CBSE Sample Paper-04 (solved)
SUMMATIVE ASSESSMENT –II
MATHEMATICS
Class – IX

Time allowed: 3 hours Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper consists of 31 questions divided into five sections – A, B, C, D and E.
c) Section A contains 4 questions of 1 mark each which are multiple choice questions, Section B contains 6 questions of 2 marks each, Section C contains 8 questions of 3 marks each, Section D contains 10 questions of 4 marks each and Section E contains three OTBA questions of 3 mark, 3 mark and 4 mark.
d) Use of calculator is not permitted.

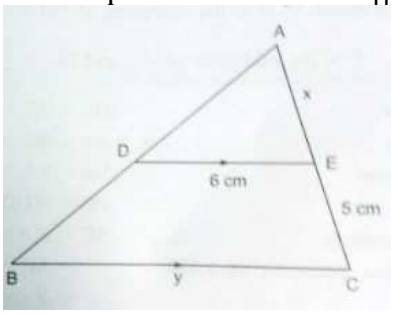
Section A

1. How many linear equation in *x* and *y* can be satisfied by x =1 and y =2?
   (a) Only one
   (b) Two
   (c) Infinitely many
   (d) Three
2. If AB = 16 cm, BC = 12 cm and AB is perpendicular to BC, then the radius of the circle passing through A,B and C are
   (a) 6 cm
   (b) 8 cm
   (c) 10 cm
   (d) 12 cm
3. If two parallelograms PQRS and AQRB are on the same base QR and between the same parallels QR and PB, what will be the ar (PQRS) if ar (AQRB) = 25cm?
   (a) 50 cm^2
   (b) 60 cm^2
   (c) 25 cm^2
   (d) 35 cm^2
4. What is the longest pole that can be put in a room of dimensions length = 20 cm, breadth = 20 cm and height = 10 cm?
   (a) 15 cm
   (b) 25 cm
   (c) 20 cm
   (d) 30 cm

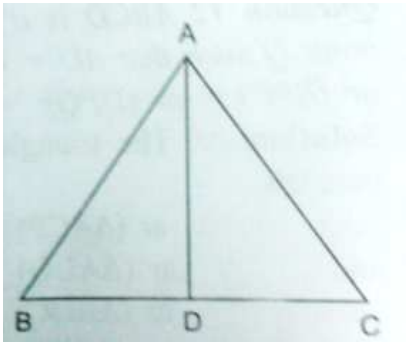
Section B

5. Find the value of k, if x = -1 and y = 2 is a solution of kx + 3y = 7.

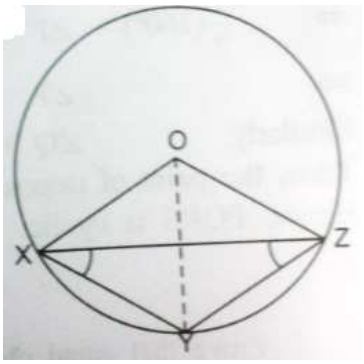
6. In the figure, D is the midpoint of AB and DE || BC. Find x and y.



7. In the figure, ABC is a triangle with AD as median. If the area of Δ ABD is 15 cm^2, then find the area of Δ ABC.

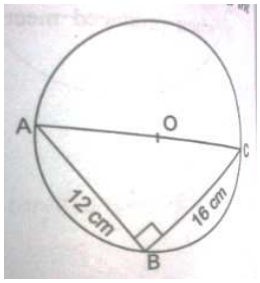


8. In the figure, if O is the centre of the circle, then show that $\angle XOZ = 2(\angle XZY + \angle YXZ)$.



Or

If points A, B and C are such that AB ⊥ BC and AB = 12 cm, BC = 16 cm. Find the radius of the circle passing through the points A, B and C.



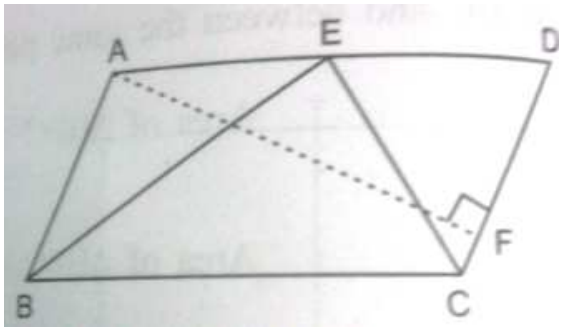
9. If the radius of a sphere is doubled, then what percent of its volume is increased?
10. A coin is tossed 150 times and found that head comes 115 times and tell 35 times. If a coin tossed at random, what is the probability of getting a) a head and b) a tail?

Section C

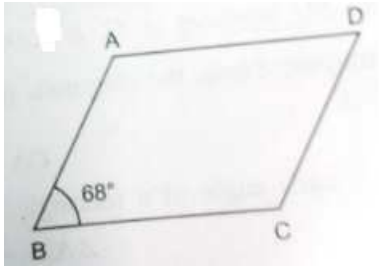
11. Find the measure of each angle of a parallelogram, if one of its angles is 15^0 less than twice the smallest angle.

Or

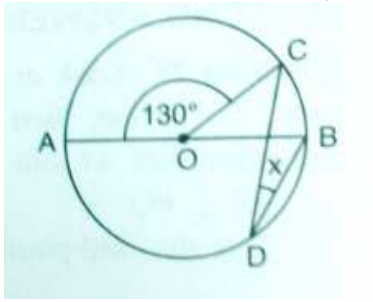
In the figure, the area of ΔBCE is $21cm^2$. If CD = 6 cm, then find the length of AF.



12. The bus fare in a town is ₹10 for the first km and ₹6 per km for the subsequent distance. Assume the distance as '*x*' km and total fare as '*y*' km, write a linear equation for the information, what will be the total fare for 15 km?
13. In the figure, if $\angle B = 68^0$, then find $\angle A$, $\angle C$ and $\angle D$.



14. In the figure, if O is the centre if the circle, then find the value of x.



15. If the circumference of the base of a right circular cylinder is 110 cm, then find its base area.

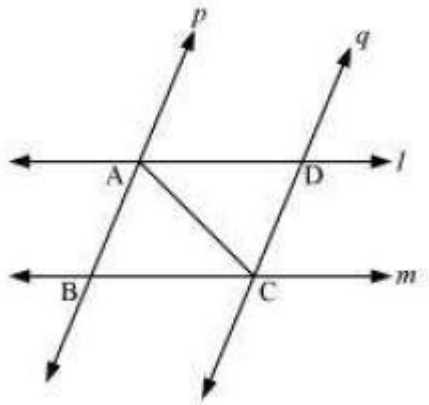
16. If a coin is tossed for a certain number of times. How many times the coin was tossed, if the probability of getting a head is 0.4 and it appeared up for 24 times?
17. Find the length of a chord which is at a distance of 4 cm from the centre of a circle of radius 5 cm.
18. Find the area of trapezium whose parallel sides are 9 cm and 5 cm respectively and the distance between these sides is 8 cm.

= 20 + 36 = 56 cm^2

Section D

19. Draw the graph of each of the following equations and in each case check whether.
    a. x = 2, y = 5
    b. x = -1, y =3 are the solutions
    i. $2x+5y=13$
    ii. $5x+3y=4$
20. Ram used to save a part of his pocket money. He wishes to buy paint for a community-centre from his savings. He buys paint in a certain container which is sufficient to paint an area equal to 9.375 m^2?
    a. How many brocks of dimensions 22.5 cm x 10 cm x 7.5 cm can be painted out of this counter?
    b. Which mathematical concept is used in the above problem?
    c. By using the pocket money saving to buy paints for community centre which values are depicted by Ram?
21. The sum of a 2-digit number is 7. When the digits are reversed the number increases by 27. Find the original number.
22. A plastic box 1.5 cm long, 1.25 m wide and 65 cm deep is to be made. It is to be open at the top. Ignoring the thickness of the plastic sheet, determine:
    i) The area of the sheet required for making the box.
    ii) The cost of the sheet for it, if a sheet measuring 1m^2 cost Rs. 20.

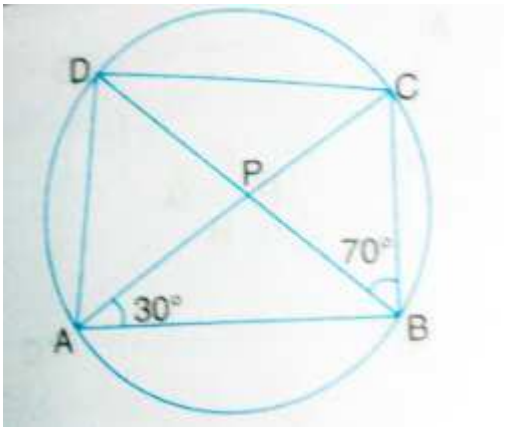
23. *l and m* are two parallel lines intersected by another pair of parallel lines *p* and q . Show that triangle ABC = Triangle CDA.



24. ABCD is a cyclic quadrilateral with AD || BC. Prove that AB = DC.

Or

In the below figure ABCD is a cyclic quadrilateral whose diagonals intersect at P. if $\angle DBC = 70^0$ and $\angle BAC = 30^0$. Find $\angle BCD$



25. If an angle of a parallelogram is $\frac{4}{5}$ of its adjacent angle, then find the measures of all the angle of the parallelogram.
26. Construct the angles of the following
    a. 30^0
    b. $22\frac{1}{2}^0$
    c. 15^0
27. A conical tent of radius 7 m and height 24 m and height 24 m is to be made. Find the cost of the 5 m wide cloth required at the rate of Rs. 50 per metre.
28. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes.

Outcomes	3 Heads	2 Heads	1 Head	No Head
Frequency	23	72	71	28

If the three coins are simultaneously tossed again, compute the probability of 2 heads coming up.

Section E

29. OTBA Question for 3 marks from Statistics. Material will be supplied later.
30. OTBA Question for 3 marks from Statistics. Material will be supplied later.
31. OTBA Question for 4 marks from Statistics. Material will be supplied later.

CBSE Sample Paper-04 (solved)
SUMMATIVE ASSESSMENT –II
MATHEMATICS
Class – IX

Time allowed: 3 hours Maximum Marks: 90

SOLUTIONS:

1. (d)
2. (c)
3. (c)
4. (d)

Section B

5. Substituting the value of x and y in the equation kx + 3y = 7, we get
   k(-1) + 3 (2) = 7
   -k + 6 = 7
   -k = -1
   k = -1
6. From the diagram, it is clear that E must be the midpoint of AC
   Therefore, AE = EC
   x = 5 cm
   Now, DE || BC
   $DE = \frac{1}{2}BC$
   $2DE = 2\left(\frac{1}{2}BC\right)$
   $2DE = BC = 2 \text{ x } 6cm$
   $BC = 12cm$
   $y = 12cm$
7. We know that a median divides the triangle into two equal areas of triangles.
   $ar\Delta ABD = \frac{1}{2}(ar\Delta ABC)$
   $\therefore 2(ar\Delta ABD) = ar(\Delta ABC)$
   $\Rightarrow 2(15cm^2) = ar(\Delta ABC)$
   $\Rightarrow 30cm^2 = ar(\Delta ABC)$
8. Join OY.
   Since the arc XY subtends $\angle XOY$ at the centre ND $\angle XZY$ at a point Z on the remaining part of the circle, so

$\angle XOY = 2\angle XZY$ ---------- (a)

Similarly,

$\angle YOZ = 2\angle YXZ$ ---------- (b)

Adding (a) and (b), we get

$\angle XOZ = 2(\angle XZY + \angle YXZ)$

Or

Since AB $\perp$ BC,

$\angle B = 90^0$ [Angle in a semicircle]

AC is diameter

Therefore, $AC^2 = AB^2 + BC^2$

$AC = \sqrt{12^2 + 16^2} = \sqrt{400} = 20$

Therefore radius = 10 cm.

9. Original volume = $\frac{4}{3}\pi r^3$

   Increased volume = $\frac{4}{3}\pi(2r)^3 = \frac{32}{3}\pi r^3$

   Increase in volume = $\frac{32}{3}\pi r^3 - \frac{4}{3}\pi r^3 = \frac{28}{3}\pi r^3$

   Percent increase in volume = $\left[\frac{\frac{28}{3}\pi r^3}{\frac{4}{3}\pi r^3}\right] \text{x}100\% = 700\%$

10. Total no. of trials = 150 times

   a) Since the number of heads = 115

      Therefore, the probability of an event of getting a head = $\frac{115}{150} = \frac{23}{30}$

   b) Since the number of tails = 35

      Therefore, the probability of an event of getting a tail = $\frac{35}{150} = \frac{7}{30}$

Section C

11. Assume that the smallest angle = x

   So, the other angle = $(2x - 15^0)$

   Hence, $(2x - 15^0) + x = 180^0$ [since, the two are adjacent angles of a parallelogram]

   $2x - 15^0 + x = 180^0$

   $\Rightarrow 3x = 195^0$

   $\Rightarrow x = \frac{195^0}{3} = 65^0$

   The other angle = $2x - 15^0$

$\Rightarrow 2(65^0) - 15^0$

$\Rightarrow 130^0 - 15^0 = 115^0$

Or

In the figure, the parallelogram ABCD and ΔBCE are one the same base and between the same parallels.

$\therefore ar(\Delta BCE) = \frac{1}{2} \text{x } ar(\text{parallelogram } ABCD)$

$\Rightarrow 21cm^2 = \frac{1}{2} \text{x } ar(\text{parallelogram } ABCD)$

$\Rightarrow 21cm^2 = \frac{1}{2} \text{x } [CD \text{ x } AF]$

$\Rightarrow AF = \frac{21\text{x}2}{6} cm = 7cm$

12. Total distance = x km

Total fare = ₹y

Therefore, $x = 1 + (x - 1)$ = 1st km + subsequent distance

Since, fare the first km = ₹10

Fare for the remaining distance = ₹6 x $(x - 1)$ = ₹ $6x$ - ₹6

Total fare = ₹10 + ₹$6x$ - ₹6 = ₹4 + ₹$6x$

Therefore, $y = 4 + 6x$

$y - 6x = 4$

$6x - y + 4 = 0$

Substituting the value of x, we get

$6 \text{ x } 15 - y + 4 = 0$

$90 - y + 4 = 0$

$94 - y = 0$

$y = 94$

Therefore, total fare = ₹94.

13. In parallelogram, the opposite angles are equal,

Therefore, $\angle B = \angle D$ and so $\angle D = 68^0$

Since $\angle B$ and $\angle C$ are supplementary, $\angle B + \angle C = 180^0$

$\angle C = 180^0 - \angle B = 180^0 - 68^0 = 112^0$

Now, $\angle A$ and $\angle C$ are opposite angles,

$\angle A = \angle C$

Therefore, $\angle A = 112^0$.

14. Since AOB is the diameter, we get

$\angle AOC + \angle COB = 180^0$

$130^0 + \angle COB = 180^0$

$\angle COB = 180^0 - 130^0 = 50^0$

Now, the arc CB is subtending $\angle COB$ at the centre and $\angle CDB$ at the remaining part, we get

$$\angle CDB = \frac{1}{2}\ \angle COB$$

$$\angle CDB = \frac{1}{2} \text{ x } 50^0 = 25^0$$

15. Assumer 'r' as radius of the base of the cylinder,

Therefore, circumference = $2\pi r = 2 \text{ x } \frac{22}{7} \text{ x r}$

Now, r = $\frac{110 \text{ x } 7}{2 \text{ x } 22} = \frac{35}{2}$ cm

Base area = $\pi r^2 = \frac{22}{7} \text{x} \frac{35}{2} \text{x} \frac{35}{2}$

$$\Rightarrow \frac{11x5x35}{2} = \frac{1925}{2} = 962.5 cm^2$$

16. No. of favourable outcomes = 25

Assume 'n' as the total number of trials.

$$P(E) = \frac{\text{No.of favourable outcomes}}{\text{Total no.of trials}}$$

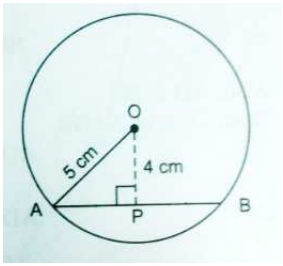
$$\Rightarrow 0.4 = \frac{24}{n}$$

$$\Rightarrow \frac{4}{10} = \frac{24}{n}$$

$$\Rightarrow \frac{n}{24} = \frac{10}{4}$$

$$\Rightarrow n = 60$$

17.



Since, the perpendicular distance, OP = 4cm

Therefore,

In right ΔAPO,

$$AO^2 = AP^2 + OP^2$$

$$5^2 = AP^2 + 4^2$$

$$AP^2 = 5^2 - 4^2 = (5 - 4)\ (5 + 4)$$

= 1 x 9 = 9

AP = $\sqrt{9}$ = 3 cm

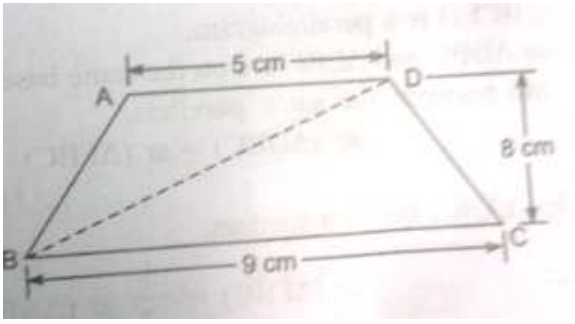
Since the perpendicular from the centre to a chord of a circle divides the chord into two equal parts,

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

AB = 2AP

AB = 6 cm

18.



Let ABCD be a trapezium such that AB || BC. Join BD.

Area of triangle = $\frac{1}{2}$ x base x height

area of ΔABD = $\frac{1}{2}$ x AD x height

$\Rightarrow \frac{1}{2}$ x 5 x 8 = 20 cm^2

$Ar(\Delta BCD) = \frac{1}{2}$ x base x height

$\Rightarrow \frac{1}{2}$ x BC x height

$\Rightarrow \frac{1}{2}$ x 9 x 8 = 36 cm^2

Now, ar (trapezium ABCD) = ar (ΔABD) + ar (ΔBCD)

= 20 + 36 = 56 cm^2

Section D

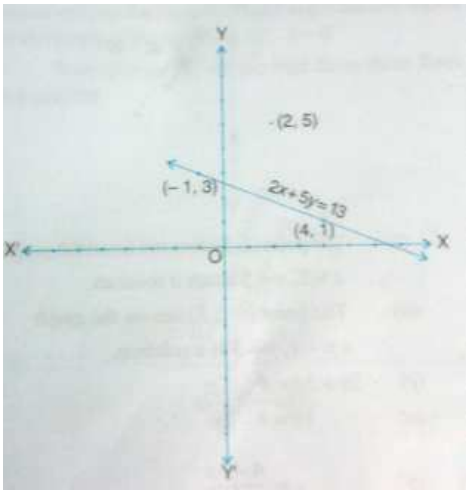
19.

i) $2x + 5y = 13$

$5y = 13 - 2x$

$$y = \frac{13 - 2x}{5}$$

The solutions are (-1,3) and (4,1) and plot on the graph and join the same by a ruler to get the line which is the graph of the equation $2x + 5y = 13$



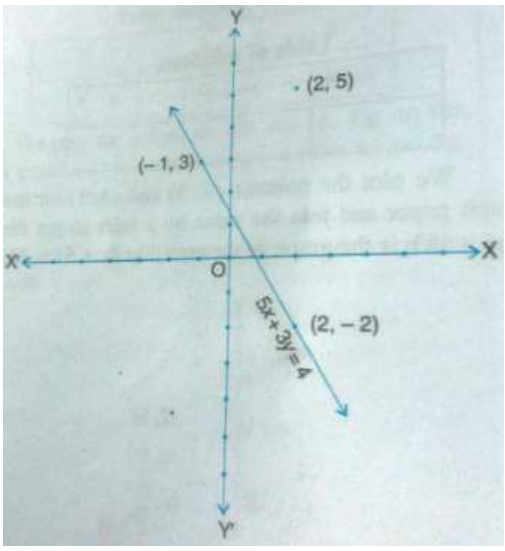
a. The point (2, 5) does not lie on the graph. x = 2, y = 5 is not a solution.
b. The point (-1, 3) lies on the graph. x = -1, y = 3 is a solution.

ii) $5x + 3y = 4$

$3y = 4 - 5x$

$$y = \frac{4 - 5x}{3}$$

The solution are (2,-1) and (-2,3) and plot on the graph and join the same by a ruler to get the line which is the graph of the equation $5x + 3y = 4$



a. The point (2, 5) does not lie on the graph. x = 2, y =5 is not a solution.
b. The point (-1, 3) lies on the graph. x = -1, y = 3 is a solution.

20.

a) Bricks is a cuboid having l = 22.5 cm
b = 10 cm
h = 7.5 cm

Total surface area of a brick = $2[lb + bh + hl]$

$= 2[(22.5 \times 10) + (10 \times 7.5) + (7.5 \times 22.5)]\text{cm}^2$

$= 2[468.75]\ \text{cm}^2$

$= 937.5\ \text{cm}^2$

The required number of bricks = n

Total surface area of 'n' bricks = $n \times \frac{937.5}{10000} m^2$

$$n \times \frac{937.5}{10000} = \frac{9375}{1000}$$

$$n = \frac{9375}{1000} \times \frac{10000}{937.5}$$

n = 100

Thus the required number of blocks = 100

b) Surface area and volume
c) Saving money and helping to charity

21. Let the number at one's place be x.

Then the number at ten's place = $(7 - x)$ and the number is $(7 - x)\ 10 + x$.

Now according to the question

$10x + (7 - x) = (7 - x)\ 10 + x + 27$

$\Rightarrow 10x + 7 - x = 70 - 10x + x + 27$

$\Rightarrow 9x + 7 = -9x + 97$

$\Rightarrow 9x + 9x - 97 - 7$

$\Rightarrow 18x = 90$ X = 5

$\therefore$ The required number is $(7 - 5)\ 10 + 5 = 25$

22. Length (l) of box = 1.5 m

Breadth (b) of box = 1.25 m

Depth (h) of box = 0.65 m

(i) Box is to be open at top.

Area of sheet required

$= 2lh + 2bh + lb$

$= [2 \times 1.5 \times 0.65 + 2 \times 1.25 \times 0.65 + 1.5 \times 1.25]\ m^2$

$= (1.95 + 1.625 + 1.875)\ m^2 = 5.45\ m^2$

(ii) Cost of sheet per m^2 area = Rs 20

Cost of sheet of 5.45 m^2 area = Rs (5.45×20)

= Rs 109

23. In ΔABC and ΔCDA

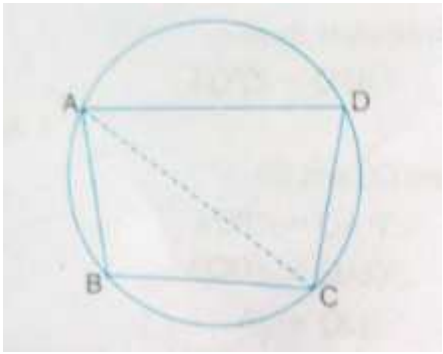
$\angle BAC = \angle DCA$

AC = CA

$\angle BCA = \angle DAC$

$\therefore \Delta ABC = \Delta CDA$

24.



Since AD || BC and AC intersects then

$\therefore \angle ACB = \angle CAD$

$\therefore ar\ AB = ar\ CD$

Since ar opposite angles are equal.

Chord AB = chord CD

Therefore AB = CD

Hence AB = DC

Or

Given – ABCD is a cyclic quadrilateral whose diagonals intersect at P. $\angle DBC = 70^0$ and $\angle BAC = 30^0$

Therefore $\angle BCD + \angle BDC + \angle DBC = 180^0$

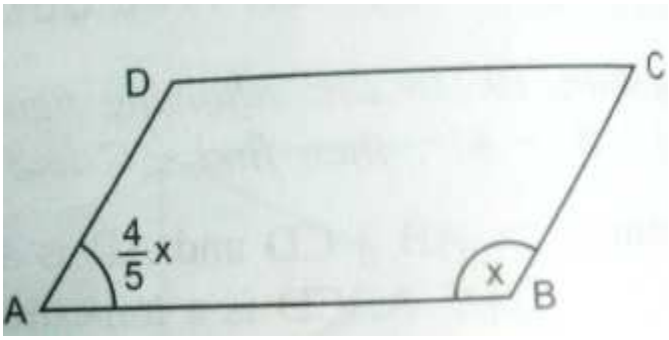
The sum of the three angles of a triangle is 180^0

$\angle BCD + 30^0 + 70^0 = 180^0$

$\angle BCD + 100^0 = 180^0$

$\angle BCD = 180^0 - 100^0 = 80^0$

25.



Let ABCD is a parallelogram in which $\angle B = x$

$$\angle A = \frac{4}{5}x$$

Since adjacent angles of a parallelogram are supplementary

$$\therefore \angle A + \angle B = 180^0$$

$$\frac{4}{5}x + x = 180^0$$

$$4x + 5x = 180^0 \text{ x } 5$$

$$9x = 180^0 \text{ x } 5$$

$$x = \frac{180^0 \text{ x } 5}{9} = 100^0$$

$$\therefore \angle B = 100^0$$

Since $\angle B = \angle D$

$$\angle D = 100^0$$

$$\angle A = \frac{4}{5}x = \frac{4}{5} \text{ x } 100^0 = 80^0$$

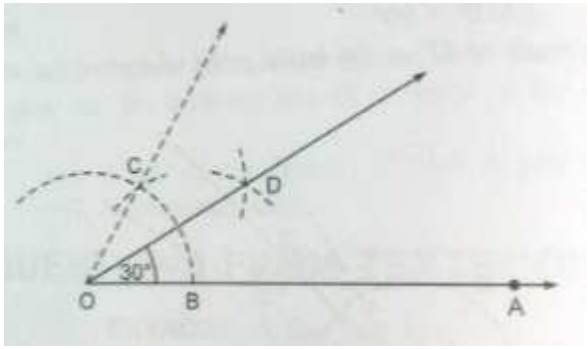
$\angle A = \angle C$

$\angle C = 80^0$

The required angles of the angles of the parallelogram are

$\angle A = 80^0$, $\angle B = 100^0$, $\angle C = 80^0$ and $\angle D = 100^0$

26.



a. Steps of constructions

i. Draw a ray OA.

ii. With O as centre and a suitable radius draw an arc, cutting $\overrightarrow{OA}$ at B.

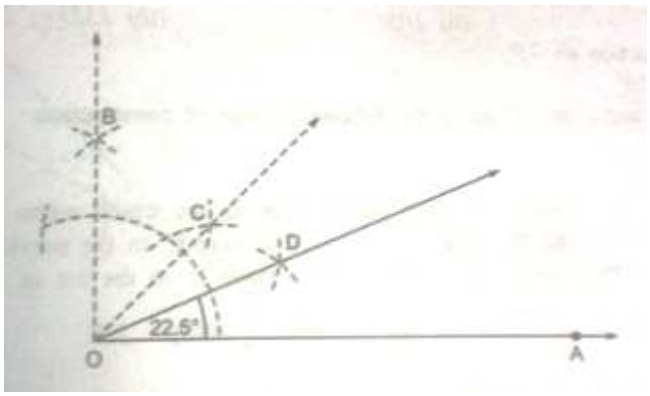
iii. With centre at B and the same radius as above, draw an arc to cut the previous arc at C.

iv. Join $\overrightarrow{OC}$ and produce such that $\angle BOC = 60^0$

v. Draw $\overrightarrow{OD}$ bisector of $\angle BOC$ such that

$$\angle BOD = \frac{1}{2}\angle BOC = \frac{1}{2}(60^0) = 30^0$$

b. Steps of construction



i. Draw a ray $\overrightarrow{OA}$

ii. Draw an angle $\angle AOB = 90^0$

iii. Draw OC the bisector of $\angle AOB$ such that

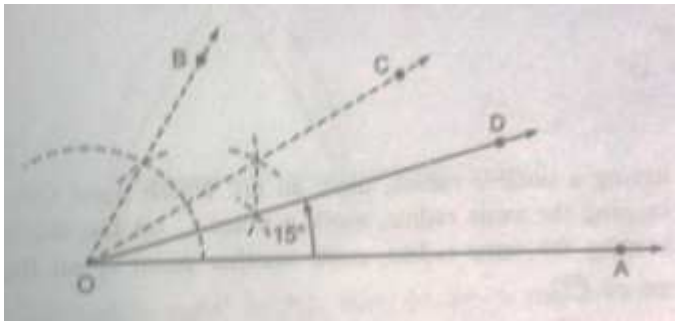
$$\angle AOC = \frac{1}{2}\angle AOB = \frac{1}{2}(90^0) = 45^0$$

iv. Now draw OD the bisector of $\angle AOC$ such that

$$\angle AOD = \frac{1}{2}\angle AOC = \frac{1}{2}(45^0) = 22\frac{1}{2}^0$$

Hence $\angle AOD = 22\frac{1}{2}^0$

c. Steps of construction



i. Draw a ray $\overrightarrow{OA}$

ii. Construct $\angle AOB = 60^0$

iii. Draw $\overrightarrow{OC}$, the bisector of $\angle AOB$ such that

$$\frac{1}{2}\angle AOB = \frac{1}{2}(60^0) = 30^0$$

$$\angle AOC = 30^0$$

iv. Draw $\overrightarrow{OD}$,the angle bisector of $\angle AOC$ such that

$$\frac{1}{2}\angle AOC = \frac{1}{2}(30^0) = 15^0$$

27. Radius of the base of the tent (r) = 7m

Height (h) = 24 m

Slant height (l) = $\sqrt{r^2 + h^2} = \sqrt{7^2 + 24^2}$

$= \sqrt{49 + 576} = 25m$

Curved surface area of the conical tent = πrl

$= \frac{22}{7}$ x 7 x $25\text{m}^2 = 550\ m^2$

Let l be the length of the cloth.

l x b = 550

l x 5 = 550

l = 110 m

28. Total number of times the three coins are tossed = 200

Number of times when 2 heads appear = 72

$\therefore$ Probability of 2 heads coming up = $\frac{72}{200} = \frac{9}{25}$