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PART - I

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As per CCE guidelines, the syllabus of Mathematics for class IX has been divided term-wise. The units specified for each term shall be assessed through both formative and summative assessment.

In each term, there shall be two formative assessments each carrying 10% weightage and one summative assessment carrying 30% weightage.

**SA- 2**

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Chapter - 4

(Linear Equations in two variables)

Key Concept

- An equation of the form $ax + by + c = 0$, where $a$, $b$ and $c$ are real numbers, such that $a$ and $b$ are not both zero, is called a linear equation in two variables.
- A linear equation in two variables has infinitely many solutions.
- The graph of every linear equation in two variables is a straight line.
- $x = 0$ is the equation of the $y$-axis and $y = 0$ is the equation of the $x$-axis.
- The graph of $x = a$ is a straight line parallel to the $y$-axis.
- The graph of $y = a$ is a straight line parallel to the $x$-axis.
- An equation of the type $y = mx$ represents a line passing through the origin.
- Every point on the graph of a linear equation in two variables is a solution of the linear equation. Moreover, every solution of the linear equation is a point on the graph of the linear equation.

Section - A

Q.1  The point $(a, a)$ always lies on the line
   (a) $y = x$  (b) $y - axis$  (c) $x - axis$  (d) $x + y = 0$

Q.2  The point $(m, -m)$ always lies on the line.
   (a) $x = m$  (b) $y = -m$  (c) $x + y = 0$  (d) $x = y$

Q.3  If $x = -2$ and $y = 3$ is a solution of the equation $3x - 5y = a$, then value of $a$ is
   (a) 19  (b) -21  (c) -9  (d) -18

Q.4  $x = 3$, $y = -2$ is a solution of the equation.
   (a) $x + y = 5$  (b) $3x - 2y = 11$
   (c) $4x - 3y = 18$  (d) $3x + y = 5$

Q.5  $x = -5$ can be written in the form of equation in two variable as
   (a) $x + o.y + 5 = 0$  (b) $o.x + y = -5$
   (c) $o.x + o.y = -5$  (d) $o.x + o.y = +5$

Q.6  The linear equation $3x - 2y = 5$ has
   (a) a unique solution
   (b) two solutions
   (c) no solution
   (d) infinitely many solutions.

Q.7  The equation of $x$-axis is
   (a) $x = k$  (b) $y = 0$  (c) $x = 0$  (d) $y = k$

Q.8  Any point on the $y$-axis is of the form
   (a) $(x, y)$  (b) $(x, x)$  (c) $(0, y)$  (d) $(x, 0)$
Q.9 Draw the graph of the equation \( x - 2y = 0 \)
Q.10 The cost of a pen is four times the cost of a pencil express the statement as a linear equation in two variables.
Q.11 Write any four solutions for each of the following equations.
   (a) \( 5x - 2 = 0 \)
   (b) \( 3x + y = 7 \)
Q.12 Find the value of \( a \) if (-1, 1) is a solution of the equation \( 3x - ay = 5 \)
Q.13 If (3,1) is a solution of the equation \( 3x + 2y = k \), find the value of \( k \).
Q.14 Verify that \( x = 2 \), \( y = -1 \), is a solution of the linear equation \( 7x + 3y = 11 \)
Q.15 Write one solution of each of the following equations
   (a) \( 4x - 3y = 0 \)
   (b) \( 2y - y = 3 \)
Q.16 The cost of 2 pencils is same as the cost of 5 erasers. Express the statement as a linear equation in two variables.

SECTION C

Q.17 Give the geometrical representation of the equation \( y = 3 \) as an equation.
   (i) In one variable
   (ii) In two variables

Q.18 Ramesh is driving his car with a uniform speed of 80 km/hr. Draw the time distance graph. Form the graph find the distance travelled by him in.
   (i) \( 1 \frac{1}{2} \) hr
   (ii) 3 hours

Q.19 Draw the graph of each of the equations \( 2x - 3y + 5 = 0 \) and \( 5x + 4y + 1 = 0 \) and find the coordinates of the point where the lines meet.

Q.20 Draw the graph of the equation \( 5x + 6y - 28 = 0 \) and check whether the point \( (2,3) \) lies on the line.

Q.21 The taxi fare in a city is as follows: For the first kilometer, the fare is Rs. 8 and for the subsequent distance it is Rs. 5 per km. Taking the distance covered as \( x \) km and total fare as Rs. \( y \), writes a linear equation for this information, and draw its graph.

Q.22 Write three solutions for the equation \( 7x - 8y = 13 \)

Answer

<table>
<thead>
<tr>
<th>Q.1</th>
<th>a</th>
<th>Q.2</th>
<th>c</th>
<th>Q.3</th>
<th>b</th>
<th>Q.4</th>
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<th>Q.5</th>
<th>a</th>
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<th>d</th>
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<tbody>
<tr>
<td>Q.7</td>
<td>b</td>
<td>Q.8</td>
<td>c</td>
<td>Q.19</td>
<td>(-1, 1)</td>
<td>Q.20</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Chapter - 8
(Quadrilaterals)

Key Concept
- Sum of the angles of a quadrilateral is 360°.
- A diagonals of a parallelogram divides it into two congruent triangles.
- In a parallelogram
  (a) diagonals bisects each other.
  (b) opposite angles are equal.
  (c) opposite sides are equal.
- Diagonals of a square bisects each other at right angles and are equal, and vice-versa.
- A line through the mid-point of a side of a triangle parallel to another side bisects the third side. (Mid point theorem)
- The line through the mid points of sides of a triangle, \( \parallel \) to third side and half of it.

Section - A

Q.1 The figures obtained by joining the mid-points of the sides of a rhombus, taken in order, is
(a) a square (b) a rhombus
(c) a parallelogram (d) a rectangle

Q.2 The diagonals AC and BD of a parallelogram ABCD intersect each other at the point O, if \( \angle DAC = 32^0 \) and \( \angle AOB = 72^0 \)
then \( \angle DBC \) is
(a) 32° (b) 24° (c) 40° (d) 63°

Q.3 In a square ABCD, the diagonals AC and BD bisect at 0. Then \( \triangle AOB \) is
(a) acute angled (b) right angled
(c) obtuse angled (d) equilateral

Q.4 ABCD is a rhombus such that \( \angle ACB = 40^0 \) then \( \angle ADB \) is
(a) 40° (b) 45° (c) 50° (d) 60°

Q.5 A quadrilateral ABCD is a parallelogram if
(a) \( AD \parallel BC \) (b) \( AB = CD \)
(c) \( AB = AD \) (d) \( \angle A = 60^0, \angle C = 60^0, \angle B = 120^0 \)

Q.6 Three angles of a quadrilateral are 60°, 70° and 80°. The fourth angle is
(a) 150° (b) 160° (c) 140° (d) None of these
Q.7 In the adjoining figure QR=RS

Find $\angle PSR$

Q.8 Prove that the sum of the four angles of a quadrilateral is $360^0$.

Q.9 Prove that the diagonals of a parallelogram bisects each other.

Q.10 The angles of quadrilateral are in the ratio $3 : 5 : 9 : 13$. Find all the angles of the quadrilateral.

Q.11 ABCD is a rectangle in which diagonal AC bisects $\angle A$ as well as $\angle C$. Show that ABCD is a square.

Q.12 In the adjoining figure, ABCD is a $\parallel$gm. If $\angle DAB = 60^0$ and $\angle DBC = 80^0$.

Find $\angle CDB$ and $\angle ADB$.

Q.13 Prove that the line segment joining the mid-points of two sides of a triangle is parallel to the third side.
Q.14 ABCD is a rectangle and P, Q, R and S are mid-points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rhombus.

Q.15 Prove that the straight line joining the mid-points of the diagonals of a trapezium is parallel to the parallel sides and is equal to half their difference.

Q.16 In the adjoining figure, D, E and F are mid-points of the sides BC, CA and AB of \( \triangle ABC \). If \( AB = 4.3 \text{cm} \), \( BC = 5.6 \text{cm} \) and \( AC = 3.5 \text{cm} \), find the perimeter of \( \triangle DEF \).

Q.17 In a parallelogram ABCD, AP and CQ are drawn perpendicularrays from vertices A and C on diagonal BD. Prove that \( \triangle APB \cong \triangle CQD \).

Q.18 In a parallelogram ABCD, E and F are points on AB and CD such that AE = CE. Prove that ED||BF.

**Section - D**

Q.19 If a line is parallel to the base of a trapezium and bisects one of the non-parallel sides, then prove that it bisects either diagonal of the trapezium.

Q.20 AD is a median of \( \triangle ABC \) and E is the mid-point of AD. BE Produced meets AC in F. Prove that \( AF = \frac{1}{3} AC \).

Q.21 ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that

(i) D is the mid-point of AC

(ii) \( CM = MA = \frac{1}{2} AB \)

Q.22 Show that the bisectors of angles of a parallelogram form a rectangle.
Answers -

Q.1 (d) Rectangle
Q.2 (c) 40°
  
Q.3 (b) Right angled
Q.4 (c) 50°
Q.5 (d) \( \angle A = 60^\circ, \angle C = 60^\circ, \angle B = 120^\circ \)
Q.6 (a) 150°
Q.7 \( \angle PSR = 105^\circ \)

******
Chapter - 9
(Area of parallelograms and triangles)

Key Concepts
* Area of a parallelogram = \( \text{base} \times \text{height} \)
* Area of a triangle = \( \frac{1}{2} \times \text{base} \times \text{height} \)
* Area of a trapezium = \( \frac{1}{2} \times \text{sum of parallel sides} \times \text{distance between them} \)
* Area of rhombus = \( \frac{1}{2} \times \text{product of diagonals} \)
* Parallelogram on the same base and between the same parallels are equal in area.
* A parallelogram and a rectangle on the same base and between the same parallels are equal in area.
* Triangles on the same base and between the same parallels are equal in area.
* If a triangle and parallelogram are on the same base and between the same parallels, then.

\[
\text{(Area of triangle)} = \frac{1}{2} \times \text{(area of the parallelogram)}
\]

* A diagonal of parallelogram divides it into two triangles of equal areas.

In parallelogram ABCD, we have

\[
\text{Area of } \triangle ABD = \text{area of } \triangle ACD
\]

![Diagram of parallelogram and diagonals]

* The diagonals of a parallelogram divide it into four triangles of equal areas therefore

\[
\text{ar}(\triangle AOB) = \text{ar}(\triangle COD) = \text{ar}(\triangle AOD) = \text{ar}(\triangle BOC)
\]
A median $AD$ of a $\triangle ABC$ divides it into two triangles of equal areas. Therefore

$$ar(\triangle ABD) = ar(\triangle ACD)$$

If the medians of a $\triangle ABC$ intersect at $G$, then

$$ar(\triangle AGB) = ar(\triangle AGC) = ar(\triangle BG\bar{C}) = \frac{1}{3} ar(\triangle ABC)$$

![Diagram of a triangle with medians](image)

**Section - A**

**Q.1** If $E$, $F$, $G$ & $H$ are mid points of sides of parallelogram $ABCD$, then show that

$$ar(\triangle EFGH) = \frac{1}{2} ar(\triangle ABCD)$$

**Q.2** Point $P$ and $Q$ are on the sides $DC$ and $AD$ of a parallelogram respectively. Show that $ar(\triangle APB) = ar(\triangle BQC)$

**Q.3** Show that a median of a triangle divides it into two triangle of equal area.

**Q.4** $\square PQRS$ and $\square ABRS$ are two parallelograms and $X$ being any point on side $BR$. Show that.

(i) $ar(\triangle PQRS) = ar(\triangle ABRS)$

(ii) $ar(\triangle A \times S) = \frac{1}{2} ar(\triangle PQRS)$

**Section - B**

**Q.5** In given figure $ABCD$ is a quadrilateral and $BE \parallel AC$ is such that $BE$ meets at $E$ on the extended $CD$. Show that area of triangle $ADE$ is equal to the area of quadrilateral $ABCD$.  

![Diagram of a quadrilateral with line $BE$](image)
Q.6  In given figure E be any point on the median AD of triangle, show that
\[
\text{ar}(ABE) = \text{ar}(ACE)
\]

Q.7  Show that the diagonals of a parallelogram divides it into four triangles of equal area.

OR

OR D, E & F are mid points of sides of triangle BC, CA & AB respectively. Show that

(i) BDEF is a parallelogram

(ii) \(\text{ar}(DEF) = \frac{1}{4} \text{ar}(ABC)\)

(iii) \(\text{ar}(BDEF) = \frac{1}{2} \text{ar}(ABC)\)

Section -

Q.8  ABCD is a trapezium in which AB||CD and
Prove that \(\text{ar}(\Delta AOD) = \text{ar}(\Delta BOC)\)

Q.9  XY is a line parallel to side BC of a triangle at E and F respectively.
\(\text{ar}(ABE) = \text{ar}(ACF)\)

Q.10  In adjoining figure ABCDE is a pentagon.
DC produced at F. Show that

(i) \(\text{ar}(ACB) = \text{ar}(ACF)\)

(ii) \(\text{ar}(AEDF) = \text{ar}(ABCDE)\)
Q.11 In given figure \( ar(DRC) = ar(DPC) \) and \( ar(BDP) = ar(ARC) \) show that both quadrilaterals ABCD and DCPR are trapeziums.

\[ \text{Diagram of quadrilaterals ABCD and DCPR} \]

**Self Evaluation**

Q.12 In given figure ABCD, DCFE and ABFE are parallelogram show that \( ar(ADE) = ar(BCF) \)

\[ \text{Diagram of parallelograms DCFE and ABFE} \]

Q.13 P and Q are respectively the mid points of sides AB and BC of a triangle ABC and R is the mid-point of AP, show that.

(i) \( ar(PQR) = \frac{1}{2} ar(ARC) \)

(ii) \( ar(RQC) = \frac{3}{8} ar(ABC) \)

(iii) \( ar(PBQ) = ar(ARC) \)

Q.14 Parallelogram ABCD and rectangle ABEF are on the same base and have equal areas. Show that perimeter of the parallelogram is greater than that of rectangle.
Chapter - 10
(Circle)

Key Concept
* Circle - circle is locus of such points which are at equidistant from a fixed point in a plane.
* Concentric circle - Circle having same centre called concentric circle.
* Two arc of a circle called congruent if they have the same degree measure.
* If two arc equal then their corresponding chords are equal.
* The perpendicular from centre to chord of circle, it bisects the chord and converse.
* There is one and only one circle passing through three non-collinear points.
* Equal chords of circle are equidistant from centre.
* The angle subtend by an arc at the centre of circle is twice the angle which subtend at remaining part of circumference.
* Any two angles in the same segment of the circle are equal.
* Angle of semicircle is right angle.
* Equal chords of circle subtend equals angle at the centre of circle.
* If the all vertices of a quadrilateral lie on the circumference of circle then quadrilateral called cyclic.
* In a cycle quadrilateral the sum of opposite angles is $180^\circ$ and converse.
* The exterior angle of a cycle quadrilateral is equal to the opposite interior angle.

Section - A

Q.1 AD is diameter of a circle and AB is a chord If $AD = 34\text{cm}$, $AB=30\text{cm}$. The distance of AB from centre of circle is.

(a) $17\text{cm}$  (b) $15\text{cm}$  (c) $4\text{cm}$  (d) $8\text{cm}$

Q.2 In given figure, $O$ is centre of circle if $\angle ABC = 20^\circ$ then $\angle AOC$ is equal to :

(a) $20^\circ$  (b) $40^\circ$  (c) $60^\circ$  (d) $10^\circ$
Q.3 Given three collinear points then the number of circles which can be drawn through these three points are.

(a) one  (b) two  (c) infinite  (d) none

Q.4 Given two concentric circles with centre O. A line cut the circle at A, B, C and D respectively if AB = 10cm then length of CD.

(a) 5cm  (b) 10cm  (c) 3.5cm  (d) 7.5cm

Q.5 In given figure value of y is

(a) 35°  (b) 45°  (c) 70°  (d) 140°

Q.6 In the given figure, \(\angle DBC = 55^\circ\), \(\angle BAC = 45^\circ\) then \(\angle BCD\) is

(a) 45°  (b) 55°  (c) 100°  (d) 80°
Section - B

Q.7 In the given figure, $\angle CAB$ is ..................., given $\angle AOB = 90^\circ$, $\angle CBA = 30^\circ$

![Diagram for Q.7](image1)

Q.8 If O is centre of circle as shown in the figure, $\angle CBD$.

![Diagram for Q.8](image2)

Q.9 In the given figure, O is the center of the circle with radius 5cm. $OP \perp CD$, $OQ \perp AB$

$AB \parallel CD$, $AB = 6\text{cm}$ and $CD = 8\text{cm}$ determine $PQ$.

![Diagram for Q.9](image3)

Q.10 Prove that the circle drawn on any equal side of an isosceles triangle as diameter, bisects the base.

Q.11 Prove that cyclic parallelogram is always a rectangle.
Section - C

Q.12 In the given figure AD is diameter of the circle, whose centre is O and AB||CD, Prove that AB = CD.

Q.13 In the given figure determine a, b and c.

Q.14 AB is a diameter of circle C (O, r). Chord CD is equal to radius OD. AC and BD produced interest at P. Prove that \( \angle APB = 60^\circ \)

Q.15 If two non parallel side of a trapezium are equal, prove that it is cyclic.

Q.16 ABC is a right angle triangle, right angled at A. A circle is inscribed in it. The length of two sides containing angle A is 12cm and 5cm find the radius.

Section - D

Q.17 A circle has radius \( \sqrt{2} \) cm. It is divided into two segments by a chord of length 2cm. Prove that the angle subtended by the chord at a point in major segment is \( 45^\circ \).

Q.18 Two circles interest each other at points A and B. AP and AQ are diameters of the two circles respectively. If \( \angle APB = 40^\circ \) and \( \angle AQB = 70^\circ \), find \( \angle PAB \) and \( \angle QAB \)

Q.19 ABCD is a parallelogram. The circle through A, B and C intersects CD produced at E. If AB=10cm, BC=8cm, CE=14cm. Find AE.
Q.20 Prove the sum of either pair of opposite angles of a cycle quadrilateral is $180^\circ$.

Q.21 In the given figure, B and E are points on line segment AC and DF respectively show that $AD \parallel CF$.

Self evaluation

Q.22 In the given figure, OA and OB are respectively perpendiculars to chords CD and EF of a circle whose centre is O. If $OA = OB$, prove that $EC = DF$.

Q.23 In the given figure $\angle BAC = 55^\circ$, $\angle BCA = 62^\circ$, the altitude BE produced meets the circle at D, determine $\angle ACD$, $\angle DAC$ and $\angle ADB$.

Q.24 In the given figure, O is centre of circle of radius 5cm. $OP \perp CD$, $AB \parallel CD$, $AB = 6\text{cm}$ and $CD = 8\text{cm}$. Determine PQ.
Q.25 In the given figure, O is the centre of circle, \( \angle BCO = 30^0 \angle AEB = 90^0 \) and OD \( \parallel \) BC find \( x \) and \( y \).

Q.26 O is circumcentre of the triangle ABC and D is the mid-point of the base BC. Prove that \( \angle BOD = \angle A \)

Answers:
1. (d) 2. (b) 40\(^0\) 3. (d) None 4. (b)
5. (a) 35\(^0\) 6. (d) 80\(^0\) 7. 105\(^0\) 8. 55\(^0\)
9. 7 cm. 13. \( a=105, b=13, c=62 \) 16. 2 cm.
18. 50\(^0\), 20\(^0\)
19. 8 cm.
23. 35\(^0\), 28\(^0\), 62\(^0\)
24. 1 cm
25. 30\(^0\), 15\(^0\)
Chapter - 11
(Constructions)

Key Concept
(1) Use only ruler and compass while drawing constructions.
(2) Protractor may be used for drawing non-standard angles.
(3) Constructions of a triangle given its base, a base angle and the difference of the other two sides.
(4) Constructions of a triangle given its perimeter and its two base angles.

Section - A

Q.1 With a ruler and compass which of the following angles cannot be constructed?
   (a) $60^\circ$  (b) $80^\circ$  (c) $90^\circ$  $105^\circ$

Q.2 With a ruler and compass which of the following angles can be constructed?
   (a) $80^\circ$  (b) $90^\circ$  (c) $100^\circ$  $110^\circ$

Section - B

Q.3 Construct an angle of $45^\circ$ at the initial point of a given ray and justify the construction.

Q.4 Construct the following angles and verify by measuring them by a protractor.
   (i) $75^\circ$  (ii) $135^\circ$

Section - C

Q.5 Construct a $\triangle PQR$ with base $QR = 3.8cm$, $\angle Q = 75^\circ$ and $PQ + PR = 7.9cm$

Q.6 Construct a $\triangle PQR$ with base $QR = 3.4cm$, $\angle R = 75^\circ$ and $PR - PQ = 1.2cm$

Q.7 Construct an equilateral triangle with sides 4cm.
Section -D

Q.8 Construct a triangle ABC in which $\angle B = 60^0$, $\angle C = 45^0$ and $AB+BC+CA = 13$ cm.

Q.9 Construct a right triangle whose base is 12cm and sum of its hypotenuse and other side is 18cm.

Q.10 Construct a $\Delta PQR$ with its perimeter = 11cm and the base angles of $75^0$ and $30^0$.

Answers:

Q.1 b Q.2 b
# Chapter - 13
(Surface areas and Volumes)

<table>
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<tr>
<th>SN.</th>
<th>Name</th>
<th>Figure</th>
<th>Lateral/curved surface area</th>
<th>Total surface area TSA</th>
<th>Volume (V)</th>
<th>Symbols use for</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cuboid</td>
<td><img src="image" alt="Cuboid" /></td>
<td>$2(l + b) \times h$</td>
<td>$2(lb + bh + hl)$</td>
<td>$lbh$</td>
<td>$l = length$ $b = breadth$ $h = height$</td>
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<tr>
<td>2</td>
<td>Cube</td>
<td><img src="image" alt="Cube" /></td>
<td>$4s^2$</td>
<td>$6s^2$</td>
<td>$s^3$</td>
<td>$s = side$</td>
</tr>
<tr>
<td>3</td>
<td>Right circular cylinder</td>
<td><img src="image" alt="Cylinder" /></td>
<td>$2\pi rh$</td>
<td>$2\pi r(h + r)$</td>
<td>$\pi r^2h$</td>
<td>$h = height$ $r = radius$ of base</td>
</tr>
<tr>
<td>4</td>
<td>Right circular cone</td>
<td><img src="image" alt="Cone" /></td>
<td>$\pi rl$</td>
<td>$\pi r(l + r)$</td>
<td>$\frac{1}{3}\pi r^2h$</td>
<td>$r = radius$ of base $h = height$ $l = slant$ height</td>
</tr>
<tr>
<td>5</td>
<td>Sphere</td>
<td><img src="image" alt="Sphere" /></td>
<td>$4\pi r^2$</td>
<td>$4\pi r^2$</td>
<td>$\frac{4}{3}\pi r^3$</td>
<td>$r = OA = radius$</td>
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<tr>
<td>6</td>
<td>Hemi sphere Solid</td>
<td><img src="image" alt="Hemisphere" /></td>
<td>$2\pi r^2$</td>
<td>$3\pi r^2$</td>
<td>$\frac{2}{3}\pi r^3$</td>
<td>$r = OA = radius$</td>
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<tr>
<td>7</td>
<td>Hemi sphere hollow</td>
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<td>$2\pi r^2$</td>
<td>$2\pi r^2$</td>
<td>$\frac{2}{3}\pi r^3$</td>
<td>$r = OA = radius$</td>
</tr>
</tbody>
</table>
Q.1 If surface areas of two spheres are in the ratio of 4: 9 then the ratio of their volumes is
(a) \(\frac{16}{27}\)  (b) \(\frac{4}{27}\)  (c) \(\frac{8}{27}\)  (d) \(\frac{9}{27}\)

Q.2 The surface area of a cube whose edge is 11cm is
(a) 725cm\(^2\)  (b) 726cm\(^2\)  (c) 727cm\(^2\)  (d) 728cm\(^2\)

Q.3 A match box measures 4cm X 2.5cm X 1.5cm. What will be the volume of a packet containing 12 such boxes?
(a) 15cm\(^3\)  (b) 180cm\(^3\)  (c) 90cm\(^3\)  (d) 175cm\(^3\)

Q.4 The curved surface area of a right circular cylinder of height 14cm is 88cm\(^2\). Find the diameter of the base of the cylinder.
(a) 1cm  (b) 2cm  (c) 3cm  (d) 4cm

Q.5 The total surface area of a cone of radius \(\frac{r}{2}\) and length 2l is
(a) \(\pi lr(l + r)\)  (b) \(\pi r(l + r)\)  (c) \(\pi r\left(l + \frac{r}{2}\right)\)  (d) \(\pi r\left(l + \frac{r}{4}\right)\)

Q.6 The surface area of sphere of radius 10.5cm is
(a) 1386cm\(^2\)  (b) 816cm\(^2\)  (c) 1390cm\(^2\)  (d) 10cm\(^2\)

Section - B

Q.7 Find the volume of a sphere whose surface area is 154cm\(^2\).

Q.8 A solid cylinder has a total surface area of 231cm\(^2\). Its curved surface area is \(\frac{2}{3}\) of the total surface area. Find the volume of the cylinder.

Q.9 The diameter of a garden roller is 1.4m and it is 2m long. How much area will it cover in 5 revolutions?

Q.10 Three metal cubes whose edge measure 3cm, 4cm and 5cm respectively are melted to form a single cube, find its edge.

Q.11 The dimensions of a cuboid are in the ratio of 1 : 2 : 3 and its total surface area is 88m\(^2\). Find the dimensions.
Section - C

Q.12 A cuboidal oil tin is 30cm X 40cm X 50cm. Find the cost of the tin required for making 20 such tins if the cost of tin sheet is Rs. 20/m².

Q.13 Find the lateral curved surface area of a cylindrical petrol storage tank that is 4.2m in diameter and 4.5m high. How much steel was actually used, if $\frac{1}{12}$ of steel actually used was wasted in making the closed tank.

Q.14 The radius and height of a cone are in the ratio 4 : 3. The area of the base is 154cm². Find the area of the curved surface.

Q.15 A sphere, cylinder and cone are of the same radius and same height. Find the ratio of their curved surfaces.

Q.16 A hemispherical bowl of internal diameter 36cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 3cm and height 6cm. How many bottles are required to empty the bowl?

Q.17 A hemisphere of lead of radius 8cm is cast into a right circular cone of base radius 6cm. Determine the height of the cone.

Section - D

Q.18 A wooden toy is in the form of a cone surmounted on a hemisphere. The diameter of the base of the cone is 6cm and its height is 4cm. Find the cost of painting the toy at the rate of Rs. 5 per 1000cm².

Q.19 Find the volume of the largest right circular cone that can be fitted in a cube whose edge is 14cm.

Q.20 A cone of height 24cm and slant height 25cm has a curved surface area $550cm^2$. Find its volume use $\pi = \frac{22}{7}$

Q.21 The radius and height of a cone are 6cm and 8cm respectively. Find the curved surface area of the cone.

Q.22 A well with 10m inside diameter is dug 14m deep. Earth taken out of it is spread all around to a width of 5m to form an embankment. Find the height of embankment.
Q.23 A metallic sheet is of the rectangular shape with dimensions 48cm X 36cm. From each one of its corners, a square of 8cm is cut off. An open box is made of the remaining sheet. Find the volume of the box.

Self Evaluation

Q.24 Water in a canal, 30dm wide and 12dm deep is flowing with a velocity of 20km per hour. How much area will it irrigate in 30min. if 9cm of standing water is desired? (10dm = 1 meter)

Q.25 Three cubes of each side 4cm are joining end to end. Find the surface area of resulting cuboid.

Q.26 A hollow cylindrical pipe is 210cm long. Its outer and inner diameters are 10cm and 6cm respectively. Find the volume of the copper used in making the pipe.

Q.27 A semi circular sheet of metal of diameter 28cm is bent into an open conical cup. Find the depth and capacity of cup.

Q.28 If the radius of a sphere is doubled, what is the ratio of the volume of the first sphere to that of second sphere?

Answer

Q.1 c  Q.2 b  Q.3 b  Q.4 b
Q.5 c  Q.6 a
Q.7 179.66cm²
Q.8 269.5cm²  Q.9 44m²
Q.10 6cm  Q.11 2, 4, 6 cm
Q.12 Rs. 376  Q.13 59.4m², 95.04m²
Q.14 192.5cm²
Q.15 4 : 4 : √5  Q.16 72
Q.17 28.44  Q.18 Rs. 0.51
Q.19 718.66cm³  Q.20 1232 cm²
Q.21 60πcm²  Q.22 4.66m
Q.23 5120cm³  Q.24 4,00,000m²
Q.25 224 cm²  Q.26 10560cm³
Q.27 12.12cm, 622.26cm³
Q.28 1:8
Chapter - 14
(Statistics)

Key Concept

* There are two types of data (i) Primary (ii) Secondary
* We can represent the data by (i) ungrouped and grouped frequency distribution.
* Data can also represent by (i) bar graph (ii) Histogram (iii) Frequency polygons
* Class mark of grouped data is \( \frac{\text{lower limit} + \text{upper limit}}{2} \)
* Measure of central tendencies by mean, median, mode.
* \( \text{Mean}(\bar{x}) = \frac{\text{sum of all observations}}{\text{Total no. of observations}} \)

If observations denoted by \( x_i \) and their occurrence i.e. frequency is denoted by \( f_i \)
then mean is

\( \bar{x} = \frac{\sum f_i x_i}{\sum f_i} \)

* Median: Arrange the observations in ascending or descending order then if
numbers of observations (n) are odd then then median is \( \frac{n+1}{2} \) th term.
If no. of observations (n) are even then median is average of \( \frac{n}{2} \) th and \( \frac{n}{2} + 1 \) th
terms.
* Mode: The observation whose frequency is greatest.
* Mode = 3 median - 2 mean.

Section - A

Q.1 If the mean of 2, 4, 6, 8, x, y is 5 then find the value of x+y.
Q.2 Write the class mark of 90-110 group.
Q.3 If the ratio of mean and median of a certain data is 2:3, then find the ratio of its
mode and mean.
Q.4 Tally marks are used to find ............

Q.5 The following marks were obtained by the students in a test.
81, 72, 90, 90, 86, 85, 92, 70, 71, 83, 89, 95, 85, 79, 62
What is the range?
Q.6 In a histogram, each class rectangle is constructed with base as
(a) frequency (b) class interval
(c) range (d) size of the class
Section - B

Q.7 The mean of 10 numbers is 20, If 5 is subtracted from every number, what will be the new mean.

Q.8 Find the mean of first 10 even natural no.

Q.9 Calculate the mean for the following distribution.

<table>
<thead>
<tr>
<th>x</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>4</td>
<td>8</td>
<td>14</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>

Q.10 Find the median of 37, 31, 42, 43, 46, 25, 39, 45, 32

Q.11 Find the mode of following series.

25, 23, 22, 22, 24, 27, 27, 25, 23, 22, 26, 32

Q.12 If the median of a series of data is 3 and mean is 2 then find the mode.

Section - C

Q.13 Find the median of the following data

19, 25, 59, 48, 35, 31, 30, 32, 51. If 25 is replaced by 52, what will be the new median.

Q.14 If the mean of the following distribution is 6, then find the value of p.

<table>
<thead>
<tr>
<th>x</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>10</th>
<th>p+5</th>
</tr>
</thead>
<tbody>
<tr>
<td>f</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Q.15 If the mean of five observations x, x+2, x+4, x+6, x+8 is 11 find the mean of first three observation.

Q.16 The mean of 5 numbers is 18. If one number is excluded, their mean is 16, find the excluded number.

Q.17 Construct a histogram for the following data:

<table>
<thead>
<tr>
<th>30-60</th>
<th>60-90</th>
<th>90-120</th>
<th>120-150</th>
<th>150-180</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>12</td>
<td>14</td>
<td>18</td>
<td>10</td>
</tr>
</tbody>
</table>

Q.18 The following observations have been arranged in ascending order. If the median of the data is 63, find the value of x.

29, 32, 48, 50, x, x+2, 72, 78, 84, 95
Q.19 Find the value of x and y in following distribution if it known that the mean of the distribution is 1.46.

<table>
<thead>
<tr>
<th>No. of accidents</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>46</td>
<td>x</td>
<td>y</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td>200</td>
</tr>
</tbody>
</table>

Q.20 The mean monthly salary of 10 members of a group is Rs. 1445, one more member whose monthly salary is Rs. 1500 has joined the group. Find the mean monthly salary of 11 members of the group.

Q.21 Draw a histogram for the marks of students given below.

<table>
<thead>
<tr>
<th>Marks</th>
<th>0-10</th>
<th>10-30</th>
<th>30-45</th>
<th>45-50</th>
<th>50-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of student</td>
<td>8</td>
<td>32</td>
<td>18</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

Q.22 For the following data, draw a histogram and frequency polygon.

<table>
<thead>
<tr>
<th>Marks</th>
<th>0-10</th>
<th>10-20</th>
<th>20-30</th>
<th>30-40</th>
<th>40-50</th>
<th>50-60</th>
<th>60-70</th>
<th>70-80</th>
<th>80-90</th>
<th>90-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of student</td>
<td>5</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

Q.23 Given below is a cumulative frequency distribution table showing the age of people living in a locality.

<table>
<thead>
<tr>
<th>Age in years</th>
<th>No. of persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 108</td>
<td>0</td>
</tr>
<tr>
<td>Above 96</td>
<td>1</td>
</tr>
<tr>
<td>Above 84</td>
<td>3</td>
</tr>
<tr>
<td>Above 72</td>
<td>5</td>
</tr>
<tr>
<td>Above 60</td>
<td>20</td>
</tr>
<tr>
<td>Above 48</td>
<td>158</td>
</tr>
<tr>
<td>Above 36</td>
<td>427</td>
</tr>
<tr>
<td>Above 24</td>
<td>809</td>
</tr>
<tr>
<td>Above 12</td>
<td>1026</td>
</tr>
<tr>
<td>Above 0</td>
<td>1124</td>
</tr>
</tbody>
</table>

Prepare a frequency distribution table.
Question for self evaluation

Q.24 The marks scored by 55 students in a test are given below:

<table>
<thead>
<tr>
<th>Marks</th>
<th>0-5</th>
<th>5-10</th>
<th>10-15</th>
<th>15-20</th>
<th>20-25</th>
<th>25-30</th>
<th>30-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Students</td>
<td>2</td>
<td>6</td>
<td>13</td>
<td>17</td>
<td>11</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Construct a histogram.

Q.25 Construct a frequency polygon for the following data:

<table>
<thead>
<tr>
<th>Age</th>
<th>0-2</th>
<th>2-4</th>
<th>4-6</th>
<th>6-8</th>
<th>8-10</th>
<th>10-12</th>
<th>12-14</th>
<th>14-16</th>
<th>16-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Q.26 If \(x_1, x_2 \ldots \ldots x_n\) are \(n\) values of a variable \(X\) such that
\[
\sum_{i=1}^{n} (x_i - 2) = 110 \quad \text{and} \quad \sum_{i=1}^{n} (x_i - 5) = 20
\]
find the value of \(n\) and mean.

Answers:

Q.1 10  Q.2 100  Q.3 5.2  Q.4 Frequency  Q.5 33  Q.6 b  Q.7 15  Q.8 11  Q.9 7.025  Q.10 39  Q.11 22  Q.12 5  Q.13 32,35  Q.14 7  Q.15 9  Q.16 26  Q.18 62  Q.19 \(x=76, \ y=38\)  Q.20 Rs 1450  Q.23

<table>
<thead>
<tr>
<th>Age</th>
<th>0-12</th>
<th>12-24</th>
<th>24-36</th>
<th>36-48</th>
<th>48-60</th>
<th>60-72</th>
<th>72-84</th>
<th>84-96</th>
<th>96-108</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person</td>
<td>98</td>
<td>217</td>
<td>382</td>
<td>269</td>
<td>138</td>
<td>15</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Q.26 \(n=30\), mean = \(\frac{17}{3}\)

*************
Chapter - 15
(Probability)

Key Concept

(1) Experiment - A job which produces some outcomes.
(2) Trial - Performing an experiment.
(3) Event - The group of outcomes, denoted by capital letter of English alphabets like A, B, E etc.
(4) The empirical (or experimental) probability \( P(E) \) of an event \( E \) is given by

\[
P(E) = \frac{\text{Number of trials in which } E \text{ has happened}}{\text{Total no. of trials}}
\]

(5) The probability of an event lies between 0 and 1 (0 and 1 are included)
(6) Impossible event: Event which never happen.
(7) Certain event - event which definitely happen.

Section - A

Q.1 Define an event.
Q.2 Give definition of probability.
Q.3 Probability of certain event is ............
Q.4 Probability of impossible event is ............
Q.5 Which is not a probability of an event?
   (a) 2   (b) \( \frac{2}{3} \)   (c) .001   (d) .25
Q.6 A bag contains 50 coins and each coin marked from 51 to 100. One coin is picked up at random. The probability that the number on the coin is not a prime number is..................

Section - B

Q.7 A coin is tossed 1000 times with the following frequencies.

Head: 455,  
Tail: 545  
compute the probability for each event.
Q.8 In a cricket match, a batsman hits a boundary 6 times out of 30 balls played. Find the probability that on a ball played.
   (i) He hits boundary  (ii) He does not hit a boundary.

Q.9 Three coins tossed simultaneously 100 times with the following frequencies of different outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No head</th>
<th>One head</th>
<th>Two head</th>
<th>Three head</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>14</td>
<td>38</td>
<td>36</td>
<td>12</td>
</tr>
</tbody>
</table>

If the coin tossed again then find the probability.
   (i) two heads coming up
   (ii) 3 heads coming up
   (iii) getting more tails than heads
   (iv) at least one head coming up

Q.10 In a football match, a player makes 4 goals from 10 kicks. The probability of a goal is from 10 kicks is.

Section - C

Q.11 The percentage of marks obtained by a student in the monthly unit tests are given as:

<table>
<thead>
<tr>
<th>Unit Test</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>% marks obtained</td>
<td>58</td>
<td>64</td>
<td>76</td>
<td>62</td>
<td>85</td>
</tr>
</tbody>
</table>

Find the probability that the student get a distinction (marks more than 75%)

Q.12 1000 families with 2 children were selected randomly, and the following data were recorded.

<table>
<thead>
<tr>
<th>No. of boys in a family</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of families</td>
<td>140</td>
<td>560</td>
<td>300</td>
</tr>
</tbody>
</table>

If a family chosen at random, find the prob. that it has
   (a) No boys
   (b) One boy
   (c) Two boys
   (d) at least one boy
   (e) at most two boy.
Q.13  The record of a weather station shows that out of the past 250 consecutive days, its weather forecast correct 175 times. What is the probability that on a given day.

(i) it was correct.

(ii) it was not correct.

Section - D

Q.14  A die is thrown 1000 times with following frequency of out comes 1, 2, 3, 4, 5 and 6 as given below

<table>
<thead>
<tr>
<th>No. on die</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>179</td>
<td>150</td>
<td>157</td>
<td>149</td>
<td>175</td>
<td>190</td>
</tr>
</tbody>
</table>

Q.15  Following table shows the marks scored by a group of 90 students in a mathematics test of 100 marks.

<table>
<thead>
<tr>
<th>Marks</th>
<th>0-20</th>
<th>20-30</th>
<th>30-40</th>
<th>40-50</th>
<th>50-60</th>
<th>60-70</th>
<th>70-80</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of student</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>8</td>
</tr>
</tbody>
</table>

Find the probability that a student obtained

(i) less than 20% marks

(ii) 60 or more marks

Q.16  The following table gives the life of 400 lamps.

<table>
<thead>
<tr>
<th>Life time in Hours</th>
<th>300-400</th>
<th>400-500</th>
<th>500-600</th>
<th>600-700</th>
<th>700-800</th>
<th>800-900</th>
<th>900-1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Lamp</td>
<td>14</td>
<td>56</td>
<td>60</td>
<td>86</td>
<td>74</td>
<td>62</td>
<td>48</td>
</tr>
</tbody>
</table>

A bulb is selected at random find the probability that the life time of the selected bulb is:

(i) less than 400

(ii) between 300 to 800 hours.

(iii) at least 700 hours.

Q.17  The percentage of attendance of different classes in a year in a school is given below:

<table>
<thead>
<tr>
<th>Class</th>
<th>X</th>
<th>IX</th>
<th>VIII</th>
<th>VII</th>
<th>VI</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance</td>
<td>30</td>
<td>62</td>
<td>85</td>
<td>92</td>
<td>76</td>
<td>55</td>
</tr>
</tbody>
</table>

What is the probability that the class attendance is more than 75%
Answers:

Q.5  a  6.  4/5  7.  0.455, 0.545
8.  (i) 0.2  (ii) 0.8
9.  (i) 0.36  (ii) 0.12  (iii) 0.52  (iv) 0.86
10.  \( \frac{4}{10} \)
11.  0.4
12.  (a) 0.14  (b) 0.56  (c) 0.30  (d) 0.86  (e) 0.7
13.  (i) 0.7  (ii) 0.3
14.  (i) .179  (ii) .15  (iii) .157  (iv) .149  (v) .175  (vi) .19
15.  7/90  23/90
16.  (i) \( \frac{7}{200} \)  (ii) \( \frac{29}{40} \)  (iii) \( \frac{23}{50} \)
17.  ½
General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 34 questions divided into 4 sections. A, B, C and D. Section - A comprises of 8 questions of 1 mark each. Section - B comprises of 6 questions of 2 marks each. Section - C comprises of 10 questions of 3 marks each and Section - D comprises of 10 questions of 4 marks each.

(iii) Question numbers 1 to 8 in section-A are multiple choice questions where you are to select one correct option out of the given four.

(iv) There is no overall choice. However, internal choice has been provided in 1 question of two marks. 3 questions of three marks each and 2 questions of four marks each. You have to attempt only of the alternatives in all such questions.

(v) Use of calculator is not permitted.

Section - A

Q.1 The value of in the given figure is

\[ \angle AOB = 68^\circ \]

(a) \(22^\circ\)  (b) \(33^\circ\)  (c) \(44^\circ\)  (d) \(68^\circ\)

Q.2 Three angle of a quadrilateral is \(60^\circ, 110^\circ\) and \(86^\circ\). The fourth angle of quadrilateral is

(a) \(104^\circ\)  (b) \(124^\circ\)  (c) \(94^\circ\)  (d) \(84^\circ\)

Q.3 Class mark of class interval 90-110 is

(a) 90  (b) 110  (c) 100  (d) None

Q.4 A die is thrown once. The probability of getting an even no. is

(a) \(\frac{1}{2}\)  (b) \(\frac{2}{3}\)  (c) \(\frac{1}{3}\)  (d) 2
Q.5 Which one is solution of eqn $x - 3y = 2$
   (a) (4,1)   (b) (6,2)   (c) (5,1)   (d) (0,2)

Q.6 If the lateral surface area of cube is 1600 cm$^2$ then its edge is
   (a) 15 cm   (b) 18 cm   (c) 25 cm   (d) 20 cm

Q.7 If the slant height of a cone is 10 cm and its radius is 6 cm, then height of cone is
   (a) 9 cm   (b) 13 cm   (c) 16 cm   (d) 8 cm

Q.8 If $(2,-3)$ is solution of eqn $3x - ky = 2$ then the value of $K$ is
   (a) -2   (b) $-\frac{2}{3}$   (c) -4   (d) $-\frac{4}{3}$

Section - B

Q.9 If the total surface area of a hemisphere is $27\pi$ cm$^2$, then its diameter is equal to

Q.10 In the given parallelogram the value of $x$ will be

```
A  2x  3x  C
  ^   |
  |   B
  |_
```

Q.11 In the given figure, if $\angle POR$ is 120°, then the value of $\angle PQR$ is

```
O
 |
/|
/ | 120°
/ |
/|
/|
/|
P
```

Q.12 The arithmetic mean of first five odd natural no. is

Q.13 The probability of an event lies between

Q.14 Write the relation between mean, median and mode...
**Section - C**

Q.15 Draw the graph of $2x + y = 6$ and find the point on x-axis where graph of this eqn cut the x-axis.

Q.16 Find three solution of the linear equation $2x + 3y = 5$, and check whether (-3, 4) is a solution of the given equation.

Q.17 In a parallelogram, show that the angle bisectors of two adjacent angles intersect at right angle.

**OR**

In the given figure, E is the mid-point of side AD of a trapezium ABCD with AB||CD. A line through E parallel to AB meets BC in F show that F is the mid-point of BC.

![Diagram]

Q.18 Triangle ABC and DBC are on the same base BC with vertices A and D on opposite sides of BC such that area of $\Delta ABC = area\ of\ \Delta DBC$. Show that BC bisect AD.

Q.19 ABCD is a cyclic quadrilateral BA and CD produced meet at E. Prove that triangle EBC and EDA are equiangular.

**OR**

In given figure, C and D are points on the

![Diagram]

Semi circle described on BA as diameter given $\angle BAD = 70^0$, $\angle DBC = 30^0$

Calculate $\angle ABD$ and $\angle BDC$. 
Q.20  Construct a triangle ABC in which BC = 4.5cm \( \angle B = 45^\circ \) and \( AB \) – \( AC = 2.5\text{cm} \)

Q.21  A conical tent is 10m high and the radius of its base is 24m. Calculate its slant height and cost of canvas required to make it at the rate Rs. 70 per m\(^2\).

Q.22  A sphere, a cylinder and a cone are the same radius and same height. Find the ratio of their curved surfaces.

OR

Volume of a cube is \( 5832\text{m}^3 \). Find the cost of painting its total surface area at the rate of Rs. 3.50 per m\(^2\).

Q.23  A car is going for a long journey of 16 hours starting at 5.00 hours. The speed of the car at different hours is given below.

<table>
<thead>
<tr>
<th>Time (in hours)</th>
<th>Speed (in km/hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.00</td>
<td>40</td>
</tr>
<tr>
<td>7.00</td>
<td>50</td>
</tr>
<tr>
<td>9.00</td>
<td>60</td>
</tr>
<tr>
<td>11.00</td>
<td>80</td>
</tr>
<tr>
<td>13.00</td>
<td>70</td>
</tr>
<tr>
<td>15.00</td>
<td>65</td>
</tr>
<tr>
<td>17.00</td>
<td>75</td>
</tr>
<tr>
<td>19.00</td>
<td>60</td>
</tr>
<tr>
<td>21.00</td>
<td>50</td>
</tr>
</tbody>
</table>

Draw a velocity time graph for the above data.
Q.24 A coin is tossed 15 times and observed that 11 times head comes up. Find the probability that a tail comes up.

Section - D

Q.25 The taxi fare in a city is as follow. For the first kilometer, the fare is Rs. 8 for the subsequent distance it is Rs. 5 per km. Taking the distance covered as x km. and total fare as Rs. y, write a linear equations for this information and draw its graph.

Q.26 If the points A (3,5) and B(1,4) lies on the line \( ax + by = 7 \) find the values of a and b.

OR

Draw the graph of the equation \( -y = 1 \) and \( 2x + y = 8 \). Shade the area bounded by these two lines and y-axis. Also determine this area.

Q.27 ABCD is a parallelogram. AB produced to E so that BE=AB. Prove that ED bisects BC.

Q.28 In given figure, ABCD is a parallelogram and EFCD is a rectangle. Also \( AL \perp DC \)

Prove that

(i) \( \text{ar}(ABCD) = \text{ar}(EFCD) \)

(ii) \( \text{ar}(ABCD) = DCXAL \)

Q.29 Prove that the area of an equilateral triangle is equal to \( \frac{\sqrt{3}}{4} a^2 \) where a is the side of the triangle.

Q.30 In given figure, calculate the angle \( \angle AOC \)

Q.31 Construct a \( \triangle ABC \) in which BC=5.6cm, AC-AB=1.6cm and \( \angle B = 45^0 \)

Q.32 The mean of the following distribution is 50.
Q.32  The mean of the following distribution is 50.

<table>
<thead>
<tr>
<th>x</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>30</td>
<td>5a+3</td>
</tr>
<tr>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>70</td>
<td>7a-11</td>
</tr>
<tr>
<td>90</td>
<td>19</td>
</tr>
</tbody>
</table>

Find the value of \( a \) and frequency of 30 and 70.

Q.33  How many planks each of which is 2m long, 2.5 cm broad and 4cm thick can be cut off from a wooden block 6m long, 15cm broad and 40cm thick?

Q.34  An iron pipe 20cm long has exterior diameter equal to 25cm. If the thickness of the pipe is 1 cm. Find the whole surface area of the pipe excluding ends of the pipe.

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**OR**

The diameter of a sphere is decreased by 25% by what percent its curved surface area decreases.
Sample Paper SA -II

Marking Scheme

Section - A
Q.1  (a)
Q.2  (a)
Q.3  (c)
Q.4  (a)
Q.5  (c)
Q.6  (d)
Q.7  (d)
Q.8  (d)

Section - B
Q.9  6cm
Q.10 36cm
Q.11 120°
Q.12  5
Q.13  0 and 1, both no. are including.
Q.14  mode = 3 median - 2 mean

Section - C
Q.15

Point on x-axis is (3,0)
Q.16 \[2x + 3y = 5 \quad --------(1)\]

Put \(x = 1, 2, 3, 0, -1, 2\) etc and get value of \(y\).

then \((x, y)\) is soln of this eq

Put \(x = -3\) and \(y = 4\) in eq \((1)\) we get

\[-6 + 12 \neq 4\]

So \((-3, 4)\) is not a solution.

Q.17

![Diagram]

To prove \(\angle APB = 90^0\)

\[\angle A + \angle B = 180^0\]

\[\frac{1}{2}\angle A + \frac{1}{2}\angle B = 90^0\]

But \[\frac{1}{2}\angle A + \frac{1}{2}\angle B + \angle APB = 180^0\]

\[90^0 + \angle APB = 180^0\]

\[\Rightarrow \angle APB = 90^0\]

OR

Construction: Join \(AC\) to intersect \(EF\) at \(G\).

Proof \(EF || DE\)

\(EG || DE\)

since \(E\) is mid point of \(AD\).

\[\therefore G\] is mid point of \(AC\) (By converse of mid point theorem)

In \(\triangle ABC\) \(FG || AB\).

\(G\) is mid point of \(AC\)

\[\therefore F\] is mid point of \(BC\).
Construction: Join AD. Which intersect BC at E draw $DN \perp BC$ \ $AM \perp BC$

Proof:
$AM=DN$ (Δ on same base and equal in area so altitude is same)

Now in $\triangle AEM$ and $\triangle DEN$

$\angle 1 = \angle 2$

$\angle AME = \angle DNE = 90^\circ$

$AM = DN$

$\triangle AEM \cong \triangle DEN$

So $AE = DE$

$\implies$ BC bisect AD

Q.19

Given $ABCD$ is a cyclic quadrilateral BA and CD produced meet at E.
To prove \( \triangle EBC \) and \( \triangle EDA \) are equiangular.

Proof: \( ABCD \) is a cyclic quad.

\[ \therefore \angle BAD + \angle BCD = 180^\circ \]

But \( \angle BAD + \angle EAD = 180^\circ \) (linear pair)

\[ \Rightarrow \angle BCD = \angle EAD \]

Similarly \( \angle ABC = \angle EDA \)

and \( \angle BEC = \angle AED \)

Hence \( \triangle EBC \) and \( \triangle EDA \) are equiangular

OR

\( \angle BCD + \angle BAD = 180^\circ \) (as \( ABCD \) is a cyclic quadrilateral)

\( \angle BCD + 70^\circ = 180^\circ \)

\( \angle BCD = 110^\circ \) -----(1)

Also \( \angle CBD + \angle BCD + \angle BDC = 180^\circ \)

\[ 30^\circ + 110^\circ + \angle BDG = 180^\circ \]

\[ \Rightarrow 30^\circ + 110^\circ + \angle BDG = 180^\circ \]

\[ \angle BDC = 40^\circ \text{ Ans.} \]

Since \( \angle ADB \) is angle in semi-circle

\[ \angle ADB = 90^\circ \]

In \( \triangle ABD \)

\[ \angle ABD + \angle ADB + BAD = 180^\circ \]

\[ \angle ABD + 90^\circ + 70^\circ = 180^\circ \]

\[ \angle ABD = 20^\circ \text{ Ans} \]

Q.20 Steps of construction

(i) Draw a ray BX and cut off a line segment BC=4.5cm from it

(ii) Construct \( \angle XBY = 45^\circ \)

(iii) Cut off a line segment BD=2.5cm from BY

(iv) Join CD.
(v) Draw \( \perp \) bisector of \( CD \) cutting \( BY \) at a point \( A \).

(vi) Join \( AC \)

So \( \Delta ABC \) is the required triangle.

Q.21 \( l^2 = r^2 + h^2 \)

\( l = 26m \)

Curved surface area = \( \pi rl \)

Cost = \( 70 \times \pi rl \)

= Rs. 137280

Q.22 Let \( r \) is radius then height of cone = sphere = cylinder = \( 2r \)

So \( S_1 = \) curved surface of sphere = \( 4\pi r^2 \)

\( S_2 = \) curved surface of cylinder = \( 4\pi r^2 \)

\( S_3 = \) curved surface cone = \( \sqrt{3} \pi r^2 \)

\( as \ l = \sqrt{r^2 + h^2} = \sqrt{r^2 + 4r^2} = \sqrt{5} r \)  \( ratio \ : \ 4 : 4 : \sqrt{5} \)

OR

volume \( S^3 = 5832m^3 \)

\( S = 18m \)

Painted area \( 6s^2 \)

\( = 1944m^2 \)

Cost = \( 1944 \times 3.5 \)

= Rs. 6804

Q.23 Check your graph with the help of your teacher/classmates

Q.24 Ans. \( \frac{4}{15} \)

Q.25 \( y = 8 + 5 \times (x - 1) \)
\[ y = 5x + 3 \]

Q.26 \[ 3a + 5b = 7 \]
\[ a + 4b = 7 \]
\[ a = -1, \ b = 2 \]

Area = \[ \frac{1}{2} \times 9 \times 3 = 13.5 \text{ sq units.} \]
$AB \parallel CD$ and $BC$ transversal

So $\angle 1 = \angle 2$

$\angle 3 = \angle 4$

$AB = CD = BE$

So $\triangle BOE \cong \triangle COD$

$\Rightarrow BO = CO, \ O$ is mid of $BC$

$\Rightarrow ED$ bisect $BC$

Q.28 Since parallelogram and rectangle are on same base $DC$ and between same height $AL$

ar $(ABCD) = ar(DEF)$

So $ar(ABCD) = CD \times FC$

$= CD \times AL \ (AL = FC$ as $ALCF$ is rectangle)

$= DC \times AL$

Q.29

$\triangle ABD \cong \triangle ACD$

$BD = DC = \frac{a}{2}$
In $\triangle ADB$

$$AD^2 = a^2 = \frac{a^2}{4}$$

$$AD = \frac{\sqrt{3}}{4} \cdot a$$

Area of $\triangle ABC = \frac{1}{2} BC \times AD = \frac{\sqrt{3}}{4} a^2$

Q.30 Join OB

- Find $\angle ABO = 30^0$
- and $\angle CBO = 40^0$
- So $\angle ABC = 70^0$
- So $\angle AOC = 140^0$

Q.31 Steps of const.

(i) Draw $BC = 5.6\text{cm}$
(ii) At B make $\angle CBX = 45^0$
(iii) Produce XB to $X^1$ to form line $XBX^1$
(iv) From ray $BX^1$ cut off line segment $BD = 1.6\text{cm}$
(v) Join $CD$
(vi) Draw ⊥ bisector of $CD$ which cut $BX$ at $A$.
(vii) Join $AC$ to obtain required $\triangle BAC$
Q.32 \[ \Sigma f_i = 12a + 60, \Sigma fixi = 640a + 2800 \]
\[ \bar{x} = \frac{\Sigma fixi}{\Sigma f_i} \]
\[ 50 = \frac{640a + 2800}{12a + 60} \]
\[ a = 5 \text{ Ans.} \]

Q.33 number of planks = \[ \frac{\text{volume of wooden block}}{\text{volume of each plank}} = \frac{600 \times 15 \times 40}{200 \times 2.5 \times 4} = 180 \]

Q.34 \[ R = 12.5 \text{ (External radius)} \]
\[ r = \text{internal radius} = (\text{external radius} - 1\text{cm}) = 11.5\text{cm} \]
\[ h = 20\text{cm} \]
\[ \text{Total surface area} = \text{External surface area} + \text{Internal surface area} = 3168\text{cm}^2 \]

OR

Given \[ S = 4\pi r^2 \]

Decreased radius = \[ \frac{3r}{4} \]

then new area = \[ \frac{3\pi r^2}{4} \]

Decreased area = \[ \frac{7\pi r^2}{4} \]

\% decrease = 43.75