

Section-A

Question numbers 1 to 10 carry 1 mark each. For each of the questions 1-10, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

- Which of the following is a solution of the equation $x+2y=7$?
(A) $x=3, y=5$ (B) $x=3, y=-5$
(C) $x=3, y=2$ (D) $x=0, y=7$
- Three angles of a quadrilateral are 60° , 110° and 86° . The fourth angle of the quadrilateral is
(A) 104° (B) 124°
(C) 94° (D) 84°
- A triangle and a rhombus are on the same base and between the same parallels. Then the ratio of area of triangle to that of rhombus is
(A) 1:1 (B) 1:2
(C) 1:3 (D) 1:4
- In Fig. 1, O is the centre of the circle and $\angle OBA=60^\circ$. Then $\angle ACB$ equals
(A) 60° (B) 45°
(C) 30° (D) 90°
- The diameter and height of a right circular cone are 7cm and 12cm respectively. The volume of the cone (in cm^3) is
(A) 88 (B) 112
(C) 154 (D) 616
- A fair coin is tossed 100 times and the Head occurs 58 times and tail 42 times. The experimental probability of getting a Head is
(A) $\frac{1}{2}$ (B) $\frac{21}{50}$
(C) $\frac{29}{50}$ (D) $\frac{42}{58}$
- The condition that the equation $ax+by+c=0$ represents a linear equation in two variables is
(A) $a \neq 0, b=0$ (B) $b \neq 0, a=0$
(C) $a=0, b=0$ (D) $a \neq 0, b \neq 0$
- In Fig.2, if the area of a parallelogram ABCD is 30cm^2 , then the length of altitude AQ is
(A) 5cm (B) 4cm
(C) 3.5cm (D) 6cm

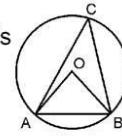


Fig. 1

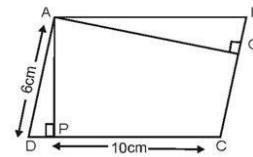
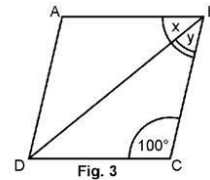


Fig. 2

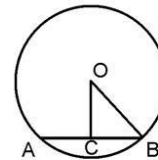
9. In Fig.3 ABCD is a rhombus in which $\angle BCD=100^\circ$. Then $(x+y)$ equals

- (A) 40° (B) 60°
(C) 80° (D) 70°



10. In Fig. 4, OC is drawn perpendicular from the centre O of the circle to the chord AB. If $OB=5\text{cm}$ and $OC=3\text{cm}$, then the length of the chord AB is

- (A) 3cm (B) 4cm
(C) 6cm (D) 8cm



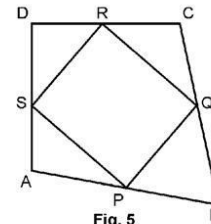
Section-B

Question numbers 11 to 18 carry 2 marks each.

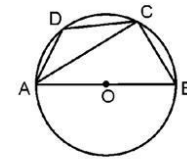
11. A three-wheeler scooter charges Rs. 10 for the first kilometer and Rs. 4.50 each for every subsequent kilometer. For a distance of x km, an amount of Rs. y is paid. Write the linear equation representing the above information.

12. ABCD is parallelogram. The angle bisectors of $\angle A$ and $\angle D$ intersect at O. Find the measures of $\angle AOD$.

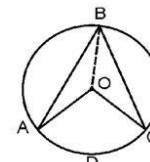
13. In Fig.5, ABCD is a quadrilateral in which P, Q, R and S are the mid-points of the sides AB, BC, CD and DA respectively. Show that PQRS is a parallelogram.



14. In Fig.6, ABCD is a cyclic quadrilateral in which AB is a diameter of the circles passing through A, B, C and D. If $\angle ADC=130^\circ$, find $\angle BAC$.

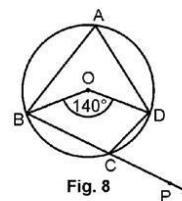


15. In Fig.7, find the measure of arc ADC if $\angle OAB=30^\circ$ and $\angle OCB=50^\circ$



OR

In Fig.8. O is the centre of the circle. The angle by the arc BCD at the centre is 140° . BC is produced to P. Find $\angle DCP$.



16. The curved surface area of a cylinder is 176cm^2 and its base area is 38.5cm^2 .
Find the volume of the cylinder and justify your answer. $\left[\text{use } \pi = \frac{22}{7} \right]$
17. A hemispherical bowl is made of steel 0.25cm thick. The inner radius of the bowl is 5cm .
Find the outer curved surface area of the bowl. $\left[\text{use } \pi = \frac{22}{7} \right]$
18. Find the mean of the first ten prime numbers.

Section-C

Question numbers 19 to 28 carry 3 marks each.

19. Draw the graph of two lines, whose equations are $3x-2y+6=0$ and $x+2y-6=0$ on the same graph paper. Find the area of triangle formed by the two lines and x-axis.
20. If the number of hours for which a labourer works is x and y are his wages (in rupees) and $y=2x-1$, draw the graph of work-wages equation. From the graph, find the wages of the labourer if he works for 6 hours.
21. In Fig.9, ABCD is a square. If $\angle PQR=90^\circ$ and $PB=QC=DR$, prove that $\angle QPR=45^\circ$.

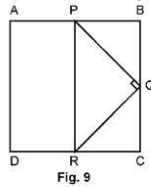


Fig. 9

22. Show that the diagonals of a rhombus are perpendicular to each other.

OR

In Fig.10, OABC is a rectangle inscribed in a quadrant of a circle of radius 25cm .
Find the area of the rectangle, if $OC=7\text{cm}$.

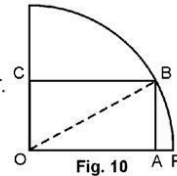


Fig. 10

23. Construct a ΔABC , in which base $BC=3\text{cm}$, $\angle B=30^\circ$ and $AB+AC=5.2\text{cm}$.
24. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7cm . If the bowl is filled with soup to a height of 4cm , how much soup the hospital has to prepare daily to serve 250 patients. $\left[\text{use } \pi = \frac{22}{7} \right]$

OR

The ratio of the curved surface area to the total surface area of a right circular cylinder is $1:3$. Find the volume of the cylinder if its total surface area is 1848cm^2 . $\left[\text{use } \pi = \frac{22}{7} \right]$.

25. A heap of wheat is in the form of a cone, whose diameter is 10.5m and height 7m. Find the volume of wheat in the heap. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required. $\left[\text{use } \pi = \frac{22}{7} \right]$.

26. Find the mean of the following data by shortcut method.

Marks	20	22	25	30	35	39	45	50	Total
Frequency	4	6	8	10	8	7	5	2	50

OR

Draw a bar chart of the data representing pass percentage of students during the period 1998-2003 given below :

Year	1998	1999	2000	2001	2002	2003
Pass percentage	80%	75%	90%	70%	95%	85%

27. On a page of a telephone directory, there are 200 telephone numbers. The frequency distribution of the digits at their units place is given below:

Unit digit	0	1	2	3	4	5	6	7	8	9
Frequency	22	26	22	22	20	10	14	28	16	20

Without looking at the page, a number is chosen at random from the page. What is the probability that the digit at the unit's place of the number chosen is greater than 6?

28. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

Outcome	3 Heads	2 Heads	1 Head	No Head
Frequency	23	72	77	28

Find the experimental probability of getting

- (i) 2 Heads (ii) at least 2 Heads

Section-D

Question numbers 29 to 34 carry 4 marks each

29. Solve for x :

$$\frac{3x+2}{7} + \frac{4(x+1)}{5} = \frac{2}{3} (2x+1)$$

OR

A and B are friends. A is elder to B by 5 years. B's sister C is half the age of B while A's father D is 8 years older than twice the age of B. If the present age of D is 48 years, find the present ages of A, B and C.

30. Prove that parallelograms on the same base and between the same parallels are equal in area.

OR

In Fig. 11, ABCD is a parallelogram.
If $AB=2AD$ and P is the mid-point of AB,
then find $\angle CPD$.

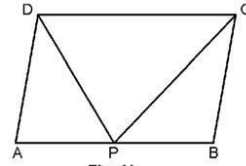


Fig. 11

31. In Fig. 12, ABCD is a trapezium in which $AB \parallel DC$.
BD is a diagonal and E is the mid-point of AD.
A line is drawn through E, parallel to AB, intersecting
BC at F. Show that F is the mid-point of BC.

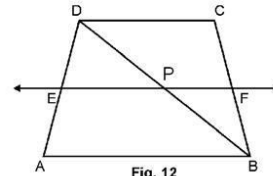


Fig. 12

32. In Fig. 13. O is the centre of the circle.
The distance between P and Q is 4cm.
Find the $\angle ROQ$.

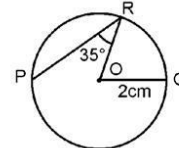


Fig. 13.

33. In Fig. 14, a right circular cone of diameter r cm
and height 12cm rests on the base of a right
circular cylinder of radius r cm. Their bases are
in the same plane and the cylinder is filled with
water upto a height of 12cm. If the cone is then
removed, find the height to which water level will fall.

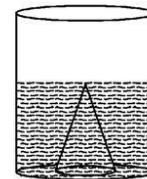


Fig. 14.

34. Draw a histogram for the following data

Marks	10-15	15-20	20-25	25-30	30-40	40-60	60-80
Number of candidates	7	9	8	5	12	12	8

**Marking Scheme
Mathematics, SA-II
Class IX**

Section-A

1. (C) 2. (A) 3. (B) 4. (C) 5. (C)
6. (C) 7. (D) 8. (A) 9. (C) 10. (D)

1x10=10

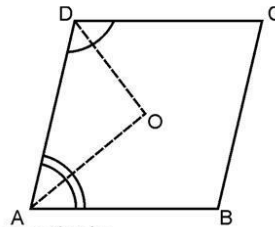
Section-B

11.
$$\left. \begin{aligned} x \text{ km} &= [1+(x-1)]\text{km} \\ \therefore y &= 10+(x-1)\left(\frac{9}{2}\right) \Rightarrow 2y = 20+9x-9 \\ &\Rightarrow 9x-2y+11=0 \end{aligned} \right\}$$

12. $\angle A + \angle D = 180^\circ$ [ABCD is a parallelogram] 1

$\therefore \frac{1}{2}\angle A + \frac{1}{2}\angle D = 90^\circ$

$\angle AOD = 180^\circ - \left(\frac{1}{2}\angle A + \frac{1}{2}\angle D\right) = 90^\circ$ 1



13. Join AC. R and S are mid-points of DC and DA respectively ½

$\therefore RS \parallel AC$ and $RS = \frac{1}{2}AC$ (i) ½

Similarly $PQ \parallel AC$ and $PQ = \frac{1}{2}AC$ (ii) ½

From (i) and (ii) PQRS is a \parallel^m ½

14. ABCD is a cyclic quadrilateral 1

$\therefore \angle ABC = 180^\circ - \angle ADC = 180^\circ - 130^\circ = 50^\circ$ 1

$\angle ACB = 90^\circ$ (Angle in a semi-circle) ½

$\Rightarrow \angle BAC = 180^\circ - (90^\circ + 50^\circ) = 40^\circ$ ½

15. Measure of arc ADC = $\angle AOC$ 1/2
 Again, $OA=OB \Rightarrow \angle ABO = 30^\circ$ 1/2
 Similarly, $\angle CBO=50^\circ \Rightarrow \angle ABC = 80^\circ$
 $\Rightarrow \angle AOC=160^\circ \Rightarrow$ Measure of arc AC = 160° 1

OR

$$\angle BAD = \frac{1}{2} \angle BOD = 70^\circ \quad 1$$

Also ABCD is a cyclic quad $\Rightarrow \angle DCP = \angle BAD = 70^\circ$ 1

16. $\frac{77}{2} = \pi r^2$, where r is the base radius of cylinder

$$\Rightarrow r^2 = \frac{77}{2} \times \frac{77}{2} = \frac{49}{4} \Rightarrow r = \frac{7}{2} \text{ cm} \quad 1$$

$$\frac{22}{7} \times r \times h = \frac{176 \times 22}{7} \Rightarrow h = \frac{16}{7} r = \left(\frac{16}{7} \times \frac{7}{2} \right) \text{ cm} = 8 \text{ cm} \quad 1/2$$

$$\therefore \text{volume} = \left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{8}{2} \right) \text{ cm}^3 = 308 \text{ cm}^3 \quad 1/2$$

17. Outer radius = $5\frac{1}{4} \text{ cm} = \frac{21}{4} \text{ cm}$ 1/2

$$\text{Curved surface area} = 2\pi r^2 = \left(2 \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4} \right) \text{ cm}^2 = \frac{693}{4} \text{ cm}^2$$

$$= 173.25 \text{ cm}^2 \quad 1+1/2$$

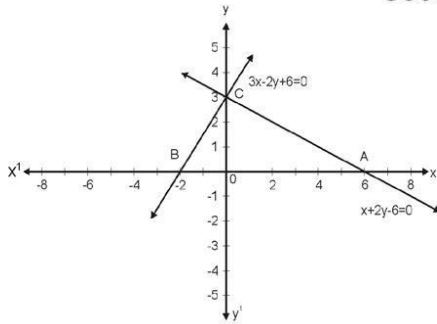
18. The first 10 prime nos are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 1

$$\text{Their mean} = \frac{2+3+5+7+11+13+17+19+23+29}{10} = \frac{129}{10}$$

$$= 12.9 \quad 1$$

Section-C

19.



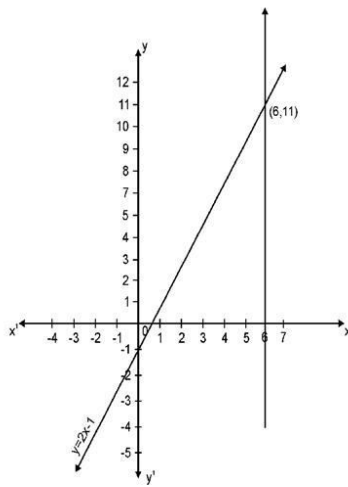
Correct lines 2

$$\text{Area of } \triangle ABC = \frac{1}{2} (AB) (OC)$$

$$= \frac{1}{2} (8) (3) \text{ sq. units}$$

$$= 12 \text{ sq. units } \quad 1$$

20.



Correct graph 2

$$x = 6$$

$$y = 11$$

∴ After working for 6 hours } 1

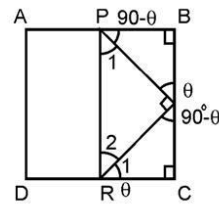
$$\text{wage} = \text{Rs } 11$$

21. From the figure, $\triangle PBQ \cong \triangle QCR$

$$\Rightarrow PQ = RQ \text{ (cpct)}$$

$$\Rightarrow \angle 1 = \angle 2 = 45^\circ$$

$$\Rightarrow \angle QPR = \angle 1 = 45^\circ$$



1

1 + 1/2

1/2

22. ABCD is a rhombus

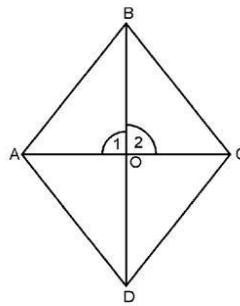
∴ Diagonals bisect each other

$$\Rightarrow AO = OC$$

In \triangle 's AOB and COB

$$OB = OB, AO = OC, AB = BC$$

$$\therefore \triangle AOB \cong \triangle COB \Rightarrow \angle 1 = \angle 2$$



1

1 + 1/2

$$\angle 1 + \angle 2 = 180^\circ \Rightarrow \angle 1 = \angle 2 = 90^\circ$$

½

OR

$$OC = AB = 7 \text{ cm}$$

$$OB = 25 \text{ cm and } \angle OAB = 90^\circ$$

$$\Rightarrow OA^2 = OB^2 - AB^2 = 625 - 49 \\ = 576$$

$$\Rightarrow OA = 24 \text{ cm}$$

1

$$\therefore \text{Area of rectangle} = (24 \times 7) \text{ cm}^2 = 168 \text{ cm}^2$$

1

23. Correct construction

3

24. Volume of soup in the cylindrical bowl = $\pi r^2 h$

$$= \left(\frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4 \right) \text{ cm}^3$$

$$= 154 \text{ cm}^3$$

2

$$\therefore \text{Volume of soup in 250 bowls} = (250 \times 154) \text{ cm}^3$$

$$= 38500 \text{ cm}^3$$

1

OR

$$\text{Total surface area} = 1848 \text{ cm}^2$$

$$\Rightarrow \text{Curved surface area} = \frac{1}{3} \times 1848 = 616 \text{ cm}^2 = 2\pi r h$$

1

$$2\pi r(r+h) = 1848$$

$$\Rightarrow 2\pi r^2 = 1232 \Rightarrow r^2 = \frac{1232 \times 7}{44} = 28 \times 7 \Rightarrow r = 14 \text{ cm}$$

½

$$2\pi r h = 616 \Rightarrow 2 \times \frac{22}{7} \times 14 \times h = 616 \Rightarrow h = \frac{616}{88} = 7 \text{ cm}$$

½

$$\text{Volume of cylinder} = \left(\frac{22}{7} \times 14 \times 14 \times 7 \right) \text{ cm}^3 = 4312 \text{ cm}^3$$

1

25. Volume of wheat in the heap (conical) = $\frac{1}{3} \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4} \times 7$

$$= \frac{1617}{8} \text{ m}^3 = 202.125 \text{ m}^3$$

1

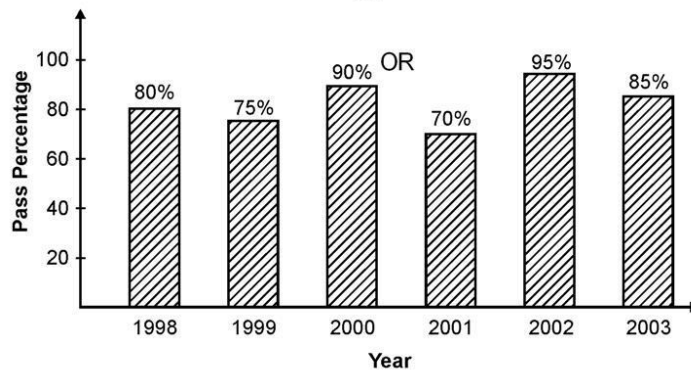
$$\text{slant height } l = \sqrt{\left(\frac{21}{4}\right)^2 + (7)^2} = \sqrt{\frac{1225}{16}} \Rightarrow \frac{35}{4}$$

1

$$\therefore \text{Curved surface area} = \frac{22}{7} \times \frac{21}{2} \times \frac{35}{4} = \frac{1155}{8} = 144 \frac{3}{8} \text{m}^2 \quad 1$$

26.	x_i	20	22	25	30	35	39	45	50	Total	
	f_i	4	6	8	10	8	7	5	2	50	
	$d_i=30-x_i$	-10	-8	-5	0	5	9	15	20		$\frac{1}{2}$
	$f_i d_i$	-40	-48	-40	0	40	63	75	40	$\Sigma f_i d_i = 90$	1

$$\therefore \bar{x} = 30 + \frac{90}{50} = 31.8 \quad 1 + \frac{1}{2}$$



$\frac{1}{2}$ mark for each correct bar

$\frac{1}{2} \times 6$

27. $>6 \Rightarrow 7, 8, 9$ $\frac{1}{2}$

Frequency of (7+8+9) = 28+16+20=64 1

\therefore Required probability = $\frac{64}{200} = \frac{8}{25}$ $1\frac{1}{2}$

28. (i) $P(2 \text{ Head}) = \frac{72}{200} = \frac{9}{25}$ 1

(ii) $P(\text{At least 2 Heads}) = P(2 \text{ Heads}) + P(3 \text{ Heads})$
 $= \frac{72+23}{200} = \frac{95}{200} = \frac{19}{40}$ 2

Section-D

29. $\frac{3x+2}{7} + \frac{4}{5}(x+1) = \frac{2}{3}(2x+1)$
 $\Rightarrow \frac{15(3x+2)+84(x+1)}{105} = \frac{70(2x+1)}{105} \Rightarrow 45x+30+84x+84 = 140x+70$ $1\frac{1}{2} + 1$

$$11x = 44 \Rightarrow x=4$$

1½

OR

Let the age of the sister be x years

½

∴ Age of B = 2x years

$$A = (2x+5) \text{ years}$$

$$D = 2(2x)+8 = 4x+8 = 48 \text{ years (given)}$$

1½

$$\Rightarrow x=10$$

½

∴ Age of A, B and C are 25 years, 20 years and 10 years respectively

1½

30. Correctly stated

Given, To Prove, Const and figure

½x4=2

Correct Proof

2

OR

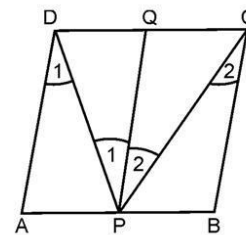
$$AP = \frac{1}{2}AB = AD \Rightarrow AP = AD$$

$$\text{Let } \angle 1 = \angle ADP = x \Rightarrow \angle A = 180^\circ - 2x$$

$$\angle B = 2x \Rightarrow \angle CPB = 90^\circ - x = \angle PCB = \angle 2$$

Draw PQIADIIBC

$$\Rightarrow \angle DPC = \angle 1 + \angle 2 = 90^\circ$$



½

1

1

31. In $\triangle DAB$, E is the mid-point of AD

1

\Rightarrow P is the mid-point of BD

1

Now, in $\triangle BCD$, F is the mid-point of BC

1

mid-point of BD \Rightarrow EF is the mid-point of AC

1

32. $PQ = 4\text{cm} = 2OQ \Rightarrow PQ$ is a diameter

1

$$\text{Join } RQ \Rightarrow \angle PRQ = 90^\circ \Rightarrow \angle ORQ = 55^\circ$$

1

$$\text{As } OR = OQ \Rightarrow \angle ORQ = \angle OQR = 55^\circ$$

1

$$\Rightarrow \angle ROQ = 180^\circ - 2 \times 55^\circ = 70^\circ$$

1

33. Radius of base of cone = $\frac{r}{2}$, radius of base of cylinder = r

1

Height of conical portion = 12cm

\Rightarrow Height of water in cylinder before cone is taken out = 12cm

∴ Volume of water left in the cylinder when cone is taken out

$$= \pi r^2 (12) - \frac{1}{3} \pi \left(\frac{r}{2}\right)^2 \times 12 = \pi r^2 \cdot 11$$

2

∴ Height of water left in cylinder = 11cm

1

34. Here the classes are of unequal widths, so let us form the table with adjusted frequencies

Mark	Frequency	Adjusted Frequency
10-15	7	$\frac{5}{5} \times 7 = 7$
15-20	9	$\frac{5}{5} \times 9 = 9$
20-25	8	$\frac{5}{5} \times 8 = 8$
25-30	5	$\frac{5}{5} \times 5 = 5$
30-40	12	$\frac{5}{10} \times 12 = 6$
40-60	12	$\frac{5}{20} \times 12 = 3$
60-80	8	$\frac{5}{20} \times 8 = 2$

