SECTION-A (This section comprises multiple choice questions of 1 mark each)

1). Mr. Sharma buys a property every year for 12 years. Every year he buys n acres more than the previous year. If in the 8th year he bought 45 acres of land and in the 5th year he bought 30 acres of land, how many acres did he buy in the last year?

a) 60 acres (b) 65 acres (c) 115 acres (d) 125 acres

2) The solution of the pair of equations $x = -5$ and $y = 6$ is

a) $(-5, 6)$ (b) $(-5, 0)$ (c) $(0, 6)$ (d) $(0, 0)$

3) If the lines represented by equations $3x + 2my = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of m is:

a) $\frac{2}{5}$ (b) $-\frac{5}{4}$ (c) $\frac{3}{2}$ (d) $\frac{15}{4}$

4) which of the following rational numbers is expressible as a terminating decimal?

a) $\frac{124}{165}$ (b) $\frac{131}{30}$ (c) $\frac{2027}{625}$ (d) $\frac{1625}{462}$

5) what is the largest number that divides each one of 1152 and 1664 exactly?

a) 32 (b) 64 (c) 128 (d) 256

6) In a rectangle, the angle between a diagonal and a side is $30°$ and the length of the diagonal is 8 cm. The area of the rectangle is:

a) 16 cm^2 (b) $\dfrac{16}{\sqrt{3}} \text{ cm}^2$ (c) $16\sqrt{3} \text{ cm}^2$ (d) $8\sqrt{3} \text{ cm}^2$

7) In the given figure, DE and DF are tangents from an external point D to a circle with centre A. If DE = 5 cm and $DE \perp DF$ then the radius of the circle is:

a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm
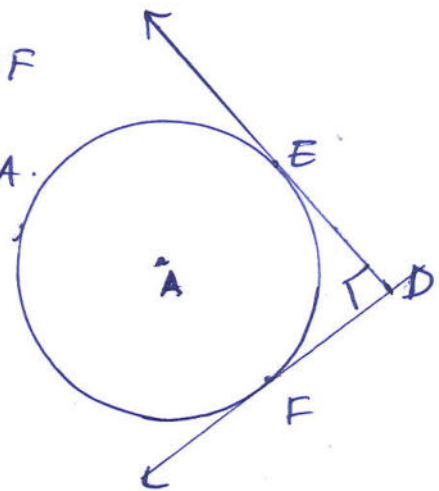
8) If $\cos A + \cos^2 A = 1$ then

$\sin^2 A + \sin^4 A = ?$

a) 1 (b) 2 (c) 4 (d) 3

9) There are 25 tickets numbered as $1, 2, 3, \cdots, 25$. One ticket is drawn at random. What is the probability that the number on the ticket is a multiple of 3 or 5?

a) $\dfrac{2}{5}$ (b) $\dfrac{11}{25}$ (c) $\dfrac{12}{25}$ (d) $\dfrac{13}{25}$

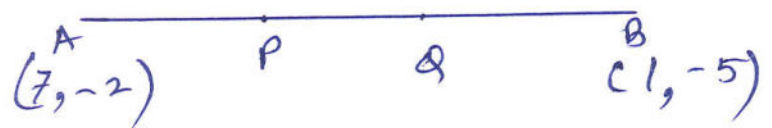10) The areas of two concentric circles are 1386 cm^2 and 962.5 cm^2. The width of the ring is:

a) 2.8 cm (b) 3.5 cm (c) 4.2 cm (d) 3.8 cm

11) $(\operatorname{cosec}\theta - \cot\theta)^2 = ?$

a) $\dfrac{1 + \cos\theta}{1 - \cos\theta}$ (b) $\dfrac{1 - \cos\theta}{1 + \cos\theta}$ (c) $\dfrac{1 + \sin\theta}{1 - \sin\theta}$ (d) none of these

12) In the given figure $P(5, -3)$ and $Q(3, y)$ are the points of trisection of the line segment joining $A(7, -2)$ and $B(1, -5)$. Then y is equal to:

a) 2 (b) 4 (c) -4 (d) $-5/2$

13) In $\triangle ABC$ and $\triangle DEF$, it is given that $\angle B = \angle E$, $\angle C = \angle F$ and $AB = 3DE$, then the two triangles are :
a) congruent but not similar
b) similar but not congruent
c) neither congruent nor similar
d) similar as well as congruent

14) If $A(1,3)$, $B(-1,2)$, $C(2,5)$ and $D(x,4)$ are the vertices of a parallelogram $ABCD$, then the value of x is :
a) 3
(b) 4
(c) 0
(d) $\frac{3}{2}$

15) $5 + 13 + 21 + \cdots + 181 = $?
a) 2476
(b) 2337
(c) 2219
(d) 2139

16) If $2 \sin 2\theta = \sqrt{3}$, then $\theta = $?
a) $30°$
(b) $45°$
(c) $60°$
(d) $90°$

17) The mean median and mode of a frequency distribution are 28 and 16 respectively. The median of the same data is :
a) 22
(b) 23.5
(c) 24
(d) 24.5

18) The next term of the A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}, \cdots$ is :
(a) $\sqrt{70}$
(b) $\sqrt{84}$
(c) $\sqrt{98}$
(d) $\sqrt{112}$

Question numbers 19 and 20 are assertion an reason based questions. Two statements are given, one labelled as assertion (A) and the other is labelled as reason (R). Select the correct answer from the codes (A), (B), (C) and (D) as given below:

(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.

19) Assertion (A): If both zeroes of the quadratic polynomial $x^2 - 2kx + 2$ are equal in magnitude but opposite in sign then value of K is $\frac{1}{2}$.

Reason (R): Sum of the zeroes of a quadratic polynomial $ax^2 + bx + c$ is $-\frac{b}{a}$.
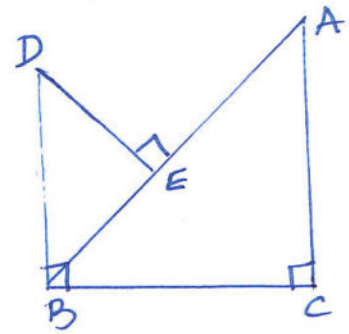
20) Assertion (A): The value of $\sin \theta = \frac{4}{3}$ is not possible.

Reason (R): Hypotenuse is the longest side in any right angled triangle.
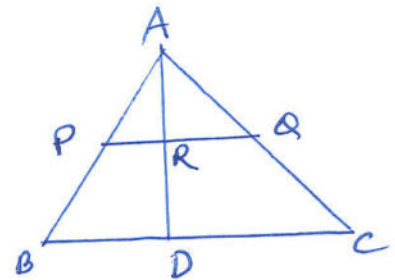
P.T.O $\longrightarrow$

21) In the given figure, $DB \perp BC$ and $DE \perp AB$. Prove that $\dfrac{BE}{DE} = \dfrac{AC}{BC}$.

OR

In the given figure, $AP = 3\,cm$, $AR = 4.5\,cm$, $AQ = 6\,cm$, $AB = 5\,cm$ and $AC = 10\,cm$. Determine the length of AD.

22) From an external point P, two tangents PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D respectively. If $PA = 10\,cm$, find the perimeter of $\triangle PCD$.
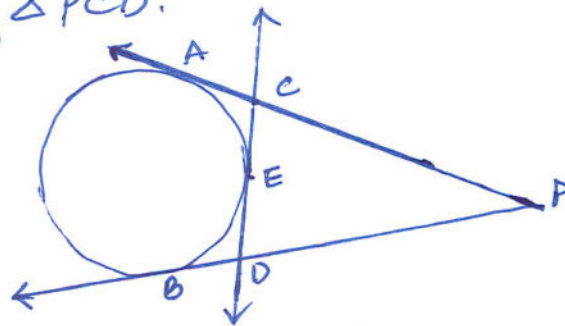
23) If $\tan \theta = \dfrac{20}{21}$, then prove that

$$\dfrac{1 - \sin \theta + \cos \theta}{1 + \sin \theta + \cos \theta} = \dfrac{3}{7}$$

OR

If $7 \sin^2 A + 3 \cos^2 A = 4$, prove that $\tan A = \dfrac{1}{\sqrt{3}}$.

24) If the sum of first n terms of an A.P. is n^2, then find its 10th term.

25) 50 circular plates, each of radius 7 cm and thickness 0·5 cm are placed one above other another to form a solid right circular cylinder. Find the total surface area of the cylinder so formed.

SECTION: C (This section comprises six questions of 3 marks each)

26) Prove that the parallelogram circumscribing a circle is a rhombus.

27) Find a quadratic polynomial whose zeroes are $\frac{2}{3}$ and $-\frac{1}{4}$. Also verify the relationship between the coefficients & the zeroes of the polynomial.

OR

If α and β are the zeroes of the quadratic polynomial $5x^2 + 5x + 1$, then find the value of (i) $\alpha^2 + \beta^2$ (ii) $\alpha^{-1} + \beta^{-1}$.

28) Prove that $3 + 5\sqrt{2}$ is an irrational number.

29) Show that $(1, -1)$ is the centre of the circle circumscribing a triangle whose vertices are $(4, 3)$, $(-2, 3)$ and $(6, -1)$.

OR

Point P divides the line segment joining the points $A(2, 1)$ and $B(5, -8)$ such that $\frac{AP}{AB} = \frac{1}{3}$. If P lies on the line $2x - y + k = 0$, find the value of k.

30) Solve for x and y.
$$37x + 43y = 123$$
$$43x + 37y = 117$$

31) The difference between the outer inner radii of a hollow right circular cylinder of length 14 cm is 1 cm. If the volume of the metal used in making the cylinder is 176 cm³, find the outer and inner radii of the cylinder.

SECTION - D (This section comprises four questions of 5 marks each.)

32) An aeroplane left 30 minutes later than its scheduled time and in order to reach its destination 1500 km away in time, it had to increase its speed by 250 km/hour from its usual speed. Determine its usual speed.

33) State and prove the Basic Proportionality theorem.

OR

Sides AB and BC and median AD of a $\triangle ABC$ are respectively proportional to sides PQ and QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$.

34) From the top of a light house, the angles of depression of two ships on the opposite sides of it are observed to be α and β. If the height of the lighthouse be h metres and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is $\dfrac{h(\tan\alpha + \tan\beta)}{\tan\alpha \tan\beta}$ metres.

OR

A boy whose eye level is 1·3 m from the ground spots a balloon moving with the wind in a horizontal line at some height from the ground. The angle of elevation of the balloon from the eyes of the boy at an instant is 60°. After 2 seconds, the angle of elevation reduces to 30°. If the speed of the wind is $29\sqrt{3}$ m/s then find the height of the balloon from the ground.

**35]** If the median of the following frequency distribution is 32.5, find the values of f_1 and f_2.

CLASS INTERVAL	0–10	10–20	20–30	30–40	40–50	50–60	60–70	TOTAL
FREQUENCY	f_1	5	9	12	f_2	3	2	40

SECTION–E (This section comprises 3 case study based questions of 4 marks each.)

36) CASE STUDY – I

Computer-based ___ CBL) refers to any teaching methodology that makes use of computers for information transmission. At an elementary school level, computer applications can be used to display multimedia lesson plans. A survey was done on 1000 elementary and secondary schools of Assam and they were classified by the number of computers they had.
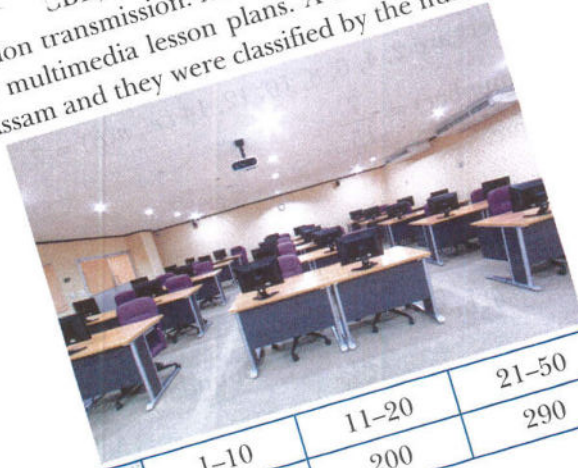
Number of Computers	1–10	11–20	21–50	51–100	101 and more
Number of Schools	250	200	290	180	80

One school is chosen at random.

Based on the above information answer the following questions.

(i) Find the probability that the school chosen at random has more than 100 computers.

OR

(ii) (a) Find the probability that the school chosen at random has 50 or fewer computers.

(b) Find the probability that the school chosen at random has no more than 20 computers.

(iii) Find the probability that the school chosen at random has 10 or less than 10 computers.

Q–37) CASE STUDY II

A golf ball is spherical with about 300 - 500 dimples that help increase its velocity while in play. Golf balls are traditionally white but available in colours also. In the given figure, a golf ball has diameter 4·2 cm and the surface has 315 dimples (hemi-spherical) of radius 2 mm.
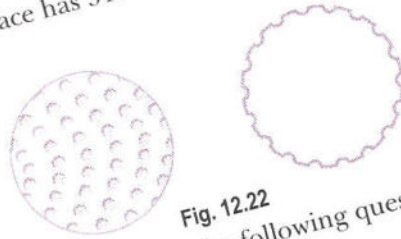
Fig. 12.22

Based on the above information answer the following questions.

(i) Find the surface area of one such dimple.

(ii) Find the volume of the material dug out to make one dimple.

OR

the total surface area exposed to the surroundings.

Saving money is a good habit and it should be inculcated in children from the beginning. Mrs. Pushpa brought a piggy bank for her child Akshar. He puts one five-rupee coin of his saving in the piggy bank on the first day. He increases his savings by one five-rupee coin daily.
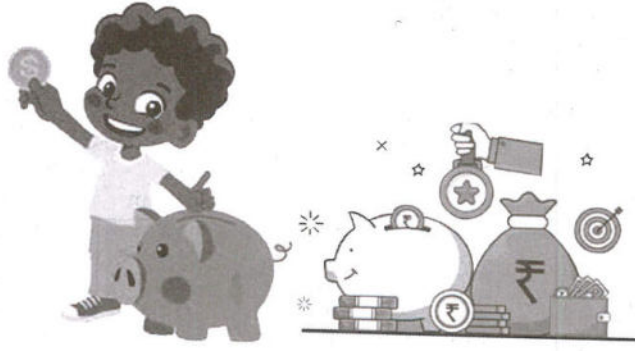
(*i*) If the piggy bank can hold 190 coins of five rupees in all, find the number of days he can contribute to put the five-rupee coins into it.

(*ii*) Find the total money he saved.   1

                                                                                                                          2

OR

How many coins are there in piggy bank on 15th day?

(*iii*) How much money Akshar saves in 10 days?

   1

DELHI PUBLIC SCHOOL, BHILAI
SAMPLE QUESTION PAPER

Time:-   MATHEMATICS   MM :- 80
3 hours   CLASS - X

General Instructions :-

i) This question paper has 5 sections A-E.

ii) Section A has 20 MCQs carrying 1 mark each.

iii) Section B has 5 questions carrying 02 marks each.

iv) Section C has 6 questions carrying 03 marks each.

v) Section D has 4 questions carrying 05 marks each.

vi) 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.

vii) 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 2 marks questions of Section E.

SECTION-A

Section A consists of 20 questions of 1 mark each.

(1.) If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$, where x, y are prime numbers, then the result obtained by dividing the product of the positive integers by the LCM(a, b) is   a) xy b) xy^2 c) $x^3 y^3$ d) $x^2 y^2$.

(2.)
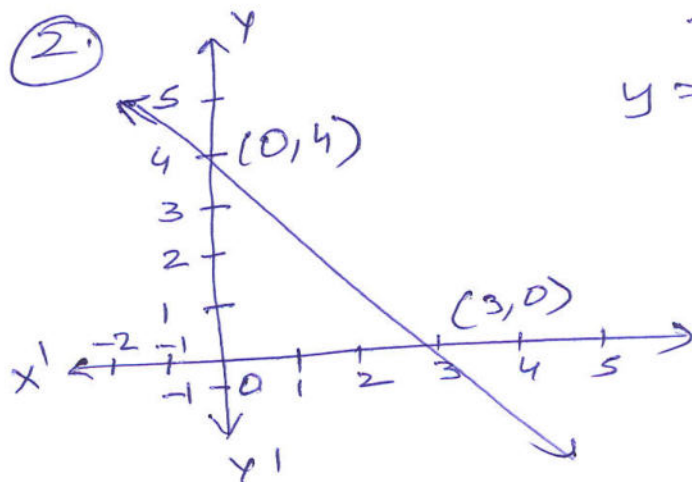
The given linear polynomial $y = f(x)$ has

a) 2 zeros   b) 1 zero and the zero is '3'

c) 1 zero and the zero is '4'.

d) No zero.

(3) If the system of equations $2x + 3y = 5$, $4x + ky = 10$ has infinitely many solutions, then $k =$

A) 1   B) $\frac{1}{2}$ C) 3   d) 6

④ The nature of roots of the quadratic equation $9x^2 - 6x - 2 = 0$ is   a) No real roots   b) 2 equal real roots.

c) 2 distinct real roots   d) More than 2 real roots.

⑤ Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8. Then the difference between their 4th terms is

a) 1   b) -7 c) 7   d) 9

⑥ What is the ratio in which the line-segment joining $(2, -3)$ and $(5, 6)$ is divided by x-axis?

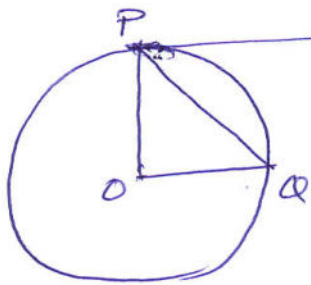a) 1:2   b) 2:1   c) 2:5   d) 5:2

⑦ A point (x, y) is at a distance of 5 units from the origin. How many such points lie in the third quadrant?   a) 0   b) 1   c) 2   d) Infinitely many.

⑧ In $\triangle ABC$, $DE \parallel AB$, If $AB = a$, $DE = x$, $BE = b$ and $EC = c$. The x expressed in terms of a, b and c is
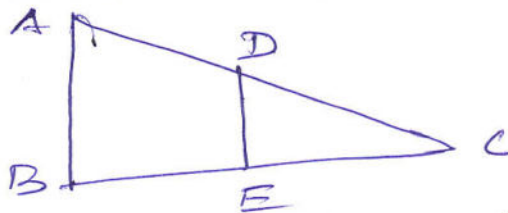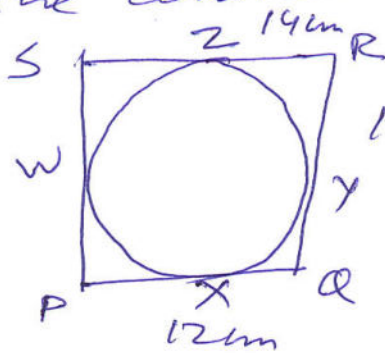

a) ac/b b) $\dfrac{ac}{b+c}$ c) $\dfrac{ab}{c}$ d) $\dfrac{ab}{b+c}$

⑨

If O is centre of a circle and chord PQ makes an angle $50°$ with the tangent PR at the point of contact P, then the angle subtended by the chord at the centre is   a) $130°$ b) $100°$ c) $50°$ d) $30°$.

⑩

A quadrilateral PQRS is drawn to circumscribe a circle. If PQ = 12 cm, QR = 15 cm and RS = 14 cm, then the length of SP is

a) 15 cm   b) 14 cm   c) 12 cm   d) 11 cm.

⑪ Given that $\sin\theta = a/b$, then $\cos\theta$ is

a) $\dfrac{b}{\sqrt{b^2 - a^2}}$ b) b/a c) $\dfrac{\sqrt{b^2 - a^2}}{b}$ d) $\dfrac{a}{\sqrt{b^2 - a^2}}$

12. (sec A + tan A) (1 - sin A) equals
   a) sec A   b) sin A   c) cosec A   d) cos A

13. A pole 6m high casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is
   a) 60°   b) 45°   c) 30°   d) 90°

14. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is   a) 2 units   b) π units   c) 4 units   d) 7 units.

15. It is proposed to build a new circular park equal in area to the sum of areas of two circular parks of diameters 16m and 12m in a locality. The radius of the new park is
   a) 10m   b) 15m   c) 20m   d) 24m

16. There is a square board of side '2a' unit circumscribing a circle. Jayadev is asked to keep out a dot on the above said board. The probability that he keeps the dot on the shaded region

   is   a) $\pi/4$ b) $\dfrac{4-\pi}{4}$ c) $\dfrac{\pi-4}{4}$ d) $\dfrac{4}{\pi}$
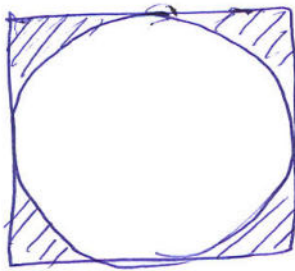
17. 2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from the remaining pack. What is the probability of getting a black card?
   a) $22/52$ b) $22/46$ c) $24/52$ d) $24/46$

18. The upper limit of the modal class of the given distribution is

Height (in cm)	Below 140	Below 145	Below 150	Below 155	Below 160	Below 165
No. of girls	4	11	29	40	46	51

   a) 165   b) 160   c) 155   d) 150

Assertion - Reasoning questions:-

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)

P.T.O

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

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

(19) Assertion (A): Total surface area of the top is the sum of the curved surface area of the — hemisphere and the curved surface area of the cone.

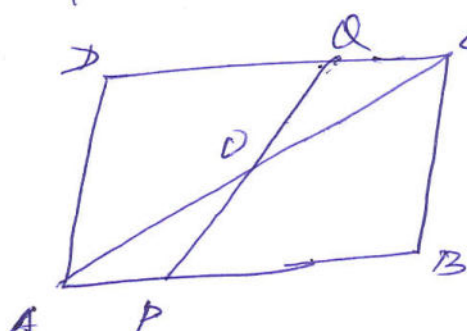Reason (R): Top is obtained by joining the plane surfaces of the hemisphere and cone together.

(20) Assertion (A): $-5, -5/2, 0, 5/2, \ldots$ is arithmetic progression.

Reason (R): The terms of an arithmetic progression cannot have both positive and negative rational numbers.

SECTION-B

Section B consists of 5 questions of 2 marks each.

(21) Prove that $\sqrt{2}$ is an irrational number.

(22) ABCD is a parallelogram. Point P divides AB in the — ratio 2:3 and point Q divides DC in the ratio 4:1. Prove that OC is half of OA.
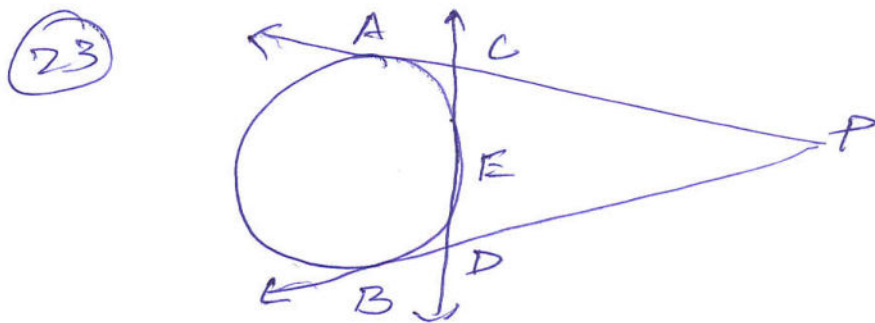
(23)

From an external point P, two tangents PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D, respectively. If PA = 10 cm, find the perimeter of $\triangle PCD$.

(24) If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = 1/\sqrt{3}$, $0° < A+B < 90°$; A > B, find A and B.

OR

Find the value of x:

$$2 \csc^2 30° + x \sin^2 60° - \frac{3}{4} \tan^2 30° = 10$$

(25) Find the area of a sector of a circle of radius 28 cm and central angle 45°

OR

Find the area of the sector of a circle of radius 5 cm, if the corresponding arc length is 3.5 cm.

SECTION C

Section C consists of 6 questions of 3 marks each

(26) National art convention got registrations from students from all parts of the country, of which 60 are interested in music, 84 are interested in dance and 108 students are interested in handicrafts. For optimum cultural exchange, organisers wish to keep them in minimum number of groups such that each group consists of students interested in the same art form and the number of students in each group is the same. Find the number of students in each group. Find the number of groups in each art form. How many rooms are required if each group will be allotted a room?

(27) If α, β are zeros of quadratic polynomial $5x^2 + 5x + 1$, find the value of

i) $\alpha^2 + \beta^2$ ii) $1/\alpha + 1/\beta$.

(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

A cab hire charges in a city comprise of a fixed charges together with the charge for the distance covered. For a journey of 12 km, the charge paid is Rs 89 and for a journey of 20 km the charge paid is Rs 145. What will a person have to pay for travelling a distance of 30 km?
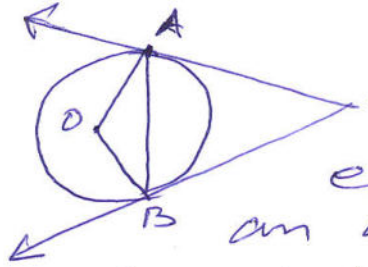
(29) PA and PB are tangents drawn to a circle of centre O from an external point P. Chord AB makes an angle of 30° with the radius at the point of contact. If length of the chord is 6cm, find the length of the tangent PA and the length of the radius OA.

OR

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

(30) If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, then prove that $\tan\theta = 1$ or $\frac{1}{2}$.

(31) The length of 40 leaves of a plant are measured correct to nearest millimeter, and the data obtained is represented in the following table.

Length (in cm)	118–126	127–133	136–144	145–153	154–162	163–171	Below 165
No of Leaves	3	5	9	12	5	4	2

Find the average length of the leaves.

SECTION-D

Section D consists of 4 questions of 5 marks each.

(32) A motorboat whose speed is 18 km/hr in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream.

OR

Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

(33) a) State and prove Basic Proportionality Theorem.
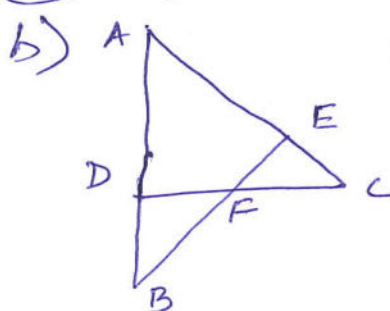
b) In the given fig. $\angle CEF = \angle CFE$. F is the mid-point of DC. Prove that $AB/BD = AE/FD$

(34) Water is flowing at the rate of 15 km/hr through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm? What should be the speed of water if the rise in water level is to be attained in 1 hour?

OR

A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 3 m and 14 m respectively and the total height of the tent is 13.5 m, find the area of the canvas required for making the tent, keeping a provision of 26 m² of canvas for stitching and wastage. Also, find the cost of the canvas to be purchased at the rate of Rs 500 per m².
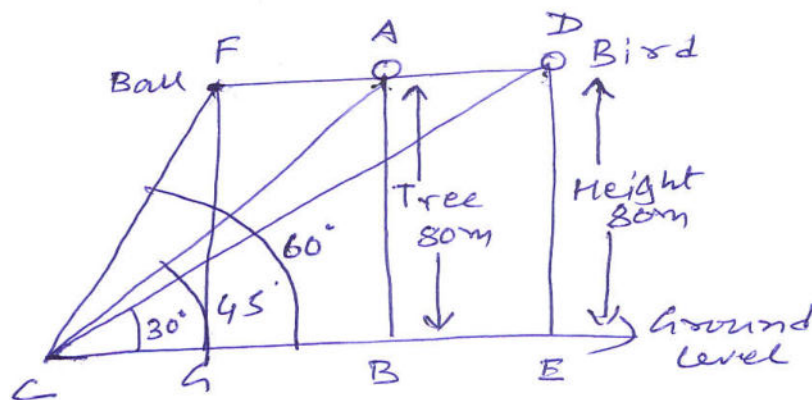
(35) The median of the following data is 50. Find the values of 'p' and 'q', if the sum of all frequencies is 90. Also find the mode.

Marks obtained	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of students	p	15	25	20	q	8	10

SECTION-E

This section comprises 3 case study based questions of 4 marks each.

(36)

One evening, Kaushik was in a park. Children were playing cricket. Birds were singing on a nearby tree of height 80 m. He observed a bird on the tree at an angle of elevation of 45°. When a sixer was hit, a ball flew through the tree frightening the bird to fly away. In 2 seconds, he observed the bird flying at the same height at an angle of elevation of 30° and the ball flying towards him at the same height at an angle of elevation of 60°.

Based on the above information, answer the following questions:

i) At what distance from the foot of tree was he observing the bird sitting on the tree? ①

ii) How far did the bird fly in the mentioned time? ②

OR

After hitting the tree, how far did the ball travel in the sky when Kaushik saw the ball? ②

iii) What is the speed of the bird in m/min if it had flown $20(\sqrt{3}+1)$ m? ①

(37)
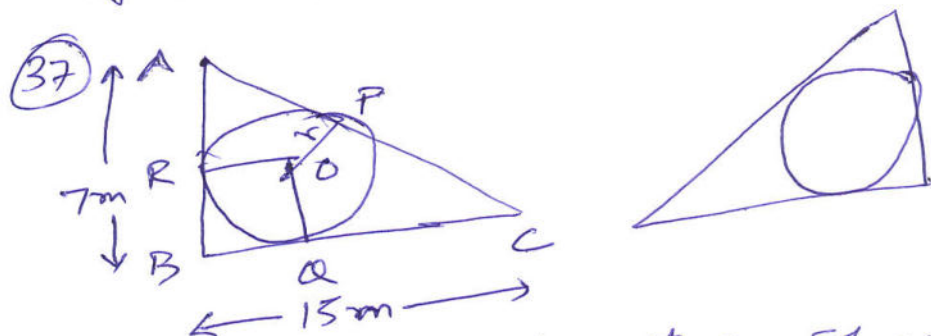
A backyard is in the shape of a triangle ABC with right angle at B. AB = 7m and BC = 15m. A circular pit was dug inside it such that it touches the walls AC, BC and AB at P, Q and R respectively such that AP = x m

Based on the above information, answer the following questions:

i) Find the length of AR in terms of x. (1)

ii) Write the type of quadrilateral BQOR (1)

iii) a) Find the length of PC in terms of x and hence find the value of x (2)

OR

b) Find x and hence find the radius r of circle.

(38) Teaching Mathematics through activities is a powerful approach that enhances students understanding and engagement. Keeping this in mind, Mukta announces the number 2 in her class and asked the first student to multiply it by a prime number and then pass it to second student. Second student also multiplied it by a prime number and passed it to third student. In this way Now, Mukta asked some questions as given below to the students:

i) What is the least prime number used by students? ①

ii) a) How many students are in the class? ②

OR

b) What is the highest prime number used by students? ②

iii) Which prime number has been used maximum times? ①

— ✗ —

Sample paper for class X.

MATHEMATICS

Paper: 1/1

1. If $a = (2^2 \times 3^3 \times 5^4)$ and $b = 2^3 \times 3^2 \times 5$ then HCF $(a,b) = \underline{\quad}$
   a) 90   b) 180,   c) 360,   d) 540.

2. The values of k for which the equation $4x^2 + kx + 9 = 0$ has real and equal roots are
   a) ± 11 b) ± 12 c) ± 6 d) ± 3.

3. The distance of the Point $(4, 7)$ form the x axis is
   a) 7 units   b) 5 units.   c) 4 units   d) 10 units

4. What is the Probability that a number selected randomly from the numbers $1, 2, 3 \cdots 15$ is a Multiple of 4
   a) $4/15$ b) $6/15$ c) $3/15$ d) $5/15$

5. The System $x + 2y = 3$ and $5x + ky = 7$ has no solutions when
   a) $k = 10$ b) $k \neq 10$ c) $k = 7/3$ d) $k = -2$

6. The Zeroes of the Polynomial $x^2 - \sqrt{2}\, x - 12$ are
   a) $\sqrt{2}, -\sqrt{2}$ b) $3\sqrt{2}, -2\sqrt{2}$ c) $-3\sqrt{2}, 2\sqrt{2}$ d) $3\sqrt{2}, 2\sqrt{2}$

7. If $\dfrac{x}{3} = 2\sin A$ $\dfrac{y}{3} = 2\cos A$, then the value of $x^2 + y^2$ is
   a) 36   b) 9   c) 6   d) 18.

8. Which term of an AP $72, 63, 54 \cdots 4\ 0$
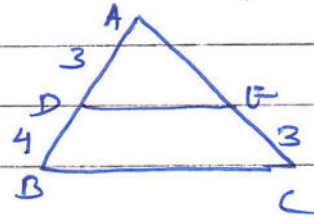   a) 8th b) 9th c) 10th,   d) 11th.

9. The height of a tower is 20m. The length of its shadow Made on the level ground when Sun's altitude is $60°$ is
   a) $20/\sqrt{3}$ m   b) $\dfrac{20}{2}$ m   c) $20\sqrt{3}$ m   d) 20 m.

10. In the given figure DE||BC and all
The length of AE is.

a) 2cm   b) 2.25cm
c) 2.5cm   d) 2.75cm

11. The length of the shadow of a tower on the
plane ground is $\sqrt{3}$ times the height of
the tower. The angle of elevation of the Sun is

a) 30°   b) 45°   c) 60°   d) 90°.

12. The Mode of a distribution whose mean is 7.2
and the Median 7.1 is

a) 6.2   b) 6.3   c) 6.5   d) 6.9.

13. from an external Point P, tangents PA and
PB are drawn to a Circle with Centre O.
If CD is the tangent to the Circle at a
Point E and PA = 14cm. The perimeter of
△PCD is

a) 14cm   b) 21cm   c) 28cm   d) 35cm

14. The slant height of an equilateral triangle
having each side 12cm is

a) $6\sqrt{2}$ cm²   b) $6\sqrt{3}$ cm²   c) $3\sqrt{6}$ cm²   d) $6\sqrt{6}$ cm²

15) The end Points of the diameter of a circle
are (3,4) and (3,-1). The radius of the Circle

a) $\frac{5\sqrt{2}}{2}$ unit   b) $5\sqrt{2}$ unit   c) $3\sqrt{2}$ units   d) $\pm\frac{5\sqrt{2}}{2}$ unit

16) The Sum of first 20 odd natural number is

a) 100   b) 210   c) 400   d) 420.

17) A number is chosen from the number 1,2,3 and
denoted as x and a number is chosen from the number
1,4,9 and denoted as y. then P(xy<9) is

a) 1/9   b) 3/9   c) 5/9   d) 7/9

18) If angle of depression of an object from a 75m high tower is 30° then the distance of the object from the tower is

a) $25\sqrt{3}$ m b) $50\sqrt{3}$ m c) $75\sqrt{3}$ m d) 150 m.
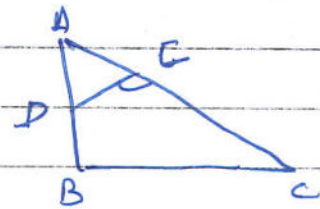
Assertion & Reason.

19) (A) A fair die is thrown once. The probability of getting a prime number is ½

(R) A natural number is a prime number if it has only two factors.

20) (A) Degree of a zero polynomial is not defined

(R) Degree of a non zero constant polynomial is 0.
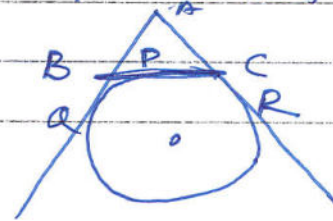
Section B

21. In the given figure AB⊥BC and DE⊥AC. Prove that ΔABC ∼ ΔAED

22. Prove that $(\sqrt{2}+\sqrt{3})^2$ is an irrational no.

or

Check whether 6^n can end with the digit. 0 for any natural number n.

23. A circle is touching the side BC of a a ΔABC at the point P and touching AB and AC produced at Points Q and R respectively. Prove that AQ = ½ (Perimeter of ΔABC

24.) find the ratio in which the point $(-1, 6)$ divides the line segment joining the points $(-3, 10)$ and $(6, -8)$, Hence find the value of k.

Or

Prove that $(3, 0)$ $(1, 4)$ and $(-1, 3)$ are the vertices of an isosceles triangle.

25. If triangle ABC is similar to triangle DEF such that $2AB = DE$ and $BC = 8$ cm then find EF.

OR

In the fig: PQ is parallel to MN. If $\dfrac{KP}{PM} = \dfrac{4}{13}$ and $KN = 20.4$ cm. find KQ.

Section C.

26) find the area of a quadrant of a circle whose circumference is 44 cm.

Or

The area of a circle inscribed in an equilateral triangle is 154 cm^2. find the Perimeter of the triangle

27). If α, β are the zeroes of a quadratic polynomial $5x^2 + 5x + 1$ find the value of i) $(\alpha^2 + \beta^2)$ ii) $(\alpha^{-1} + \beta^{-1})$

28. The H.C.F of two numbers a and b is 5 and their LCM is 200. find the product ab.

29. Three Unbiased Coins are tossed. find the probability of getting.

i) at least one head.
ii) exactly one head
iii) two heads and one tail.

30. Prove that a parallelogram circumscribing a circle is a Rhombus.

31. If the sum of the first 14 terms of an AP is 1050. and the first term is 10. find the 20th term and the nth term of the A.P.

32. The sum of two digit number and the number obtained the by reversing the digit is 66. If the digits of the number differ by 2, find the number/numbers.

OR

~~The Sum of the Reciprocals~~

The sum of the numerator and denominator of a fraction is 8. If 3 is added to both of the numerator and the denominator, the fraction becomes $\frac{3}{4}$. find the fraction.

33. A juice seller was serving his customers using glasses as shown in the fig. The inner diameter of the cylindrical glass is 5cm but the bottom of the glass had a hemispherical raised portion. If the height of the glass is 10cm find the actual capacity, and the total surface area of the glass.

Q.30 Side AB and AC and Median AD of a triangle ABC is respectively equal to Side PQ and PR and of median PM of △ PQR. Show tha △ ABC ~ △ PQR

34) The Median of the following data is 28.5. find the Value of x and y.

CI	0-10	10-20	20-30	30-40	40-50	50-60	Total
frequency	5	x	20	15	y	5	60

35. From a window 15m high above the ground in a Street, the angle of elevation and the depression of the top and the foot of another house on the opp sides of the Street are 30°. and 45°. find the height of the opposite house.

Case study based questions are compulsory.

36. **Salary** : In investigating different job opportunities, you find that firm A will start you at Rs 25,500 per year and guarantee you a raise of Rs 1,200 each year whereas firm B will start you at Rs 28,800 per year but will guarantee you a raise of only Rs 800 each year.

(i) Over a period of 15 years, how much would you receive from firm A?
(ii) Over a period of 15 years, how much would you receive from firm B?
(iii) What would be your annual salary at firm A for the tenth year?
(iv) What would be your annual salary at firm B for the tenth year?
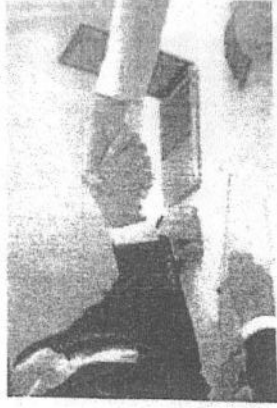
37. From his hotel room window on the fourth floor, Ranjan notices some window washers high above him on the hotel across the street.
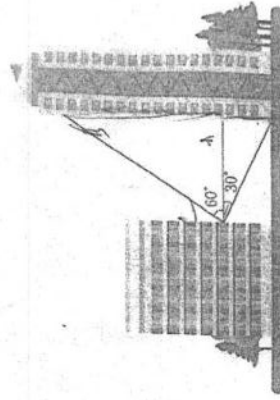
Curious as to their height above ground, he quickly estimates the buildings are 60 m apart, the angle of elevation to the workers is about 60°, and the angle of depression to the base of the hotel is about 30°.
(i) How high above ground is the window of Ranjan's hotel room?
(ii) How high above ground are the workers?

38. *Political survey questions are questions asked to gather the opinions and attitudes of potential voters. Political survey questions help you identify supporters and understand what the public needs. Using such questions, a political candidate or an organization can formulate policies to gain support from these people.*

A survey of 100 voters was taken to gather information on critical issues and the demographic information collected is shown in the table. One out of the 100 voters is to be drawn at random to be interviewed on the India Today News on prime time.

|	Women	Men	Totals
Republican	17	20	37
Democrat	22	17	39
Independent	8	7	15
Green Party	6	3	5
Totals	53	47	100

(i) What is the probability the person is a woman or a Republican ?
(ii) What is the probability the person is a Democrat ?
(iii) What is the probability the person is a Independent men ?
(iv) What is the probability the person is a Independent men or green party men ?

Class: 10   Delhi Public School, Bhilai   Time : 3 hrs

Sub: Maths   Sample Question Paper   M·M: 80 M

Section - A : Multiple Choice Questions   20×1M = 20M

1. The maximum sum of the following A.P. series

  $20 + 19\frac{1}{3} + 18\frac{2}{3} + 18 + \cdots$ is

  a) 210   b) 110   c) 310   d) None of these.

2. If $\operatorname{cosec}\theta = \frac{13}{5}$, then $\cot\theta$ is

  a) $\frac{5}{13}$ b) $\frac{12}{5}$ c) $\frac{12}{13}$ d) $\frac{13}{5}$

3. Evaluate $\dfrac{1 - \sin^2 45°}{1 + \sec^2 45°}$ a) $\frac{2}{3}$ b) $\frac{1}{3}$ c) $\frac{1}{6}$ d) $\frac{1}{2}$.

4. The product of the zeroes of polynomial $2x^2 - 8x + 6$ is

  a) 3   b) 4   c) 6   d) 12 .

5. If the mean of a frequency distribution is 8·1 and $\Sigma f_i x_i = 132 + 5K$, $\Sigma f_i = 20$, then the value of K is

  a) −6   b) 6   c) 0   d) None of these.

6. The length of the tangent drawn from a point, which is 5 cm away from the centre of circle of radius 3 cm is

  a) 4 cm   b) −5 cm   c) −4 cm   d) 5 cm.

7. If the area of a sector of a circle is $\frac{1}{3}$ of the area of the circle, then the sector angle is

  a) 120°   b) 126°   c) 116°   d) None of these.

8. AB and CD are two common tangents to circles which touch each other at a point C. If D lies on AB such that CD = 4 cm, then the value of AB is

  a) 4 cm   b) 8 cm   c) 3 cm   d) 1 cm.

9. In the given figure, DE ‖ AB, If AD = 2x, DC = x+3, BE = 2x−1 and CE = x, then the value of x is

  a) $\frac{5}{3}$ b) $\frac{2}{5}$ c) $\frac{3}{5}$ d) None of these.

(PTO) →
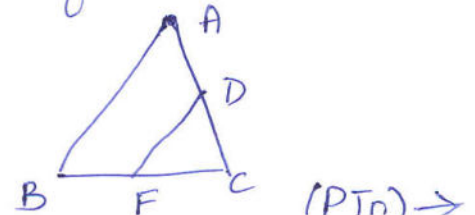
10. The real roots of the quadratic equation
$3x^2 - 5x - 2 = 0$ are
a) $-\frac{1}{3}, 2$ b) $-2, \frac{1}{3}$ c) $-\frac{1}{3}, -2$ d) $2, \frac{1}{3}$.

11. The LCM of smallest two digit composite number and smallest composite number is
a) 12   b) 4   c) 20   d) 44.

12. If $\csc\theta - \cot\theta = \frac{1}{2}$, $0 < \theta < \frac{\pi}{2}$, then value of $\csc\theta + \cot\theta$ is
a) 1   b) 0   c) 2   d) -1

13. If $\sqrt{2}\,x - \sqrt{3}\,y = 0$ and $\sqrt{5}\,x + \sqrt{2}\,y = 0$, then the value of x & y are
a) $x = 0, y = 0$ b) $x = 2, y = 3$ c) $x = 4, y = 1$ d) $x = 3, y = -3$.

14. Cards marked with numbers 2 to 90 are placed in a box and mixed thoroughly. One card is drawn at random from the box. The probability that the card drawn, shows a two-digit number is
a) $\frac{89}{81}$ b) $\frac{81}{89}$ c) $\frac{89}{90}$ d) None of these.

15. If x_i are the midpoints of the class-Intervals of grouped data, f_i's are the corresponding frequencies & $\bar{x}$ is the mean, then $\Sigma(f_i x_i - \bar{x})$ is equal to
a) 1   b) 0   c) -1 d) 2.

16. If the radius of a circle is 3.5 cm, then the area of quadrant of the circle is
a) $8.62\,cm^2$ b) $9.625\,cm^2$ c) $9\,cm^2$ d) None of the above.

17. $9 + 5\sqrt{27}$ is
a) rational   b) an irrational   c) prime   d) integer.

18. If mean = 31.04, median = 30.625, then mode is
a) 28.78   b) 29.8   c) 30   d) 29.

19. Assertion (A) The value of $q = \pm 2$, if $x = 3$ & $y = 1$ is the solution of the line $2x + y - q^2 - 3 = 0$.

Reason (R) The solution of the line will satisfy the equation of the line.

20. Assertion (A) There is no such point on X-axis which is at a distance c $(c < 3)$ from the point $(2, 3)$

Reason (R) The distance between two points (x_1, y_1) & (x_2, y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Section - B : Very Short Answer Type   (2M Each)

21. Solve the following system of equations by Elimination method
$$x + y = a - b \quad ; \quad ax - by = a^2 + b^2$$

OR

In a two-digit number, the ten's digit is three times the unit's digit. When the number is decreased by 54, then the digits are reversed. Find the number.
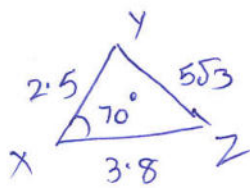
22. Find the length of a tangent drawn to a circle, with radius 5 cm, from a point 13 cm away from the centre of the circle.

23. If $\cos \alpha = \frac{1}{2}$ & $\tan \beta = \frac{1}{\sqrt{3}}$, then find $\sin(\alpha + \beta)$. where α & β are both acute angles.
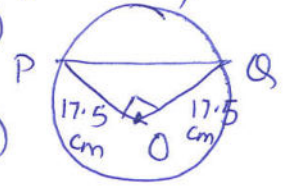
OR

Find an acute angle θ, when $\dfrac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \dfrac{1 - \sqrt{3}}{1 + \sqrt{3}}$.

24. From the given figures, find $\angle R$.
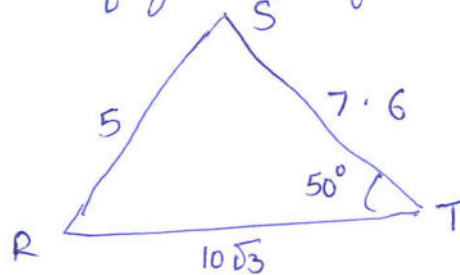
25. Find the area of segment PYS, if radius of the circle is 17.5 cm and $\lfloor POS = 90°$ (Take, $\pi = \frac{22}{7}$) ④

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

OR

Prove that $\dfrac{1+\tan^2\theta}{1+\cot^2\theta} = \left(\dfrac{1-\tan\theta}{1-\cot\theta}\right)^2 = \tan^2\theta$.

27. From a bus stand in Delhi, if we buy 2 tickets to Pitampura and 3 tickets to Dilshad Garden, the total cost is Rs 46 but if we buy 3 tickets to Pitampura and 5 tickets to Dilshad Garden, the total cost is Rs 74. Then, find the fares from the bus stand to Pitampura & to Dilshad Garden.

28. Show that $7-\sqrt{3}$ is irrational.

29. Find a quadratic polynomial whose zeroes are reciprocals of the zeroes of the polynomial $f(x)=ax^2+bx+c$, $a \neq 0, c \neq 0$.

OR

If α, β are the zeroes of the polynomial $P(x)=2x^2+5x+k$ satisfying the relation $\alpha^2+\beta^2+\alpha\beta = \frac{21}{4}$, then find the value of k for this to be possible.

30. If the pth, q^{th} & r^{th} terms of an A.P are a, b & c respectively, then show that $a(q-r) + b(r-p) + c(p-q) = 0$.

31. Find the co-ordinates of the points which divide the line segment joining A$(-3,-7)$ and B$(-7,8)$ into 4 equal parts.

32. A girl of height 90cm is walking away from the base of a lamp-post at a speed of 1·2 m/s. If the lamp is 3·6 m above the ground, then find the length of her shadow after 4S.

(P.T.O) $\Rightarrow$

Based on the above information, answer the following questions

i) What is the measure of $\angle APD$?

ii) If $\angle AQB = 30°$, then $\angle ABD$ is also $30°$. Why?

iii) How far is boat P from the light house?

OR

How far is boat Q from the light house?
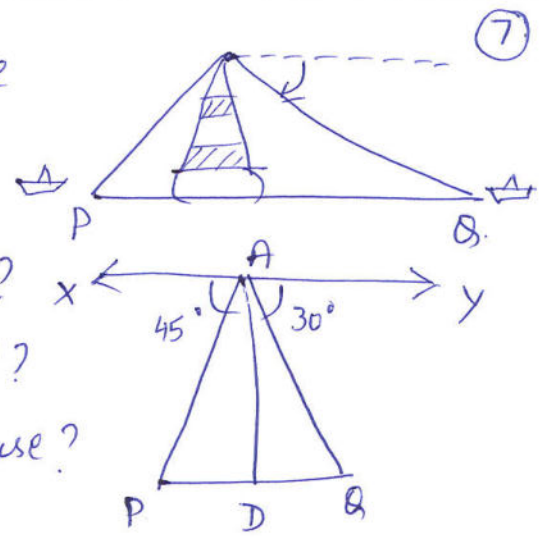
X————X

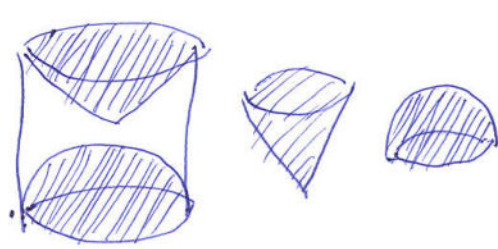33. Calculate the mode of the following frequency distribution table.

Marks	No of Students
25 or more than 25	10
35 or more than 35	12
45 or more than 45	7
55 or more than 55	23
65 or more than 65	9
75 or more than 75	21

34. Find the sum of first 51 terms of an AP whose second & 3rd terms are 14 & 18, respectively.

OR

If the sum of first 7 terms of an AP is 49 and that of 17 terms is 289. Find the sum of first n terms.

35. A wooden article was made by scooping out a hemisphere from one end of a cylinder & cone from the other end as in the fig. If the height of cylinder is 50 cm, radius of cylinder is 7cm & ht of cone is 24 cm.

i. Find the slant ht of cone & the volume of hemisphere.
ii. Find the total volume of the article

OR

A solid toy is in the form of a hemisphere surmounted by a R.C. cone. Height of the cone is 6cm & diameter of the base is 10cm. If a right circular cylinder circumscribes the solid. Find how much more space it will cover?

Section – F (case-study based)   (Each 4M)

36. Kaushal is a class X student residing in a village. one day he went to a city hospital along with his grandfather for general checkup. From there he visited

three places school, library & police station. After returning to ⑥
his village, he plotted a graph by taking hospital as origin &
marked three places on the graph as per his direction of
movement & distance. The graph is shown below,
Based on the above information, answer the
following questions

i) Find the distance between school & hospital.

ii) Find nearest place to library.

OR
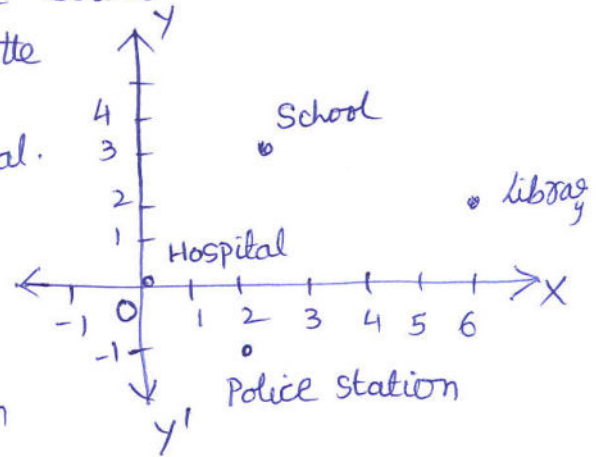
Find the ratio in which x-axis divides
the line joining School & police station.

iii) Find the coordinates of the midpt between
police station & library.

37. In the month of Dec 2020, it rained
heavily throughout the day over the city
of Hyd. Anil observed the raindrops
as they reached him. Each
raindrop was in the shape of a
hemisphere surmounted by a cone
of the same radius of 1mm. Volume of one such drops is
3.14 mm³. Anil collected the rainwater in a pot having a
capacity of 1099 cm³. (use $\sqrt{2} = 1.4$)
Based on the above information, answer the following questions

i) Find the total height of the drop.

ii) What is the CSA of the drop?

iii) As the drop fell into the pot, it changed into a sphere.
what was the radius of the sphere?

OR

How many drops will fill the pot completely?

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

DELHI PUBLIC SCHOOL, BHILAI

PRACTICE PAPER

MATHEMATICS — X — 2024

MM: 80
Time: 3HRS.

Questions no. 1 to 20 are multiple choice Type Questions, carrying 1 mark each.

(1) The next (4th) term of the A.P. $\sqrt{18}, \sqrt{50}, \sqrt{98}, \ldots$ is:

(a) $\sqrt{128}$ (b) $\sqrt{140}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

(2) In a single throw of a pair of dice, the probability of getting the sum as a perfect square is

(a) $\frac{7}{36}$ (b) $\frac{5}{36}$ (c) $\frac{8}{36}$ (d) $\frac{11}{36}$

(3) If P is point on x-axis such that its distance from the origin in 3 units, then the coordinates of point P are

(a) $(0,3)$ (b) $(3,0)$ (c) $(0,0)$ (d) $(0,-3)$

(4) If a pair of linear equations in two variables in inconsistent, then the lines represented by two equations are

(a) intersecting (b) parallel
(c) always coincident (d) intersecting or coincident

(5) If $4\sec\theta - 5 = 0$, then the value of $\cot\theta$ is:

(a) $\frac{3}{4}$ (b) $\frac{4}{5}$ (c) $\frac{5}{3}$ (d) $\frac{4}{3}$

(6) The ratio of the sum and product of the roots of the quadratic equation $5x^2 - 6x + 21 = 0$ is

(a) 5:21 (b) 2:7 (c) 21:5 (d) 7:2

(7) For the data $2, 9, x+6, 2x+3, 5, 10, 5$; if the mean is 7, then the value of x is

(a) 9 (b) 6 (c) 5 (d) 3

(8) One ticket is drawn at random from a bag containing tickets numbered 1 to 40. The probability that the selected ticket has a number which is multiple of 7 is

(a) $\frac{1}{7}$ 　　(b) $\frac{1}{8}$ 　　(c) $\frac{1}{5}$ 　　(d) $\frac{7}{40}$

(9) If the probability of success 0.9% then probability of failure is

(a) 0.91 　　(b) 0.091 　　(c) 99.1 　　(d) 0.991

(10) The greatest number which divides 281 and 1249, leaving remainder 5 and 7 respectively, is

(a) 23 　　(b) 276 　　(c) 138 　　(d) 69

(11) If 1 is a zero of the polynomial $p(x) = ax^2 - 3(a-1)x - 1$, then the value of a is

(a) 1 　　(b) 2 　　(c) -1 　　(d) -2.

(12) The distance of the point (5,4) from x-axis is

(a) 5 units 　　(b) 4 units 　　(c) 1 unit 　　(d) 9 units

(13) If d and β are the zeros of the polynomial $p(x) = kx^2 - 30x + 45k$ and $d + \beta = a\beta$, then the value of k is

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

(14) $5\sin^2 30° + \cos^2 45° - 4\tan^2 30°$ is equal to

(a) $\frac{5}{6}$ 　　(b) $\frac{2}{3}$ 　　(c) $\frac{5}{8}$ 　　(d) $\frac{5}{12}$

(15) The mean of first ten odd natural number is

(a) 5 　　(b) 10 　　(c) 29 　　(d) 19.

(16) In what ratio does the point (-2,3) divides the line segment joining the points (-3,5) and (4,-9)?

(a) 1:6 　　(b) 6:1 　　(c) 5:1 　　(d) 1:5.

(17) If a cylinder is covered by 2 hemispheres shaped lid of equal shape, then the total curved surface area of the new object will be

(a) $4\pi rh + 2\pi r^2$ 　(b) $4\pi rh + 2\pi r^2$ 　(c) $2\pi rh + 4\pi r^2$ 　(d) $2\pi rh + 4\pi r$

(18) Two identical solid hemispheres of equal base radius rcm are stuck together along their bases. The total surface area of the combination is

(a) $6\pi r^2$ 　　(b) $5\pi r^2$ 　　(c) $4\pi r^2$ 　　(d) $3\pi r^2$

(19) and (20) A statement of Assertion (A) is followed by a statement of Reason (R). Choose correct option.

(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.

(19) Assertion: $n^3 + n$ has only one real zero.

Reason: A polynomial of nth degree must have n real zeros.

(20) Assertion: If length of a tangent from an external point to a circle is 8 cm, then length of the other tangent from the same point is 8 cm.

Reason: Length of the tangent drawn from from an external point to a circle are equal.

SECTION-B

(21) One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting:

(i) a non face card,   (ii) a black king.

(22) In the given figure, PQR is a triangle right angled at Q and XY || QR. If PQ = 6 cm, PY = 4 cm and PX : XQ = 1 : 2. Calculate the length of PR and QR.
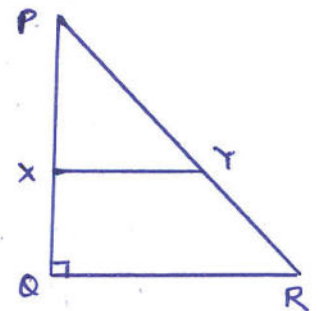
(23) If two positive integers p and q are written as $p = a^2 b^3$ and $q = a^3 b$, where a and b are prime numbers than verify LCM (p, q) × HCF (p, q) = pq

OR

Show that any positive even integer can be written in the form $6q$, $6q + 2$ or $6q + 4$, where q is an integer.

(24) The age of father is equal to the square of the age of his son. The sum of the age of father and five times the age of the son is 66 years. Find their ages.

(25) If $\sin d = \frac{1}{2}$, then show that $(3 \cos d - 4 \cos^3 d) = 0$

OR.

For what value A, $\dfrac{\cos A + \sin A}{\cos A - \sin A} = \dfrac{\sqrt{3} + 1}{\sqrt{3} - 1}$?

(26) For what value of p will the following system of equations have no solution?

OR.

The sum of two numbers is 8. Determine the numbers if the sum of their reciprocals is $\frac{8}{15}$

(27) Prove that $(\sqrt{2} + \sqrt{3})^2$ is an irrational number, given that $\sqrt{6}$ is an irrational number.

(28) Prove that the parallelogram circumscribing a circle is a rhombus.

(29) Prove that:

$$\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \sec A \csc A$$

(30) A toy is in shape of a cone mounted on a hemisphere of same base radius. If the volume of the toy is $231 \, cm^3$ and its diameter is 7cm, then find the height of the toy

OR

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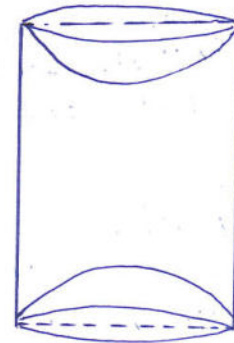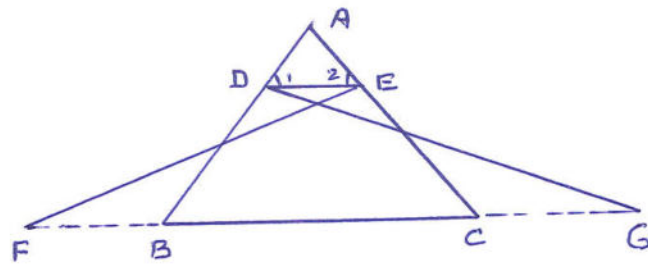

(31) Find the ratio in which P(4,m) divides the segment joining the points A(2,3) and B(6,-3). Hence find m.

(32) From a point on a bridge across the river, the angles of depressions of the banks on opposite sides of the river are 30° and 45° respectively. If the bridge is at height of 4m from the banks, Find the width of the river.

(33) In the given figure, $\triangle FEC \cong \triangle GDB$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \sim \triangle ABC$

OR

Sides AB and AC and median AD of a ΔABC are respectively sides PQ and PR and median PM of another ΔPQR. Show that ΔABC ∼ ΔPQR.

(34) Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

(35) If the sum of the first n terms of an AP is $4n - n^2$, what is the first term (that is S_1)? What is the sum of the first two terms? What is the second term? Similarly find the 3rd, the 10th and nth terms.

OR

The sum of the third and the seventh terms of an AP is 6 and their product is 8. Find the sum of the first sixteen terms of the AP.

SECTION-E

(36) Activities like running or cycling reduce stress and the risk of mental disorders like depression. Running helps build endurance. Children develop stronger bones and are less prone to gain weight. The physical education teacher of a school has decided to conduct an interschool running tournament in his school premises. The time taken by a group of students to run 100m, was noted as follow:
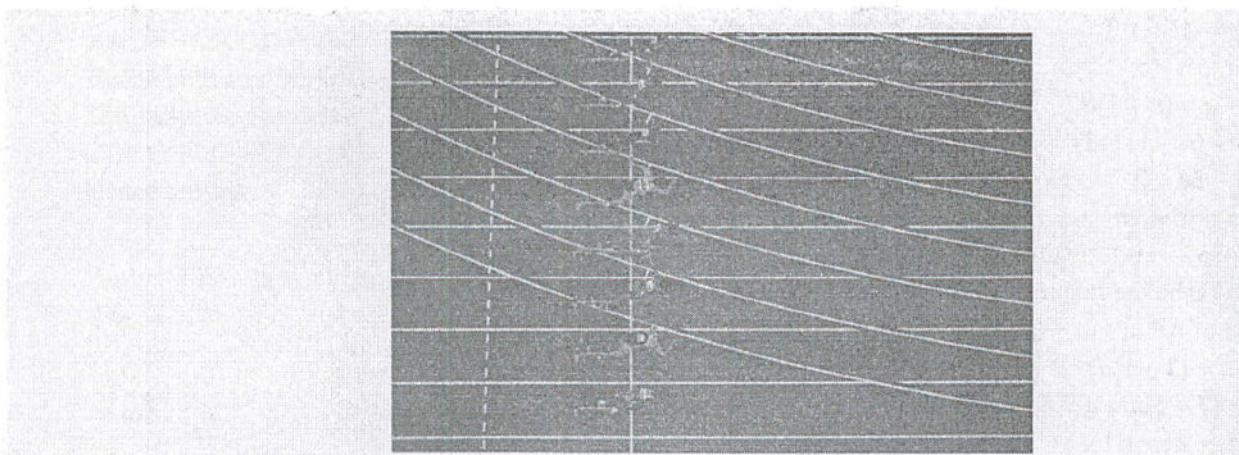
Time (in seconds)	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Number of students	8	10	13	6	3

Based on the above, answer the following questions:

(i) What is the median class of the above given data?

(ii) (a) Find the mean time taken by the students to finish the race?

OR

(b) Find the mode of the above given data.

(iii) How many students took less time than 60 seconds?

(37) Maximum Profit : An automobile manufacturer can produce up to 300 cars per day. The profit made from the sale of these vehicles can be modelled by the function $P(n) = -n^2 + 350n - 6600$ where $P(n)$ is the profit in thousand Rs and n is the number of automobiles made and sold. Answer the following questions based on this model:

(i) When no cars are produced what is a profit/loss?

(ii) what is the ~~pro~~ break even point? (zero prabit point is called break even).

(iii) (a) what is the ~~break~~ prabit / loss in 175 cars are produced?

OR

(b) what is the prabit / loss if 400 cars are produced?
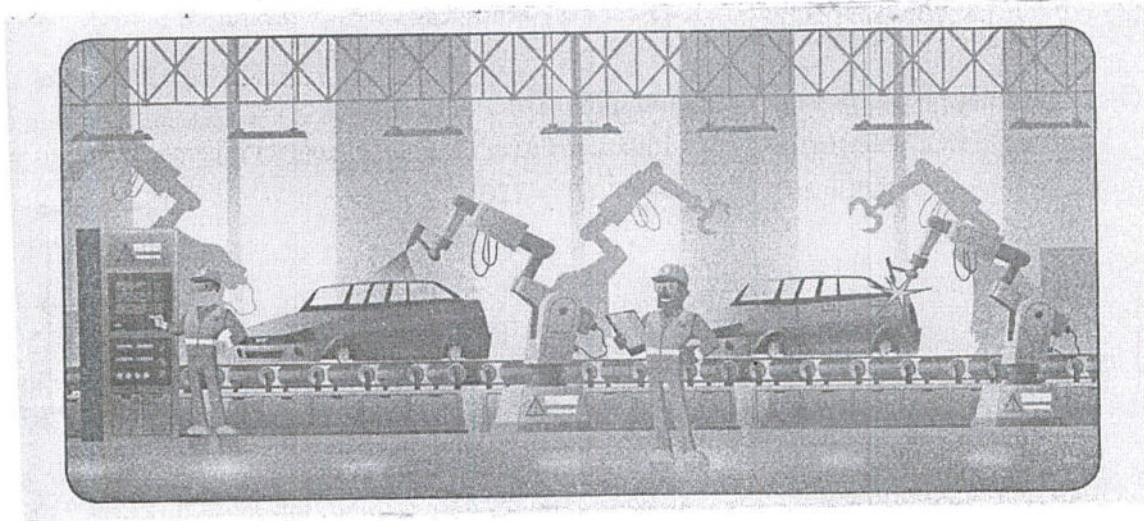
38. In a park, four poles are standing at positions A, B, C and D around the fountain such that the cloth joining the poles AB, BC, CD and DA toathes the fountain at P, Q, R and S respectively as shown in the figure. (fig. at back).
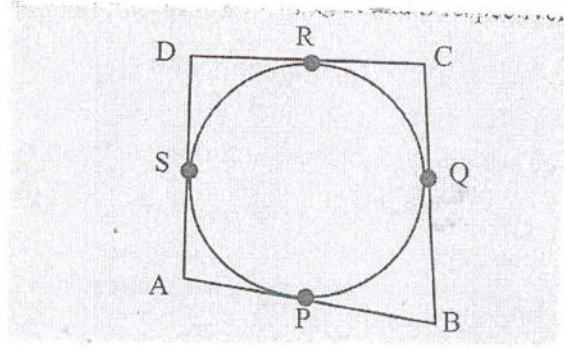
Based on the information, answer the following Question.

(i) If O is the centre of the circular fountain, then $\angle OSA = \dots$

(ii) If AB = AD, then write the name of the figure ABCD

(iii) (a) If DR = 7cm and AD = 11cm, then find the lenght of AP.

OR

(b) If O is the centre of the circular fountain with $\angle QCR = 60°$, then find the imagine ... .

56a

CLASS X   TIME = 3HRS.

Gineral Instructions :

SECTION A $1 \times 20 = 20$

1) which term of the A.P. $-29, -26, -23, \cdots 61$ is 16 ?
(a) 11th (b) 16th (c) 10th (d) 31st.

2) If two positive integers p and q can be expressed as $p = 18a^2b^4$ and $q = 20a^3b^2$, where a and b are prime numbers, then LCM (p, q) is
(a) $2a^2b^2$ (b) $180a^2b^2$ (c) $12a^2b^2$ (d) $180a^3b^4$

3) The graph of a polynomial $p(x)$ is shown. The number of zeros of $p(x)$ is
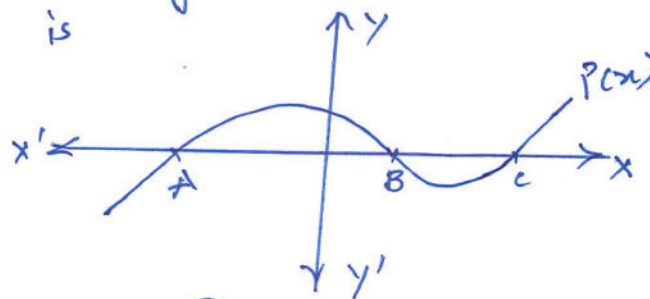
(a) 1   (b) 2   (c) 3   (d) 4

4) In the given figure, tangents PA and PB to the circle centred at O, from point P are perpendicular to each other. If $PA = 5cm$ then length AB is equal to
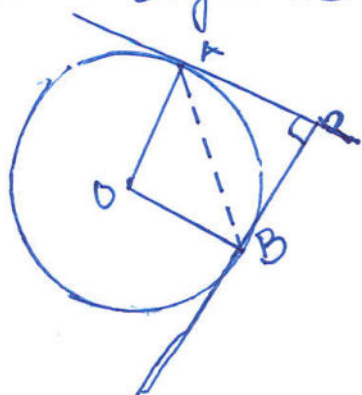
(a) $5cm$ (b) $5\sqrt{2}$ cm   (c) $2\sqrt{5}$ cm   (d) $10cm$

(5) If $\sin\theta = \cos\theta$, $(0° < \theta < 90°)$, the value of $\sec\theta . n\theta$ is

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

6) Two dice are rolled together. The probability of getting the sum of the two numbers to be more than 10 is

(a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{7}{12}$ (d) $\frac{1}{9}$

7) The nature of roots of the quadratic equation $9x^2 - 6x - 2 = 0$ is

ⓐ No real roots ⓑ 2 equal real roots ⓒ Two distinct real roots
ⓓ More than two real roots.

8) If o is the centre of a circle and chord PQ makes an angle 50° with the tangent PR at the point of contact P, then the angle subtended by the chord at the centre is
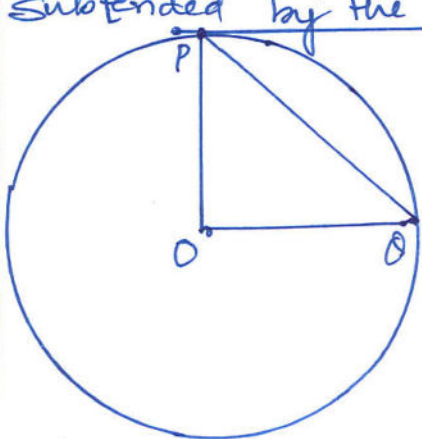
ⓐ 130° ⓑ 100° ⓒ 50° ⓓ 30°

9) If a pole 6 m high, casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is

a) 60° (b) 45° (c) 30° (d) 90°

10) It is proposed to build a new circular park, equal to the sum of areas of two circular parks of diameters 16m and 12 m. in a locality. The radius of new park is

a) 10 m (b) 100 m. (c) 20 m. (d) 24 m.

11) If value of each observation in a data is increased by 2, then the median of the new data

ⓐ Increases by 2 (b) increases by 2n ⓒ remains same
ⓓ decreases by 2

12) The value of k for which the system of equations $3x - y + 8 = 0$ and $6x - ky + 16 = 0$ has infinitely many solutions, is

(a) −2 (b) 2 (c) ½ (d) −½

13) Point P divides the line segment joining points $A(4, -5)$ and $B(1, 2)$ in the ratio $5:2$. Coordinates of point P are

(a) $\left(\frac{5}{2}, \frac{-3}{2}\right)$ (b) $\left(\frac{11}{7}, 0\right)$ (c) $\left(0, \frac{13}{7}\right)$ (d) $\left(\frac{13}{7}, 0\right)$

14) The sum of first 200 natural numbers is

ⓐ 2010 (b) 2000 (c) 20100 (d) 21000

15) The minute hand of a clock is 10 cm. long. The area of the face of the clock described by the minute hand between 10 A.M. and 10:35 A.M. is

(a) 84 cm² (b) 183.3 cm² (c) 185 cm² (d) 184.5 cm²

16) A buffalo is tied with a rope of length 14 m at the corner of a rectangular field of dimensions 20 m × 16 m., then the area of the field in which the buffalo can graze is

(a) 154 m² (b) 15.4 m² (c) 160 cm² (d) 154 cm²

17) If $\sin A = \frac{1}{2}$ and $\cos B = \frac{1}{2}$, then $A + B = $?

(a) 1 (b) 45˙ (c) 30˙ (d) 60˙

18) The length of tangent drawn from a point 10 cm. away from the centre of a circle of radius 6 cm is

(a) 5 cm (b) 8 cm (c) $(512)^{\frac{1}{2}}$ cm (d) $\sqrt{3}$ cm.

DIRECTIONS In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of reason (R). Choose the correct option out of the following:-

a) Both Assertion (A) and Reason (R) are true and Reason(R) is the correct explaination of (A)

(b) Both Assertion (A) and reason (R) are true and Reason (R) is not the correct explaination of Assertion (A)

(c) Assertion (A) is true but Reason (R) is false

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

19) Assertion (A) : The H.C.F. of two numbers is 5 and their product is 150, then their L.C.M is 30.

Reason (R) For any two positive integers a and b
HCF (a,b) + LCM (a,b) = a×b.

20) Assertion (A): The mode and Mean is given by 7 and 8, respectively. Then the median is $\frac{23}{3}$.

Reason (R): Mode = 3 Median − 2 Mean.

Section B

21) If $\sin\theta + \sin^2\theta = 1$, then prove that $\cos^2\theta + \cos^4\theta = 1$

OR

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

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

Q23) solve for x:

$$\sqrt{2x+9} + x = 13$$

Q24) The curved surface area of a right circular cylinder is 176 cm² and its volume is 1232 cm³. What is the height of the cylinder?

Or

Find the height of the cylinder whose radius is 7cm and the total surface area is 968 cm².

Q25) Half of the difference between two numbers is 2. The sum of the greater number and twice the smaller number is 13. Find the numbers.

SECTION C

Q26) Prove that $\sqrt{3} + \sqrt{5}$ is irrational

Or

Find HCF and LCM of 312 and 27 and verify that HCF × LCM = Product of the numbers.

Q27) In a test, the marks obtained by 100 students (out of 50) are given below

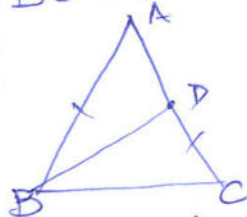| Marks obtained	0-10	10-20	20-30	30-40	40-50
No. of students	12	23	34	25	6

Find the mean marks of the students.

Q28) Prove that $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta) + 1 = 0$

Or

Prove that $\dfrac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$

Q29) The sum of the 4th and 8th terms of an AP is 24 and the sum of 6th and 10th terms is 44. Find the first three terms of an AP.

Q30) In a $\triangle ABC$, $AB = AC$ and D is a point on side AC, such that $BC^2 = AC \times CD$. Prove that $BD = BC$.

Q31) The shadow of a tower, standing on a level ground is found to be 30m longer when the star's altitude is 30° than when it was 60°. Find the height of the tower. $[\sqrt{3} = 1.73]$

Q 32] Find Mean, Median and mode of the following data

Classes	0-20	20-40	40-60	60-80	80-100	100-120	120-140
Freq.	6	8	10	12	6	5	3

Q 33] The cost of painting the total outside surface of a closed cylindrical tank at 60 paise per sq.dm. is Rs. 237.60. The height of the tank is 6 times the radius of the base of the tank. Find its volume

OR

A conical tent is to accommodate 11 persons Each person must have 4 sq.m. of space on the ground and 20m³ of air to breath. Find the height of the cone.

Q 34] A man rowing a boat away from a light house 150 m. high, takes 2 minutes to change the angle of elevation of the top of light house from 45° to 30°. Find the speed of the boat.

OR

A pole, 5m. high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point 'A' on the ground is 60° and the angle of depression of point 'A' from the top of the tower is 45°. Find the height of the tower. ($\sqrt{3}=1.73$)

Q 35] # Rohan is now half his father's age. Twenty years ago Rohan's father was six times older than Rohan. Find the present ages of Rohan and his father.

SECTION-E

Q 36] In a survey on holidays, 120 people were asked to state which type of transport they used on their last holiday. The following pie chart shows the results of the survey,
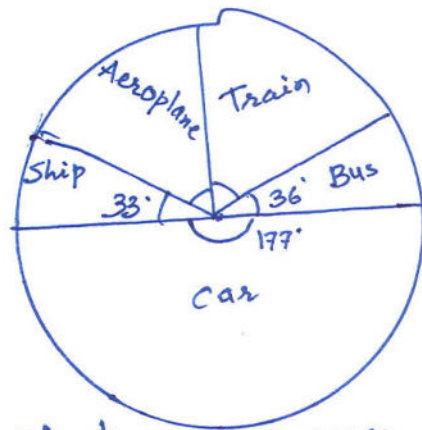
Observe the pie chart and answer the following questions:

(i) If one person is selected at random, find the probability that he/she travelled by bus or ship.

(ii) Which is most favourite mode of transport and how many people used it?

(III) (a) A person is selected at random. If the probability that he did not use train is 4/5, find the number of people who used train.

OR

(III) (b) The probability that randomly selected person used aeroplane is 7/60. Find the revenue collected by air company at the rate of Rs.5000 per person.

Q37. Manpreet kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86 m at the Asian Grand Prix in 2017 is the maximum distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in olympics one day. Initially, her throw reached 7.56 m only. Being an athlete in School, she regularly practiced and was able to improve the distance 9 cm every week. During the special camp of 15 days, she started with 40 throws and Every day kept increasing the number of throws by 12, to achieve this remarkable progress.

(I) How many throws Sanjitha practiced on 11th day of the camp?

(ii) What would be Sanjitha's throw distance at the end of 9 weeks?

OR

when will she be able to achieve a throw of 11.16 m?

(III) How many throws did she do during the entire camp of 15days?

Q38 A ball is thrown in the air so that t seconds after it is thrown, its height 'H' meter above its starting point is given by the polynomial $h = 25t - 5t^2$.
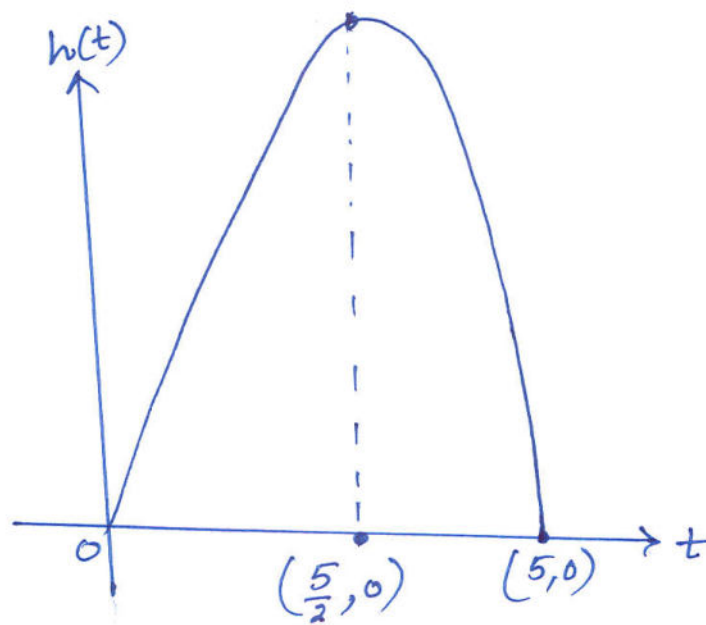
Observe the graph of the polynomial and answer the following questions :

(i) Write the zeros of the polynomial.

(ii) Find the maximum height achieved by the ball.

(iii) (a) After throwing upward, how much time did the ball take to reach to the height of 30 cm. ?

or

(b) Find the two different values of 't' when the height of the ball was 20 cm.