Allowed: 3 hours **Max.Marks:80**

General Instruction

1. This Question Paper has 5 Sections A-E.
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 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 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks 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 MCQs with one correct option.

1 If HCF and LCM of two numbers are 4 and 9696, then the product of the two numbers is:
(a) 9696 (b) 24242 (c) 38784 (d) 4848

2 If the equation $x^2 - bx + 1 = 0$ has two distinct roots then
(a) $-3<b<3$ (b) $-2<b<2$ (c) $b > 2$ (d) $b<-2$

3 If α, β are the zeroes of the polynomials $f(x) = x^2 - p(x + 1) - c$, then $(\alpha + 1)(\beta + 1) =$
(a) $c - 1$ (b) $1 - c$ (c) c (d) $1 + c$

4 The value of k for which the system of equations $x + 2y = 3$ and $5x + ky + 7 = 0$ has no solution is
(a) 10 (b) 6 (c) 3 (d) 1

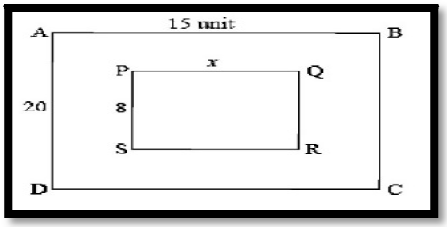
5 The ratio in which x - axis divides the line segment joining the points (5, 4) and (2, –3) is:
(a) 5 : 2 (b) 3 : 4 (c) 2 : 5 (d) 4 : 3

6 XY is drawn parallel to the base BC of a ΔABC cutting AB at X and AC at Y. If AB = 4BX andYC = 2 cm, then AY =
(a) 2 cm (b) 6 cm (c) 8 cm (d) 4 cm

7 The value of $2\sin^2 30° - 3\cos^2 45° + \tan^2 60° + 3\sin^2 90°$ is
(a) 1 (b) 5 (c) 0 (d) none of these

8 If Sin (A + B) = 1 = cos(A – B) then
(a)A = B = 90° (b)A = B = 0° (c)A = B = 45° (d)A = 2B

9 Given Quad. ABCD ~ Quad PQRS then x is



(a)13 units (b)12 units
(c)6 units (d) 15 units

10 If HCF of two numbers is 18 and their sum is 90, then number of such pairs possible are:
(a)1 (b)2 (c)3 (d)4

11 The circumference of a circle is 88 cm. Find the area of the sector whose central angle is 72°.

(a) 123 cm^2 (b) 123.5 cm^2 (c) 123.4 cm^2 (d) none of these

12 The area of a circle circumscribing a square of area 64 $cm^2$is

(a)50.28 cm^2 (b)25.5 cm^2 (c)100.57 cm^2 (d)75.48 cm^2

13 A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at apoint on the minor arc.

(a) 150^o (b) 30° (c) 60° (d) none of these

14 The mean of first five prime numbers is

(a) 5.0 (b) 4.5 (c) 5.6 (d) 6.5

15 If the mean of n observations $x_1, x_2, x_3, ...x_n$is $\bar{x}$then $\sum_{i=1}^{n} x_i - \bar{x}$ is

(a) 1 (b)–1 (c) 0 (d) cannot be found

16 In the formula $\bar{x} = a + \left(\frac{\sum f_i u_i}{\sum f_i} \times h \right)$, finding the mean of the grouped data, u_i =

(a) $\frac{x_i + a}{h}$ (b) $\frac{x_i - a}{h}$ (c) $\frac{a - x_i}{h}$ (d) $h(x_i - a)$

17 A bag has some red balls and 2 yellow balls. A ball is drawn from the bag without looking into thebag. If the probability of getting a red ballis $\frac{2}{3}$, then how many red balls are there?

(a) 6 (b) 4 (c)8 (d) none of these

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

(a) 1 (b) $\frac{7}{25}$ (c) 3 (d) $\frac{24}{25}$

DIRECTION: 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 **Statement: A**: (Assertion)**:** The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.

Statement: R:(Reason)**:** If a and b are two positive integers, then H.C.F. × L.C.M. = a × b.

(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 and 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 **Statement: A**: (Assertion): The value of the product *P*= $\cos 1^0 \cos 2^0 \cos 3^0 \ldots.. \cos 179^0 \cos 180^0$ is zero.

Statement: R:(Reason): The value of $\cos 90^0$ is zero.

(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 and 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.

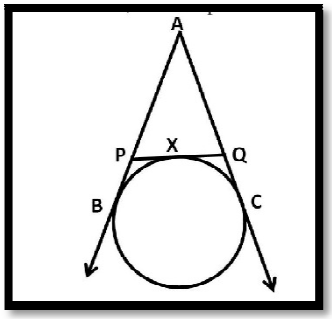
SECTION B

Section B consists of 5 questions of 2 marks each.

21 For what value of k , the following pair of linear equations have no solution?
x + 2y = 5; 3x + ky + 15 = 0

22 ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O.Show that $\frac{AO}{BO}=\frac{CO}{DO}$

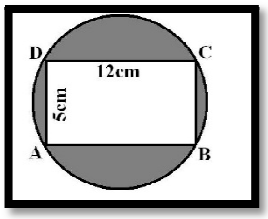
23 In the below figure from an external point A, tangents AB and AC are drawn to a circle. PQ is atangent to the circle at X. If AC =15 cm, find the perimeter of the triangle APQ.



24 The area of a square is the same as the area of a circle. Find the ratio of their perimeters

OR

Find the area of the shaded region in the below figure, if the inscribed rectangle has length 12cm and breadth 5 cm.[Take $\pi = 3.14$]



25 If A and B are acute angles such that tanA= $\frac{1}{3}$, tanB = $\frac{1}{2}$ and tan(A + B) = $\frac{\tan A+\tan B}{1-\tan A\tan B}$.
Find the value of (A + B)= 45°.

OR

If cosecθ = 2, show that $\left\{\cot\theta+\frac{\sin\theta}{1+\cos\theta}\right\}=2$.

SECTION-C

Section C consists of 6 questions of 3 marks each.

26 In a seminar, the number of participants in Hindi, English and Mathematics are 60,84 and 108, respectively. Find the minimum number of rooms required if in each room the samenumber of participants are to be seated and all of them being in the same subject. Also find the number of students in each room.

27 Find the zeroes of the quadratic polynomial $f(x) = abx^2 + (b^2 - ac)x - bc$ and verify therelationship between the zeroes and its coefficients.

28 Two places A and B are 120 km apart on a highway. A car starts from A and another from B atthe same time. If the cars move in the same direction at different speeds, they meet in 6 hours. Ifthey travel towards each other, they meet in 1 hours 12 minutes. Find the speeds of the two cars.

OR

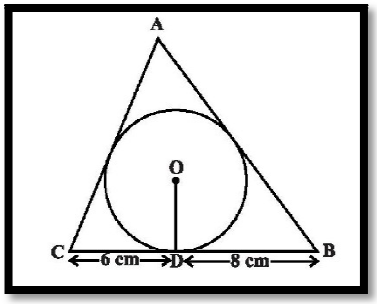
The students of a class are made to stand in rows. If 3 students are extra in a row, there would be1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number ofstudents in the class.

29 Prove that $\frac{\cos\theta}{1-\tan\theta}+\frac{\sin\theta}{1-\cot\theta}=\sin\theta+\cos\theta$

30 Prove that opposite sides of a quadrilateral circumscribing a circle, subtend supplementary anglesat thecentre of circle.

OR

A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD andDC into which BC is divided by the point of contact D, are of lengths 8 cm and 6 cmrespectively. Find the sides AB and AC.



31 A number x is selected from the numbers 1,2,3 and then a second number y is randomlyselected from the number 1, 4, 9. What is the probability that

(i) the product xy of the two numberswill be less than 9?

(ii) the sum of the numbers will be more than 5 but less than 12.

SECTION -D

Section D consists of 4 questions of 5 marks each.

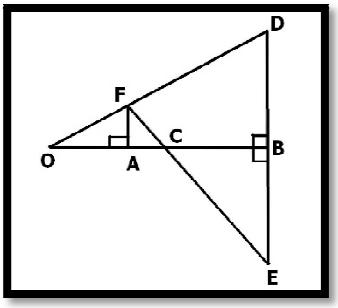
32 In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marksmore in Mathematics and 3 marks less in English, the product of their marks would have been210. Find her marks in the two subjects.

OR

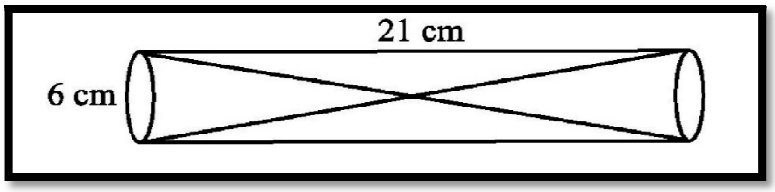
33 If two sides and the median between them of a triangle are proportional to two sides and corresponding median of another triangle then prove the triangles are similar. If the ratio of the square of their corresponding medias is 3:4 then find the ratio of their perimeters.

OR

In the below Figure, OB is the perpendicular bisector of the line segment DE, FA ⊥ OB and FEintersects OB at the point C. Prove that $\frac{1}{OA}+\frac{1}{OB}=\frac{2}{OC}$.

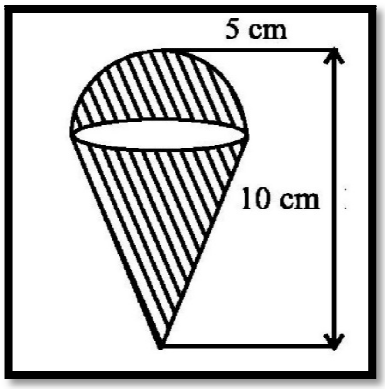


34 Two solid cones A and B are placed in a cylindrical tube as shown in the below figure. The ratioof their capacities is 2:1. Find the heights and capacities of cones. Also, find the volume of theremaining portion of the cylinder.



OR

An ice cream cone full of ice cream having radius 5 cm and height 10 cm as shown in the belowfigure. Calculate the volume of ice cream, provided that its $\frac{1}{6}$ part is left unfilled with icecream.



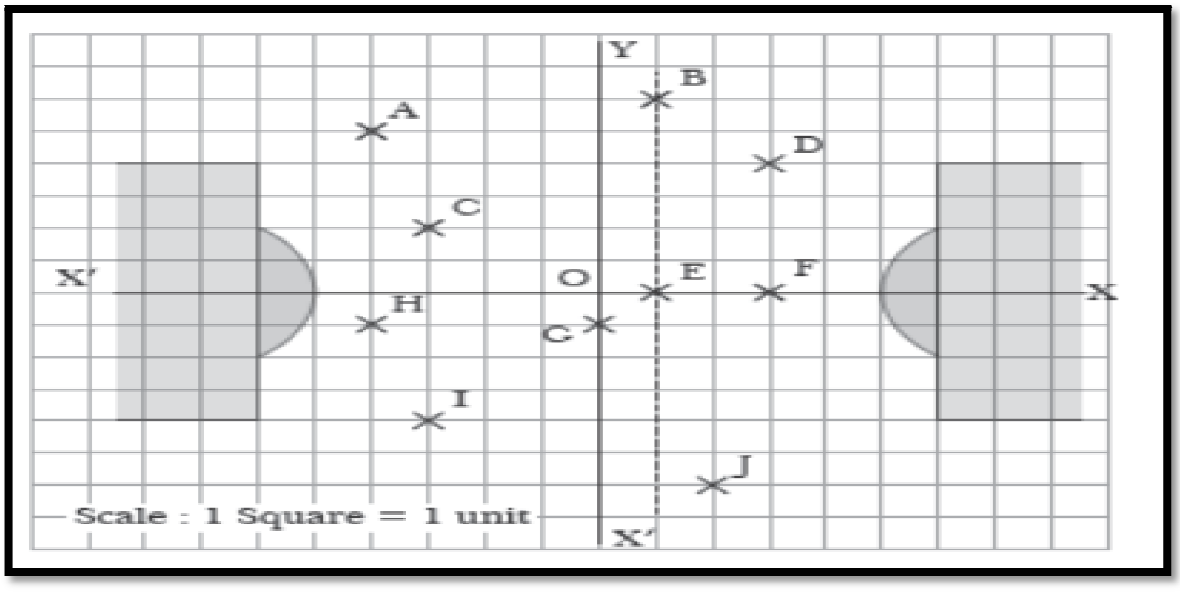
35 Find the missing frequencies in the following frequency distribution table, if the total frequencyis 100 and mode is $46\frac{2}{3}$.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	8	7	x	28	20	10	y

SECTION -E

Section E consists of 3 Case Study Based questions of 4 marks each. All are compulsory.

36 A hand ball team was playing at the court which was in a marked coordinated plane. The centre of both side court is treated as origin. If the players are caught at an instance when a goal was being done by the player at H. Seeing the positions of the players at that point answer the following questions.



(i) If the ball is passed from E to C then find the distance between them.

(ii) If the ball is passed from B to C and then A, what is the horizontal distance the ball travelled?

(iii) If A, B,C,D and E are in one group and F, G, H, I, and J are in another group then on the position which two players pass of ball could be the longest pass of ball to their group members. And what is the longest horizontal distance the ball could travel?

37 Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month, answer the following:

(i)Findthe amount paid by him in 30th instalment is
(ii)Find in how many months the repayment will be completed?
(iii) What amount does he still have to pay after 30th instalment?

OR

If the increase in instalment will be Rs200 then in how many months the Repayment can becompleted approximately?

38 An electrician has to repair on electric fault on a pole of height 4m. he needs to reach a point1.3m below the top of the pole to undertake the repair work.

(take $\sqrt{3}$ =1.732)

(i) Draw a neat levelled diagram for this situation showing the information.

(ii)What should be the height of theladder that he should use at angle of 60° to the horizontal, would enable him reach the requiredposition?

(iii)Find how far the foot of the pole should he place the foot of the ladder to reach to the desired height. If the ladder slips down from 60^0 to 30^0also find how much distance it will come back in the same straight line?

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SAMPLE PAPER-12

SUB: MATHEMATICS Max. Mark: 80

CLASS- X Time : 3 Hrs

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 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 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks 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 marks each.)

Q1.If one zero of a quadratic polynomial, $f(x) = x^2+3x+2k$ is -2,

then find the value of k.

(a) -1 (b) 0 (c) 1 (d) 12

Q2. If two positive integers a and b are written as

$a = p^3q^2$ and $b = pq^3$; p, q are prime numbers. Find HCF (a, b) × LCM (a,b)

(a) p^3q^2 (b) p^3q (c) p^3q^3 (d) p^4q^5

Q3. If $\propto$ and β are the roots of the equation $2x^2 – 3x – 6 = 0$. The equation whose roots are $1/\alpha$ and $1/\beta$ is

(a) $6x^2 – 3x + 2=0$ (b)$6x^2 + 3x – 2 =0$ (c)$6x^2 – 3x – 2 =0$ (d)$x^2 + 3x-2 = 0$

Q4.Find the value of p for which the system of equations

$px – y = 2$ and $6x – 2y = 3$ has unique solution.

(a) $p\neq 4$ (b) $p\neq 3$ (c) $p\neq 2$ (d) $p\neq 1$

Q5. If Δ ABC ~ ΔRPQ, AB = 3 cm, BC = 5 cm, AC = 6 cm, RP = 6 cm and PQ = 10 cm, then find QR .

(a) 1cm (b) 10 cm (c) 16cm (d) 12cm

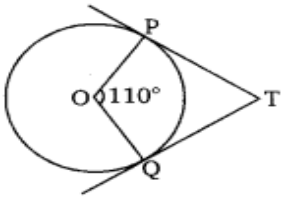
Q6.If $\cos A = \frac{4}{5}$, then find tanA .

(a) 1/2 (b) ¾ (c) 1/3 (d) 3/2

Q7.If ABC and DEF are similar triangles such that ∠A = 47° and ∠E = 63°, then the measures of ∠C = 70°. Is it true?

(a) True(b) False(c) No (d) None of these

Q8.In figure, if TP and TQ are the two tangents to a circle with centre O, So that ∠POQ = 110°, then ∠PTQ is equal to



(a) 60^0 (b) 50^0 (c) 90^0 (d) 70^0

Q9.Find mode, using an empirical relation, when it is given that mean and median are 10.5 and 9.6 respectively.

(a) 9.7 (b) 5.4 (c) 8.7 (d) 7.8

Q10.Find mean of first five prime numbers.

(a) 5.9 (b) 8.2 (c) 5.6 (d) 7.9

Q11. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°.

(a) 131/7 cm^2 (b) 133/7 cm^2 (c) 134/7 cm^2 (d) 132/7 cm^2

Q12. A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is red.

(a) 3/5 (b) 3/8 (c) 5/8 (d) 5/3

Q13. If θ = 45°, then what is the value of $2\sec^2\theta + 3\operatorname{cosec}^2\theta$.

(a) 5 (b) 12 (c) 8 (d) 10

Q14.If the distance between the points (x, -1) and (3, 2) is 5, then the value of x is

(a) -7 or -1 (b) -7 or 1 (c) 7 or 1 (d) 7 or -1

Q15. What is the minimum value of sin A, $0 \leq A \leq 90°$

(a) -1 (b) 0 (c) 1 (d) 12

Q16. In ΔABC, if DE || BC, AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, then value of x is

(a) 3 (b) 4 (c) 5 (d) 3.5

Q.17. A cylinder, a cone and a hemisphere are of equal base and have the same height. What is the ratio of their volumes?

(a) 3 : 1 : 2 (b) 3 : 2 : 1 (c) 1 : 2 : 3 (d) 1 : 3 : 2

Q18. If the radius of a circle is doubled, its area becomes

(a) 2 times (b) 8 times (c) 4 times (d) 16 times

Q19**. Assertion:** The only prime in the factorization of 4^n is 2.

Reason: The uniqueness of the Fundamental Theorem of Arithmetic guarantees that there are no other primes in the factorization of 4^n.

(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.

Q20. **Assertion**: The point (4, 0) lies on y-axis.

Reason : The x-coordinate of the point on y-axis is zero.

a) Both Assertion and Reason are correct and Reason is the correct explanation for Assertion

b) Both Assertion and Reason are correct and Reason is not the correct explanation for Assertion.

c) Assertion is true but the reason 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. Solve the following pair of linear equations for x and y:
141x + 93y = 189;93x + 141y = 45

22.If $\Delta ABC \sim \Delta PQR$, perimeter of ΔABC = 32 cm, perimeter of ΔPQR = 48 cm and PR = 6 cm, then find the length of AC.

23. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.

24. A square is inscribed in a circle. Calculate the ratio of the area of the circle and the square.

OR

If the area of a circle is equal to sum of the areas of two circles of diameters 10 cm and 24 cm, calculate the diameter of the larger circle (in cm).

25. Solve the following: $0° < \theta < 90°$

$2 \sin^2 \theta = 3/2$

OR

If $(1 + \cos A)(1 - \cos A) = 3/4$, find the value of sec A.

SECTION C

(Section C consists of 6 questions of 3 marks each.)

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

27. α and β are zeroes of the quadratic polynomial $x^2 - 6x + y$. Find the value of 'y' if $3\alpha + 2\beta = 20$.

28.In a flight of 600 km, an aircraft was slowed due to bad weather. Its average speed for the trip was reduced by 200 km/hr and the time of flight increased by 30 minutes. Find the original duration of the flight.

OR

Find two consecutive positive integers, the sum of whose squares is 365.

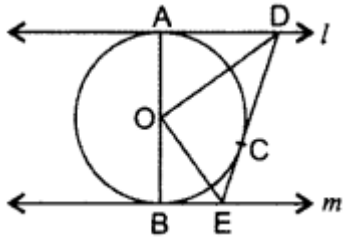
29.Prove the following trigonometric identities.

$(\text{cosec}\theta + \sin\theta)(\text{cosec}\theta - \sin\theta) = \cot^2\theta + \cos^2\theta$

30.Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the center of the circle.

OR

In the figure, l and m are two parallel tangents to a circle with center O, touching the circle at A and B respectively. Another tangent at C intersects the line l at D and m at E. Prove that ∠DOE = 90°.



31. A bag. contains cards numbered from 1 to 49. A card is drawn from the bag at random, after mixing the cards thoroughly. Find the probability that the number on the drawn card is

1. an odd number.
2. a multiple of 5.
3. a perfect square.

SECTION-D

(Section D consists of 4 questions of 5 marks each)

32. If the roots of the quadratic equation
$(x – a)(x – b) + (x – b)(x – c) + (x – c)(x – a) = 0$
are equal, then show that $a = b = c$.

OR

In a class test, the sum of Shefali's marks in Mathematics and English is 30. Had she got 2 marks more in Mathematics and 3 marks less in English, the product of her marks would have been 210. Find her marks in the two subjects.

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

Using the above theorem,DE || BC. If AD = x, DB = x – 2, AE = x + 2 and EC = x – 1, find the value of x.

34. Shelvi's house has an overhead tank in the shape of a cylinder. This is filled by pumping water from a sump (an underground tank) which is in the shape of a cuboid. The sump has dimensions 1.57 m × 1.44 m × 95cm. The overhead tank has a radius of 60 cm and a height of 95 cm. Find the height of the water left in the sump after the overhead tank has been completely filled with water from the sump which had been full. Compare the capacity of the tank with that of the sump. (Use $\pi = 3.14$)

OR

Metallic spheres of radii 6 cm, 8 cm and 10 cm, respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.

35.The lengths of 40 leaves of a plant are measured correct to the nearest millimeterand the data obtained is represented in the following table :

Length(in mm)	Number of leaves
118-126	3
127-135	5
136-144	9
145-153	12
154-162	5
163-171	4
172-180	2

Find the median length of leaves.

36.Case study based question–I

There are 25 trees at equal distance of 5m from the wall planted by a gardener in the school premises. All the trees are planted in the line of the wall. The

distance of the wall from the nearest tree is 10 m.The gardener starts watering all the trees from the tree nearest to the wall to the farthest one and comes. He waters each tree and comes back to the tap and refills his bucket and waters the next. Answer the following questions using the given passage.

(i) State the A.P. formed in terms of the distance covered by the gardener each time he waters the tree. (1)
(ii) How much distance the gardener needs to travel to water the 15th tree?(1)
(iii) What is the total distance covered by the gardener? (2)
or
What is the total distance required to be covered in order for watering the sixth tree? (2)
37.Case study based question -II

Trigonometry in the form of triangulation forms the basis of navigation, where it is by land ,sea and air. GPS a radio navigation system helps to locate our position on earth with the help of satellites. A guard stationed at the top of a 240metres tower, observed an unidentified boat coming towards it. A clinometre is an an instruments used for measuring angles and slopes. The guard used the clinometre to measure the angle of depression of the boat coming towards the lighthouse and found it to be 30^0.

i)Make a labeled figure on the basis of the given information. (1)

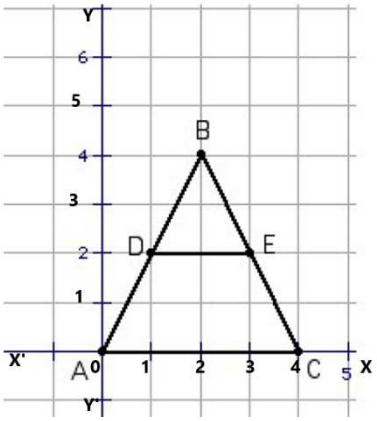
ii)Calculate the distance of the boat from the foot of the observation tower. (1)

iii) After 10 minutes , the guard observed that boat was approaching the tower and its distance from the tower is reduced by $240(\sqrt{3}-1)$ metre. He immediately raised the alarm. What was the new angle of depression of the boat from the top of observation tower. (2)

OR

As observed from the top of a 240 m high tower from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. (2)

38.Case study based question -III



In the above given image, a triangle with vertices A, B and C are shown. The line segments AB, BC and AC are made after joining the three vertices with a straight line in the cartesian system. The points shown in the image lies in the same coordinates of the cartesian system. Refer to the image and information given above and answer the following questions.

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

(ii) By section formula, can we say that point A and B are internally divided in 1:1 at D? (1)

(iii) Find the length of median passing through vertex B . (2)

OR

Find the coordinate of centroid of triangle ABC . (2)

SAMPLE PAPER - 13
Class- X Session- 2022-23
Subject- Mathematics

Time Allowed: 3 Hrs. Maximum Marks: 80

General Instructions:

1. This Question Paper has 5 Sections A-E.
2. Section **A** has 20 MCQs carrying 1 mark each
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. 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 2marks 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. The largest number which divides 70 and 125 leaving remainders 5 and 8 respectively is

a) 13 b) 65 c) 875 d) 1750

2.If difference of the roots of the quadratic equation $x^2 + kx + 12 = 0$ is 1 the positive value of k is

a) 4 b) -7 c) 7 d) 8

3. If α and β are zeros of the polynomial $p(x) = x^2 + x - 1$ then find $\frac{1}{\alpha} + \frac{1}{\beta}$

a) -1 b) 1 c) 0 d) 4

4.The value of k for which kx+2y =5 and 3x +y =1 have unique solution, is:

(a) k= -1 (b) k ≠ 6 (c) k =6 (d) k =2

5. If two adjacent vertices of a parallelogram are (3 2), and (-1 0), and the diagonals intersect at (2 -5), then find the co-ordinates of the other two vertices.

(a) (- 14, 4) and (-10, 5) (b) (4, -14) and (5 -10) (c) (1, -12) and (5, -10)(d) (-12,1) and (-10, 5)

6.If ΔABC ~ ΔDEF and ΔABC is not similar to ΔDEF then which of the following is not true?

(a) BC.EF = AC.FD(b) AB.ED = AC.DE(c) BC.DE = AB.EE(d) BC.DE = AB.FD

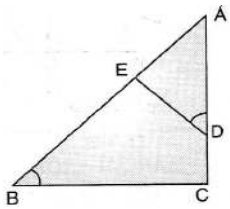
7. If sin A – cos A = 0, then the value of $\sin^4 A + \cos^4 A$ is

(a) 2(b) 1(c) ¾(d) 1/2

8. If sec A + tan A = x, then tan A =

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

9. ΔADE ~ ΔABC. if AD = 7.6 cm, AE = 7.2 cm BE = 4.2 cm and BC = 8.4 cm, then find DE.



(a) 5.6 cm (b) 2.8 cm (c) 4.8 cm (d) 3.8 cm

10. If in triangles ABC and DEF, AB/DE=BC/FD, then they will be similar, if

(a) ∠B = ∠E(b) ∠A = ∠D(c) ∠B = ∠D(d) ∠A = ∠F

11. If the circumference of a circle and the perimeter of a square are equal, then

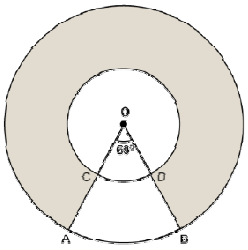
(a) area of the circle = area of the square

(b) area of the circle > area of the square

(c) area of the circle < area of the square

(d) nothing definite can be said about the relation between the areas of the circle and square.

12. In the given fig.two concentric circle with Centre O have radii 21 cm and 42 cm. If <AOB =60^0, what is the area of the shaded region?



(a) 3465 cm^2 (b) 1236 cm^2 (c) 4168 cm^2 (d) 1968 cm^2

13.What is the maximum length of a pencil that can be placed in a rectangular box of dimensions (8 cm × 6 cm × 5 cm)?

14.What is the value of x, if the median of the following data is 27.5?

24, 25, 26, x + 2, x + 3, 30, 33, 37

15.If the mode is 8 and mean is also 8 then median will be ___

16. Find the radius of a circle whose circumference is equal to sum of the circumference of the two circles of diameters are 36 cm and 20 cm

17.The probability of selecting a rotten apple ran domly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

18.If sin θ = 1/2, then find the value of 3 cos θ – 4 $\cos^3$ θ

19. **DIRECTION**: In the question number 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R).Choose the correct option

Statement A (Assertion): The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162.

Statement R(Reason) : If a and b are two positive integers, then H.C.F. × L.C.M. = a × b.

(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 and 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.**Statement A** (Assertion): The point (0, 4) lies on y-axis.

Statement R(Reason) : The x-coordinate on the point on y-axis is zero.

(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 and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason(R) is false.

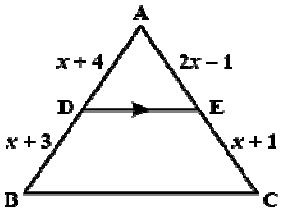
(d) Assertion (A) is false but reason(R) is true.

SECTION B

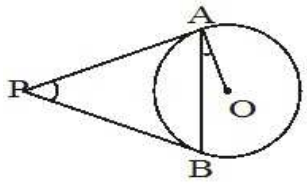
Section B consists of 5 questions of 2 marks each.

21.If 19x -17y =55 and 17x -19y =53 then, the value of x -y is:

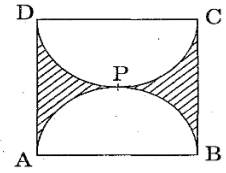
22.In the given fig.*DE* || *BC*. In the figure the value of *x*



23.Two tangents PA and PB are drawn to a circle with center O from an external point P. Prove that ∠APB=2∠OAB

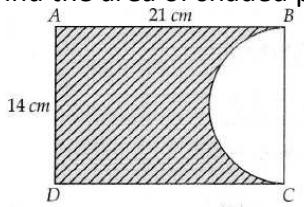


24.Find the perimeter of the shaded region.



OR

Find the area of shaded portion.



25.Given that $\sin(A + 2B) = \sqrt{3}/2$ and $\cos(A + 4B) = 0$ where *A* and*B* are acute angles. The value of *A* is

OR

If cos θ + sin θ = *p* and sec θ + cosec θ = *q*, then find the value of $q(p^2 - 1)$

SECTION C

Section C consists of 6 questions of 3 marks each

26.Prove that $\sqrt{2} + \sqrt{7}$ is not rational number.

27.Find the value of *k* such that $3x^2 + 2kx + x - k - 5$ has the sum of the zeroes as half of their product.

28.In a function if 10 guests are sent from room *A* to *B*, the number of guests in room *A* and *B* are same. If 20 guests are sent from *B* to *A*, the number of guests in *A* is double the numbr of guests in *B*. Find number of guests in both the rooms in the beginning.

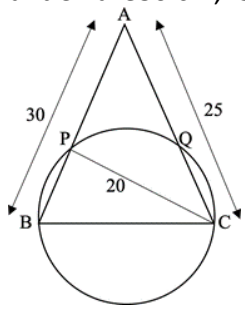
OR

A mobile company charges a fixed amount as monthly rental which includes 100 minutes free per month and charges a fixed amount these after for every additional minute. Abhishek paid Rs. 433 for 370 minutes and Ashish paid Rs. 398 for 300 minutes. Find the bill amount under the same plain, if Usha use for 400 minutes.

29.Prove that $\frac{\tan\theta+\sec\theta-1}{\tan\theta-\sec\theta+1}=\frac{\cos\theta}{1-\sin\theta}$

.

30.A circle with a diameter of BC is drawn on the triangle ABC, intersecting AB and AC atpoints P and Q, respectively. Find the length of BQ in cm using similarity of triangles ifthelengthsof AB,AC, andCP are30 cm,25 cm,and 20cm, respectively.



OR

If a, b, c are the sides of a right triangle where c is the hypotenuse , then prove that radius r of the circle touches the sides of the triangle is given by r= (a+b-c)/2.

31.Out of the families having three children, a family is chosen random. Find the probability that the family has

(i) Exactly one girl

(ii) At least one girl

(iii) At most one girl

SECTION D

Section D consists of 4 questions of 5 marks each.

32.A fox and an eagle lived at the top of a cliff of height 6m, whose base was at a distance of 10m from a point A on the ground. The fox descends the cliff and went straight to the point A. The eagle flew vertically up to a height *x* meters and then flew in a straight line to a point A, the distance traveled by each being the same. Find the value of x.

OR

A pole has to be erected at a point on the boundary of a circular park of diameter 13m in such a way that the differences of its distances from two diametrically opposite fixed gates A & B on the boundary in 7m. Is it possible to do so? If answer is yes atwhat distances from the two gates should the pole be erected.

33.ABC is a right triangle, right angled at C. If p is the length of the perpendicular from C to AB and a, b, c have the usual meaning, then prove that

i) $cp = ab$ii)$\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

34.From a solid cylinder whose height is 8cm and radius 6cm, a conical cavity of height 8cm and of base radius 6cm, is hollowed out. Find the volume of the remaining solid correct to two places of decimals. Also find the total surface area of the remaining solid [take =3.14]?

OR

A golf ball has radius of r cm. It has 175 hemispheres carved from its surface such that the totalvolumeoftheballis$566\pi cm^3$.Ifthediameterofahemisphereis2cm,calculatetheoutersurfaceareaof theball.

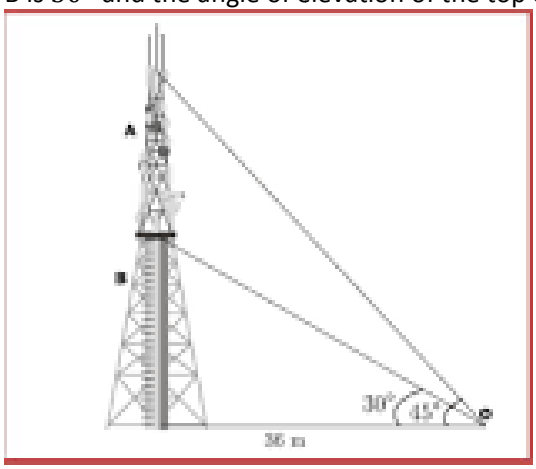
35.If the median of the following data is 32.5. Find the value of x and y.

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

SECTION E

Case study based questions are compulsory.

36.Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure, including microwave dishes. They are among the tallest human-made structures. There are 2 main types: guyed and self-supporting structures. On a similar concept, a radio station tower was built in two sections A and B . Tower is supported by wires from a point O . Distance between the base of the tower and point O is 36 m. From point O , the angle of elevation of the top of section B is 30^0 and the angle of elevation of the top of section A is 45^0



(i) What is the height of the section B ?

(ii) What is the height of the section A ?

(iii) What is the length of the wire structure from the point O to the top of section A ?

37.

Barun lives in Rourkela,odisha. Satellite image of his colony is shown in given figure. In this view, his house is pointed out by a flag, which is situated at the point of intersection of x and y - axes. If he goes 2 cm east and 3 cm north from the house, then he reaches to a grocery store, If he goes 4 cm west and 6 cm south from the house, then he reaches to his office. If he goes 6 cm east and 8 cm south from the house, then he reaches to a food court. If he goes 6 cm west and 8 cm north from the house, he reaches to his kid's school. Based on the above information, answer the following questions.

(i) Find the distance between grocery store and food court.

(ii) Find the distance of the school from the house.

(iii)If the grocery store and office lie on a line, what is the ratio of distance of house from grocery store to that from office?

OR

Find the ratio of distances of house from school to food court.

38.Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs 1,18,000 by paying every month starting with the first instalment of Rs 1000. If he increases the instalment by Rs 100 every month, answer the following:

i) Find the The amount paid by him in 30th installment

ii) What amount does he still have to pay offer 30th installment?

iii) Find The ratio of the 1st installment to the last installment

SAMPLE PAPER-14
Subject: Mathematics (Standard)
CLASS - X

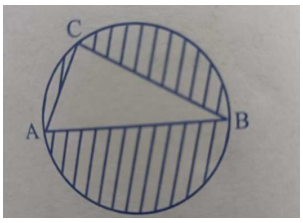
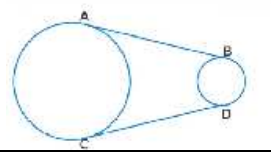
Time Allowed: 3 Hrs. **Max Marks: 80**

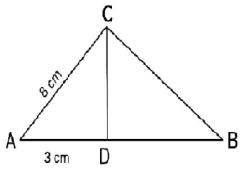
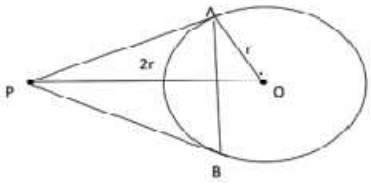
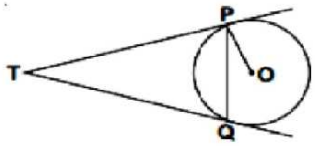
General Instructions:

1. This Question Paper has 5 Sections: A - E.
2. Section **A** has 20 MCQs carrying 1mark each.
3. Section **B** has 5 questions carrying 02 marks each.
4. Section **C** has 6 questions carrying 03 marks each.
5. Section **D** has 4 questions carrying 05 marks each.
6. Section **E** has 3 case based integrated units of assessment (04 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 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π = 22/7 wherever required if not stated.

	SECTIONA	
	Section A consists of 20 questions of 1 mark each.	mark
1.	If two positive integers p and q can be expressed as p = $ab^2$and q = a^3b; a, b being prime numbers, then LCM (p, q) is (a) ab (b) a^2b^2 (c) a^3b^2 (d) a^3b^3	1
2.	Value of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is (a) 0 only (b) 4 (c) 8 only (d) 0 and 8	1
(b)	If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is (a) 10 (b) -10 (c) 5 (d) -5	1
(c)	AOBC is a rectangle whose three vertices are vertices A (0, 3), O (0, 0) and B (5, 0). The length of its diagonal is (a) 5 (b) 3 (c) $\sqrt{34}$ (d) 4	1
(d)	If ΔABC ~ ΔQRP, $\frac{\text{perimeter (A BC)}}{\text{perimeter (PQR)}} = \frac{9}{8}$, AB = 18 cm , BC = 15 cm and AC =12 cm then PR is equal to (a) 10.6 cm (b) 12cm (c)20cm (d) 8cm	1
(e)	If the perimeter of the circle and square are equal, then the ratio of their areas will be equal to: a) 14:11 (b) 22:7 (c) 7:22 (d) 11:14	1
(f)	If the radius and slant height of a cone are in the ratio 3: 5 and curved surface area is 9240cm^2, then its radius is a) 13 cm (b) 42 cm (c)14cm (d) 21cm	1

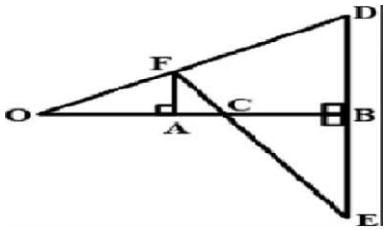
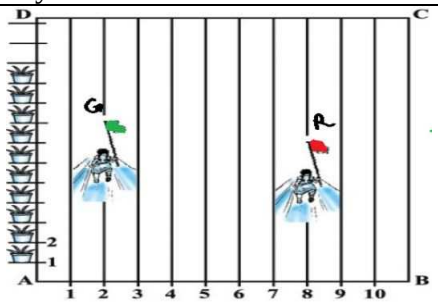
(g)	The mode and mean is given by 7 and 8, respectively. Then the median is: (a) 1/13 (b) 13/3 (c) 23/3 (d) 33	1
(h)	If TP and TQ are the two tangents to a circle with centre O so that ∠POQ = 110°, then ∠PTQ is equal to (a) 60° (b) 70° (c) 80° (d) 90°	1
(i)	If the mean of first n natural numbers is 3n/5, then the value of n is: (a) 3 (b) 4 (c) 5 (d) 6	1
(j)	A bag has 5 white marbles, 8 red marbles and 4 purple marbles. If we take a marble randomly, then what is the probability of not getting purple marble? (a) 0.5 (b) 0.66 (c) 0.08 (d) 0.76	1
(k)	$\frac{2\tan 30°}{1+\tan^2 30°}$ = (a) sin 60° (b) cos 60° (c) tan 60° (d) sin 30°	1
13	If four sides of a quadrilateral ABCD are tangent to the circle, then a) AB + CD = BC +AD (b) AC + AD =BC +BD (c) AB + CD =AC + BC (d) AC+AD =BD+CD	1
14	The mean of the following distribution is x_i: 11, 14, 17, 20 f_i: 3, 6, 8, 7 (a) 15.6 (b)17 (c)14.8 (d)16.4	1
15	If the volume of a cube is 1331 cm^3, then the length of its edge is equal to (a) 11 cm (b) 12 cm (c) 13 cm (d) 17 cm	1
16	For the following distribution C.I.: 0-10, 10-20, 20-30, 30-40, 40-50 f: 20, 30, 24, 40, 18 the sum of lower limit of modal class and median class (a)20 (b)30 (c)40 (d)50	1
17	A box of 600 bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. Then the probability that it is non-defective bulb is: (a) $\frac{143}{150}$ (b) $\frac{49}{50}$ (c) $\frac{1}{25}$ (d) $\frac{1}{50}$	1
18	If Δ ABC is right angled at C, then the value of cos (A+B) is (a) 0 (b) 1 (c) ½ (d) √3/2	1
`19	**DIRECTION:** In the question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option **Statement A :(Assertion):**The HCF of two numbers is 5 and their product is 105, then their LCM = 35 **Statement R : (Reason) :**If a,b are two positive integer, then HCF (a,b) × LCM (a,b) = a× b a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of	1

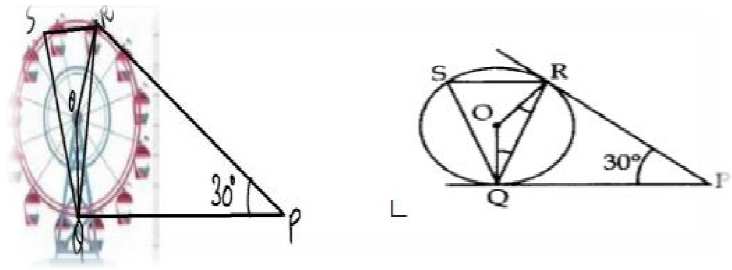
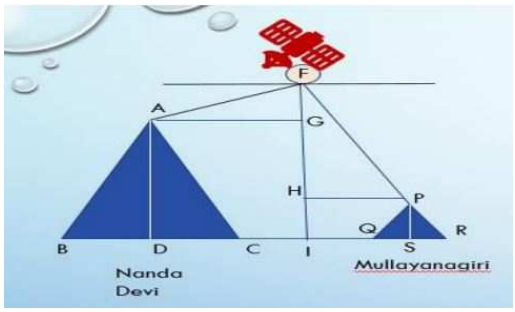
	assertion (A) b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) c) Assertion (A) is true but reasons (R) is false. d) Assertion (A) is false but reasons (R) is true.	
20	**Statement A : (Assertion):** The three vertices of a parallelogram taken in order are (-1,-6), (2,-5) and (7,2) then its fourth vertex is (4,1) **Statement R : (Reason):** Diagonals of a parallelogram bisect each other. (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 and 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.	1
	SECTION - B	
	Section B consists of 5 questions of 2 marks each.	Marks
21	Given that : sin (A+B) = sin A.cos B + cos A.Sin B Find the value of sin 75°	2
22	Area of a sector of a circle of radius 36cm is 54 cm^2. Find the length of corresponding arc of the sector. (**Or)** AB is a diameter of the circle, AC =6cm and BC = 8 cm .Find its area of the shaded region. 	2
23	Do the equations 4x + 3y = 6 and 12x + 9y = 15 represents a pair of coincident lines? Justify Your answer.	2
24	AB and CD are common tangents to two circles of unequal radii. Prove that AB = CD. 	2

25	In the given figure, if ∠ACB = ∠CDA, AC =8 cm and AD =3cm, Find BD. 	2
	SECTION – C Section C consists of 6 questions of 3 marks each	
26	If α and β are the zeros of the quadratic polynomial F(x) = $x^2 - p(x+1) - C$, Show that $(\alpha + 1)(\beta + 1) = 1 - C$.	3
27	If a cos θ + b sin θ = C, then prove that a sin θ –b cos θ = $\pm\sqrt{a^2 + b^2 - c^2}$	3
28	 From a point P two tangents PA and PB are drawn to a circle with centre O. If OP is the diameter of the circle, Show that Δ APB is equilateral. (OR) Two tangents TP and TQ are drawn to circle with centre O, from an external point T. Prove that ∠ PTQ = 2 ∠OPQ 	3
29	Cards marked with numbers 5 to 50, are placed in a box and mixed thoroughly. A card is drawn from the box at random. Find the probability that the number on the card taken out is : (a) A prime number less than 20 (b) A perfect square number (c) A multiple of 5	3
30	If $\sqrt{ab}$ is an irrational number, prove that $\sqrt{a}+\sqrt{b}$ is an irrational.	3
31	If the list price of a toy is reduced by Rs 2, a person can buy 2 toys more for Rs 360. Find the original price of the toy. **(OR)** At t minutes past 2 pm ,the time needed by its minute hand of a clock to show 3 pm was found to be 3 minutes less than $\frac{t^2}{4}$ minutes .Find t.	3
	SECTION – D Section D consists of 4 questions of 5 marks each	
32	Find the mean marks by (step-deviation method)	5

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	4	10	18	28	40	70

33	A gulabjamun contains sugar syrup up to about 30 % of its volume. Find approximately how much syrup would be found in 45 gulabjamuns shaped like a cylinder with two hemispherical ends, if the complete length of each of them is 5cm and its diameter is 2.8cm.	5

	(OR) The diameter of a right circular conical tent is 6m. If a pole of length 2m can be fixed up in the tent at half the distance of the radius from the centre of the base, then find the area of the canvas required to make the tent. Also find the volume of air present in the tent.	
34	92 % and 97% pure acid solutions are mixed to obtain 25 liters 94% pure acid solution. Find the quantity of each type of acid to be mixed to form the mixture. (OR) Determine algebraically the vertices of the triangle formed by the lines $5x - y = 5, x + 2y = 1$ and $6x + y = 17$	5
35	 In fig , OB is the perpendicular bisector of the line segment DE , FA $\perp OB$ and FE intersects OB at the point C. Prove that : $\frac{1}{OA} + \frac{1}{OB} = \frac{1}{OC}$	5
	SECTION - E	
	Case based questions are compulsory.	
36	In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs $\frac{1}{4}$ th the distance AD on the 2nd line and posts a green flag. Preet runs $\frac{1}{5}$ th distance AD on the eighth line and posts a red flag.  1. Find the position of green flag. 2. Find the position of red flag. 3. What is the distance between both the flags? OR If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag ?.	1 1 2 2

37	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.  In the given figure (a) find ∠ROQ (b) Find ∠RQP (c) Find ∠RSQ OR (d) Find ∠ORP	 1 1 2 2
38	Satellite flying at height h is watching the top of the two tallest mountains in Uttarakhand and Karnataka, them being Nanda Devi(height 7,816m) and Mullayanagiri (height 1,930 m). The angles of depression from the satellite, to the top of Nanda Devi and Mullayanagiri are 30° and 60° respectively. If the distance between the peaks of the two mountains is 1937 km, and the satellite is vertically above the midpoint of the distance between the two mountains.  (a) The distance of the satellite from the top of Mullayanagiri is (b) The distance of the satellite from the ground is (c) What is the angle of elevation if a man is standing at a distance of 7816m from Nanda Devi? OR (d) If a mile stone very far away from, makes 45^{o} to the top of Mullanyangiri Mountain. So, find the distance of this mile stone from the mountain.	 1 1 2 2

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