IX MATHEMATICS – WORK SHEETS

LINEAR EQUATIONS IN TWO VARIABLES

Choose the correct answer from the given four options(1 to 5):

1. If the point (2,-3) lies on the graph of the linear equation $5x - ky = 1$, then the value of k is
   a) 3 b) -3 c) -4 d) -9

2. A solution of the equation $3x - 4y + 7 = 0$ is
   a) $\left(\frac{7}{4}, 0\right)$ b) $\left(0, -\frac{7}{3}\right)$
   c) $(1, -1)$ d) $(-1, 1)$

3. The graph of the equation $3x + y = 0$ is a line
   a) Parallel to x-axis
   b) parallel to y-axis
   c) Passing through origin
   d) passing through the point $(-1, -3)$

4. Passing through the point $(-3, 5)$
   a) One and only one line can be drawn
   b) Two and only two lines can be drawn
   c) Only a finite number of lines can be drawn
   d) Infinitely many lines can be drawn

5. Give the geometrical representation of$2x + 9 = 0$ as an equation
   a) In one variable b) in two variables

6. The taxi fare in a city is as follows:
   For the first kilometre, the fare is Rs.8 and for the subsequent distance, it is Rs.5 per km. Taking the distance covered as x km and the total fare as Rs.y, write a linear equation for this information, and draw its graph.

7. Give the equations of three lines passing through the point $(2, 14)$. How many more such lines are there and why.

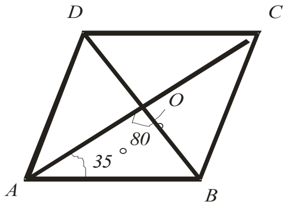
8. Write four solutions of the equation $x + 2y = 6$. Also draw its graph

9. Draw the graph of $4x - 3y + 12 = 0$. From the graph, find the value of
   (i) y when $x = 3$ (ii) x when $y = -4$

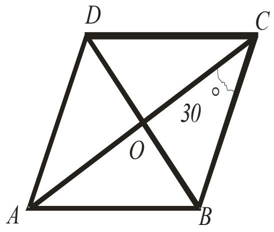
10. Draw the graph of the linear equation $2x - y + 1 = 0$. From your graph, find the values of h and k if the graph passes through the points $(h, 4)$ and $\left(\frac{1}{2}, k\right)$.

QUADRILATERALS

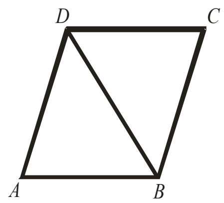
1. A parallelogram which has equal diagonals must be a
   a) Square b) rectangle
   c) rhombus d) kite
2. In the adjoining figure, the diagonals of a parallelogram intersect at the point O. If ∠OAB = 35° and ∠AOB = 80°, then ∠ODC is equal to
   a) 115° b) 90°
   c) 80° d) 65°
3. In a parallelogram ABCD, if ∠A = 50°, then ∠B, ∠C and ∠D are respectively



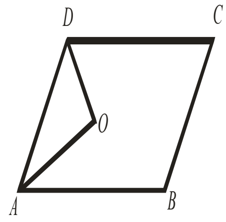
   a) 130°,130°,50°
   b) 50°,130°,130°
   c) 130°,50°,130°
   d) 130°,50°,50°
4. If the diagonals of a square ABCD intersect each other at O, then ΔOAB is
   a) An equilateral triangle
   b) A right angled but not an isosceles triangle
   c) An isosceles but not right angles triangle
   d) An isosceles right angled triangle



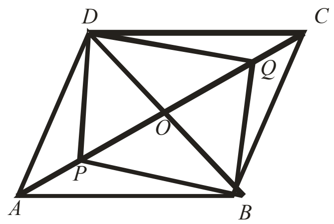
5. In the adjoining figure, ABCD is a rhombus. If AB = BD, then find ∠ADC.



6. In the adjoining figure, ABCD is a parallelogram. If the bisector of ∠A and ∠D meet at O, then find ∠AOD.



7. In the adjoining figure, ABCD is a parallelogram and its diagonals AC and BD intersect at O. P and Q are points on the diagonal AC such that AP = CQ. Show that PBQD is a parallelogram.

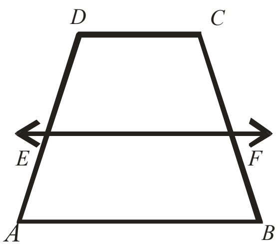


8. In the adjoining figure, ABCD is a rhombus. If ΔACB = 30°, then ∠ADB is equal to
a) 30° b) 45° c) 60° d) 120°

9. A quadrilateral is a rectangle but not a square when

a) all angles are not equal
b) its diagonals are not equal
c) its diagonals do not bisect each other
d) its diagonals are not perpendicular

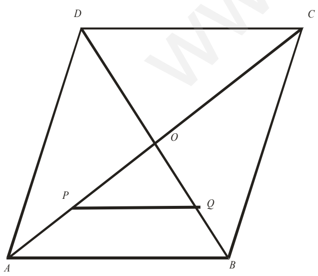
10. A quadrilateral is a rhombus but not a square when



a) its opposite angles are not equal
b) the lengths of its diagonals are not equal
c) its diagonals are not perpendicular to each other
d) its diagonals do not bisect each other

11. If the angles of a quadrilateral ABCD taken in order are in the ratio 4:6:7:3, then ABCD is a
a) Kite b) rhombus
c) trapezium d) parallelogram

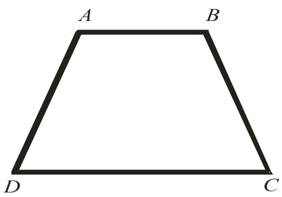
12. In the adjoining figure, the diagonals AC and BD of a rhombus ABCD intersect at O. P and Q are mid-points of OA and OB respectively. If AC = 8 cm and BD = 6 cm, then the length of PQ is
a) 3 cm b) 4 cm
c) 5 cm d) 2.5 cm



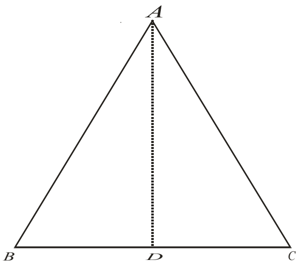
13. Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is a square.

14. Show that the bisectors of the angles of a parallelogram form a rectangle

15. In the adjoining figure, ABCD is a trapezium in which AB || DC and AD = BC. Show that
(i) $\angle A = \angle B$ (ii) $\angle C = \angle D$
(iii) $\Delta ABC \cong \Delta BAD$
(iv) Diagonal AC = diagonal BD



16. In the adjoining figure, ABCD is a trapezium in which AB||DC and E is mid-point of AD. A line is drawn through E parallel to AB intersecting BC at F. Show that F is mid-point of BC.

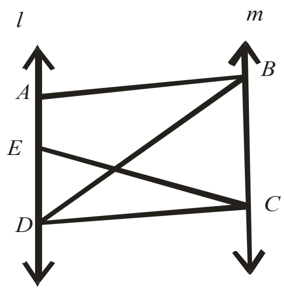


17. In a triangle ABC, AD is a median and E is mid-point of AD. BE is joined and extended to meet AC at F. Prove that $AF = \frac{1}{3}AC$.

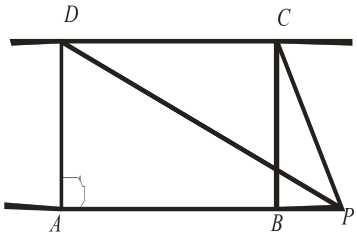
AREAS OF PARALLELOGRAMS

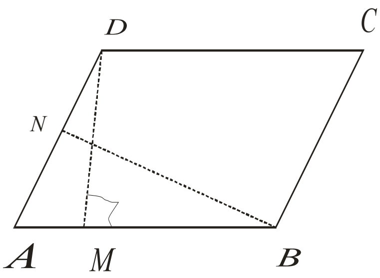
1. In the adjoining figure, if $l \parallel m$ and $AB \parallel DC$, then which of the following two figures are not on the same base and between the same parallels
   a) || gm ABCD and ΔBCD
   b) || gm ABCD and quad. ABCE
   c) ΔABD and ||gm ABCD
   d) ΔABD and quad. ABCE

2. In the adjoining figure, ABCD is a rectangle. If AB = 6 cm and BC = 4 cm, then the area of ΔPCD is
   a) 24 cm^2
   b) 12 cm^2
   c) 6 cm^2
   d) 48 cm^2

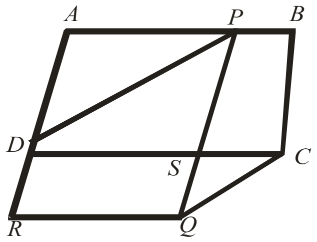


3. In the adjoining figure, ABCD is a parallelogram, DM ⊥AB and BN ⊥ AD. If AB = 20 cm, DM = 12 cm and BN = 16 cm, then BC is equal to
   a) 24 cm
   b) 18 cm
   c) 15 cm
   d) 10 cm

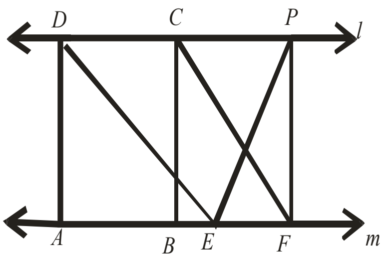




4. In the adjoining figure, if D is the mid-point of the side BC of ΔABC, then which of the following statements is not true
   a) ar(ΔABD) = ar(ΔADC)
   b) ar(ΔABD) = $\frac{1}{2}$ar(ΔABC)
   c) ar(ΔADC) = $\frac{1}{2}$ar(ΔABC)
   d) ar(ΔADC) = $\frac{1}{4}$ar(ΔABC)

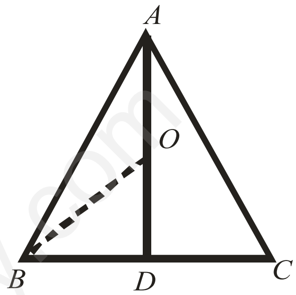


5. In the adjoining figure, l || m, ABCD is a rectangle with sides AB = 6 cm and AD = 9 cm (not drawn to scale). If DE || CF, find the area of
   (i) Parallelogram EFCD
   (ii) ΔEFP

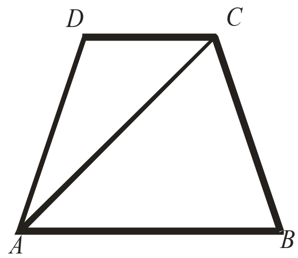


6. ABCD is a parallelogram and its diagonals AC and BD intersect at the point O. If area of ΔOBC is 6 cm^2, then the area of the parallelogram ABCD is
   a) 48 cm^2 b) 24 cm^2
   c) 12 cm^2 d) 36 cm^2
7. In the adjoining figure, if D is the mid-point of the side BC of ΔABC and O is mid-point of AD, then which of the following statements is not true
   a) ar(ΔOAB) = ar(ΔOBD)
   b) ar(ΔOAB) = $\frac{1}{2}$ar(ΔABD)
   c) ar(ΔOAB) = $\frac{1}{2}$ar(ΔADC)
   d) ar(ΔOAB) = $\frac{1}{2}$ar(ΔABC)

8. In the adjoining figure, AB || DC and AB ≠ DC. If area of ΔABC = 12 cm^2, then the area of the trapezium ABCD is



   a) 24 cm^2 b) 12 cm^2
   c) 6 cm^2 d) none of these



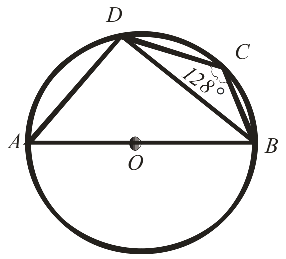
9. In the adjoining figure, ABCD and APQR are two parallelograms of equal area.
   Prove that DP is parallel to QC.

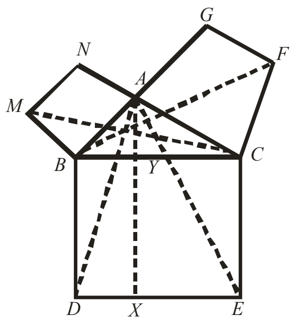
10. Diagonals AC and BD of a quadrilateral ABCD intersect each other at P. Show that:
Ar (ΔAPB) $\times$ar(ΔCPD) = ar(ΔAPD) $\times$ar(ΔBPC).

11. If P and Q are respectively the mid-points of sides AB and BC of a triangle ABC and R is mid-point of AP, show that:
    (i) Ar (ΔPQR) = $\frac{1}{2}$ar (ΔARC)
    (ii) Ar(ΔPBQ) = ar (ΔARC)
    (iii) Ar (ΔRQC) = $\frac{3}{8}$ar (ΔABC)

12. In the adjoining figure, ABC is a right triangle right angled at A. BCEG, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment AX $\perp$ DE meets BC at Y.
Show that :
    (i) ΔMBC $\cong$$\Delta$ABD
    (ii) ar (rect.BYXD) = 2 ar (ΔMBC)
    (iii) ar (rect. BYXD) = ar (square ABMN)
    (iv) ΔFCB $\cong$$\Delta$ACE
    (v) ar (rect. CYXE) = 2 ar (ΔFCB)
    (vi) ar (rect. CYXE) = ar (sq. ACFG)

(vii) ar (sq.BCED) = ar(sq.ABMN) + ar (sq.ACFG)





CIRCLES & CONSTRUCTIONS

1. In the adjoining figure, AB is a chord of a circle with centre O. If P is any point on the chord AB different from A and B, then

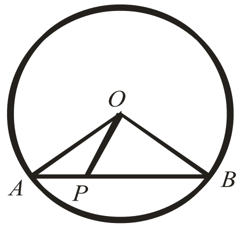
a) OP > OA b) OP ≥ OA

c) OP < OA d) OP ≥ OB

2. In the adjoining figure, AB is a diameter of a circle and C, D are points on the circle. If ∠ABC = 35°, then ∠BDC is

a) 35° b) 55°

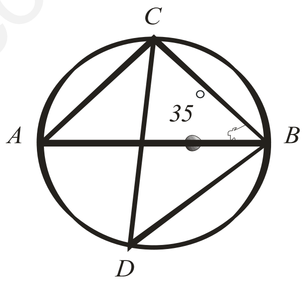
c) 45° d) 65°



3. In the adjoining figure, a line l intersects two concentric circles with centre O at the points A, B, C and D. If OM ⊥ l, AD = 14 cm and BC = 8 cm, then AB is

a) 7 cm b) 6 cm

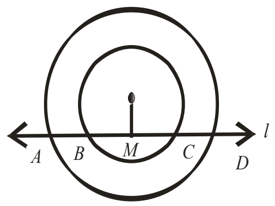
c) 4 cm d) 3 cm



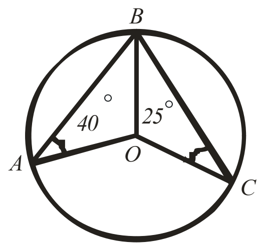
4. In the adjoining figure, O is the centre of a circle, If ∠OAB = 40° and ∠OCB = 25°, then ∠AOC is

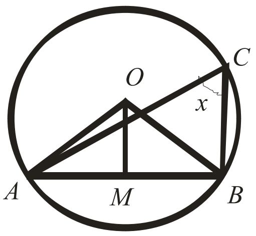
a) 130° b) 115°

c) 125° d) 150°

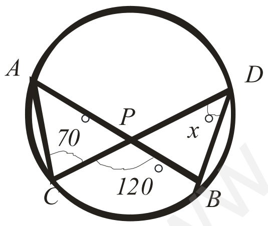


5. In the adjoining figure, AB is a diameter of a circle with centre O and points C, D lie on the circle. If ∠BCD = 128°, find ∠ABD.





6. In the adjoining figure, chords AB and CD of a circle intersect at P. If $\angle CPB = 120°$ and $\angle ACP = 70°$, then find the value of x.



7. If two equal chords of a circle intersect within the circle, prove that the segments of one chord are equal to corresponding segments of the other chord.

8. If diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, prove that it is a rectangle.

9. Construct a right triangle whose base is 4.5 cm and sum of its hypotenuse and other side is 7.5 cm.

10. If the adjoining figure, AB is a chord of a circle with centre O and C is a point on the circle. If M is mid-point of AB and $\angle AOM = 42°$, then the value of x is

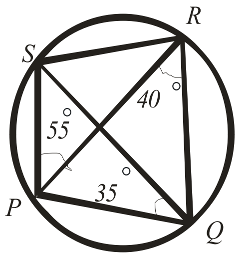
a) 42° b) 84°

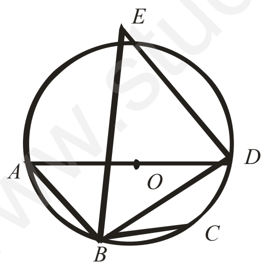
c) 21° d) 63°

11. In the adjoining figure, if PQRS is a cyclic quadrilateral then ∠QPR is
    a) 35° b) 40°
    c) 50° d) 55°

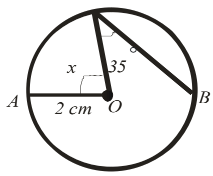
12. In the adjoining figure, the points A, B, C and D lie on a circle with centre O. If ∠BCD = 48° then ∠ACB is
    a) 48° b) 42°
    c) 52° d) 24°

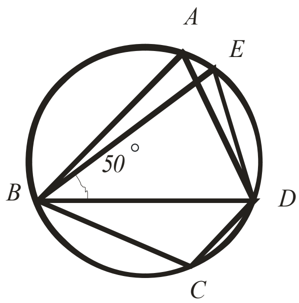
13. In the adjoining figure, O is the centre of a circle. If the distance between A and B is 4 cm, then the value of x is
    a) 55° b) 60°
    c) 65° d) 70°



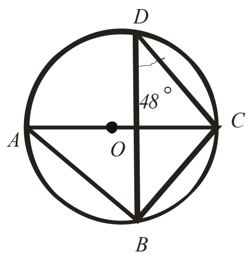


14. In the adjoining figure, the points A,B,C,D and E lie on a circle. If AB = AD and ∠ABD = 50°, then find ∠BED and ∠BCD.





15. In the adjoining figure, BC is a chord parallel to the diameter AD of the circle ABCDE. If ∠BED = 63°, find ∠CBD.



16. Prove that the quadrilateral formed (if possible) by the internal angle bisectors of any quadrilateral is cyclic.

17. Bisectors of angles A, B and C of a triangle ABC intersect its circumcircle at points D,E and F respectively. Prove that the angles of the triangle DEF are $90° - \frac{1}{2}\angle A$, $90 - \frac{1}{2}\angle B$ and $90° - \frac{1}{2}\angle C$.

18. In any triangle ABC, if the angle bisector of $\angle A$ and perpendicular bisector of BC intersect, prove that they intersect on the circumcircle of the triangle ABC.

SURFACE AREAS & VOLUMES

1. If the length of a diagonal of a cube is $5\sqrt{3}$ cm, then its surface area is
   a) 75 cm^3 b) 150 cm^2
   c) 300 cm^2 d) 450 cm^2
2. If each side of a cube is increased by 50%, then the surface area of the cube increases by
   a) 50% b) 100%
   c) 125% d) 150%
3. If two cones of same volume have their heights in the ratio 2:3, then the ratio of their radii is
   a) $\sqrt{3}:\sqrt{2}$ b) $\sqrt{2}:\sqrt{3}$
   c) $\sqrt{2}:1$ d) $\sqrt{3}:1$
4. If the base diameter and the height of a cone are 10 cm and 12 cm respectively, then its total surface area is
   a) 60π cm^2 b) $65\pi cm^2$
   c) 85π cm^2 d) 90π cm^2
5. If the total surface area of a hemisphere is 192π cm^2, then the diameter of the hemisphere is
   a) 8 cm b) 16 cm
   c) 4 cm d) 16 m
6. The capacity of a cylindrical vessel is 1100 cm3. If its height is 14 cm, then the diameter of the cylinder is
   a) 22 cm b) 20 cm
   c) 10 cm d) 5 cm
7. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute.

8. The inner diameter of a cylindrical wooden pipe is 24 cm and its outer diameter is 28 cm. The length

of the pipe is 35 cm. Find the mass of the pipe, if 1 cm^3 of wood has a mass of 0.6 gm.

9. A dome of a building is in the form of a hemisphere. From inside it was painted at a cost of Rs.4950. If the rate of painting is Rs.14 per m^2, find
   (i) The base diameter of the dome
   (ii) The volume of the air inside the dome.

10. Monica has a piece of canvas whose area is 551 m^2. She uses it to make a conical tent with a base radius of 7 m. Assuming that all the stiching margins and the wastage incurred while cutting, amounts to approximately 1 m^2, find the volume of the tent that can be made with it.

11. If the surface are of a cube is 486 cm^2, then the length of the longest rod which can be placed in it is
    a) 9 cm   b) $9\sqrt{3}$ cm
    c) 18 cm   d) $9\sqrt{6}$ cm
12. If the inner length, breadth and height of a cuboidal box are 10 cm, 8 cm and 5 cm respectively, then the maximum number of cubes of side 2 cm that can be placed in the box is
    a) 400   b) 200
    c) 50   d) 40
13. If a metallic right circular cone of height 9 cm and base radius 7 cm is melted and recast into a cuboid whose two sides are 11 cm and 6 cm, then the length of the third side of the cuboid is
    a) 5 cm   b) 6 cm
    c) 7 cm   d) 11 cm
14. If the height of a cylinder is 8 cm and its base area is 38.5 cm^2, then its volume is
    a) 154 cm^3 b) 308 cm^3
    c) 380 cm^3 d) 830 cm^3
15. If the capacity of a conical vessel is 66 litres and its vertical height is 70 cm, then its diameter is
    a) 30 cm   b) 40 cm
    c) 60 cm   d) 1.2 m
16. If the ratio of the diameters of two spheres is 2 : 3, then the ratio of their volume is
    a) 4 : 9   b) 9 : 4
    c) 27 : 8   d) 8 : 27

17. The external dimensions of an open rectangular wooden box are 98 cm × 84 cm × 77 cm. If the wood is 2 cm thick all around, find
    (i) The capacity of the box
    (ii) The volume of the wood used in making the box, and
    (iii) The weight of the box in kilograms correct to 1 decimal place, given that 1 cm^3 of wood weighs 0.8 gm.

18. Find
    (i) The lateral surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.
    (ii) How much area of steel was actually used, if $\frac{1}{12}$ of the area of steel actually used was wasted in making the tank.

19. The soil taken out on digging a circular tank of diameter 17.5 m is spread all around the tank uniformly to a width of 4 m, to form an embankment of height 2 m. Calculate the depth of the circular tank correct to 2 decimal places. (The depth of the tank is uniform everywhere).

20. The volume of a conical tent is 1232 m^3 and the area of the base floor is 154 m^2. Calculate the:
    (i) The radius of the floor
    (ii) Height of the tent
    (iii) Length of the canvas required to cover this conical tent if its width is 2 m.

21. A dome of a building is in the form of a hemisphere. From inside, it was white-washed at a cost of Rs.498.96. If the cost of white washing is Rs.2 per square metre, find
    (i) The inside surface of the dome
    (ii) Volume of air inside the dome.

STATISTICS & PROBABILITY

1. The mean of the first five prime numbers is
   a) 3 b) 5.2
   c) 5.6 d) 6.83
2. The mean weight of a group of 6 students is 25 kg and the mean weight of another group of 4 students is 30 kg. The combined mean weight of 10 students is
   a) 25 kg b) 27 kg
   c) 27.5 kg d) 30 kg
3. The number of goals scored by a football team in a series of matches are
   3,1,0,5,7,3,3,1,4,2,0,2
   The median of this data is
   a) 2 b) 3
   c) 4 d) 2.5
4. The value of p, for which the following data:
   3,5,0,7,5,3,5,6,p,7,6,4,9 has mode 5 is
   a) 9 b) 7
   c) 5 d) 6
5. A coin was tossed 50 times and it showed head 28 times. The probability of getting a tail is
   a) 0 b) $\frac{11}{25}$
   c) $\frac{1}{2}$ d) $\frac{14}{50}$
6. If each observation of a data is increased by the same quantity k, then the mean of the data is also increased by k.
7. A die is thrown 500 times with the frequencies for the outcomes 1,2,3,4,5 and 6 as given in the following table:

Outcomes	1	2	3	4	5	6
Frequency	85	78	79	87	80	91

   Find the probability of getting
   (i) a number greater than 4
   (ii) a prime number
8. The marks obtained (out of 80 marks) by 40 students in a test of mathematics are given in the following table:

Marks obtained	0-20	20-30	30-40	40-50	50-60	60-70	70-80
No.of students	3	2	5	8	6	9	7

   Find the probability of a student, chosen at random, getting
   (i) Less than 40 marks
   (ii) 50 or more marks

9. The length of 40 leaves of a plant are measured correct to one millimetre, and 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

(i) Draw a histogram to represent the given data

(ii) Is there any other suitable graphical representation for the same data

(iii) Is it correct to conclude that the maximum number of leaves are 153 mm long.why.

10. The mean of first five odd prime numbers is
    a) 5.6 b) 5.8
    c) 6.8 d) 7.8

11. The mean of 5 observations is 9. If the mean of the first 3 observations is 6 and the mean of the last 3 observations is 11, then the third observation is
    a) 6 b) 8
    c) 9 d) 11

12. The mean of the age of three students Vijay, Rahul and Anu is 15 years. If their ages are in the ratio 4 :5 : 6 respectively, then their respective ages are
    a) 12 years, 15 years, 18 years
    b) 12 years, 18 years, 15 years
    c) 18 years, 15 years, 12 years
    d) 15 years, 12 years, 18 years

13. If the number 3,6,7,10,x,x+4,19,20,25,28 are in ascending order and their median is 13, then the value of x is
    a) 11 b) 12
    c) 13 d) 14

14. In a test in Mathematics, 7 students scored 19 marks, 11 students scored 15 marks, 16 students 13 marks and 12 students scored 10 marks. The mode of the data is
    a) 19 marks b) 15 marks
    c) 13 marks d) 10 marks

15. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows:

Number of letters	Number of surnames
1 – 4	6
4 – 6	30
6 – 8	44
8 – 12	16
12 – 20	4

(i) Draw a histogram to depict the given information

(ii) Write the class interval in which the maximum number of surnames lie.

16. The following table gives the distribution of students of two sections according to the marks obtained by them:

Section A		Section B	
Marks	Frequency	Marks	Frequency
0 – 10	3	0 – 10	5
10 – 20	9	10 – 20	19
20 – 30	17	20 – 30	15
30 – 40	12	30 – 40	10
40 - 50	9	40 – 50	1

Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the two polygons compare the performance of the two sections.

NOTE : (Student's use)

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