CBSE Class 09 Mathematics
Sample Paper 01 (2020-21)

Maximum Marks: 80
Time Allowed: 3 hours

General Instructions:

i. This question paper contains two parts A and B.
ii. Both Part A and Part B have internal choices.

Part – A consists 20 questions

i. Questions 1-16 carry 1 mark each. Internal choice is provided in 5 questions.
ii. Questions 17-20 are based on the case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.

Part – B consists 16 questions

i. Question No 21 to 26 are Very short answer type questions of 2 mark each,
ii. Question No 27 to 33 are Short Answer Type questions of 3 marks each
iii. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
iv. Internal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.

Part - A

1. Express 8.0025 in the form $\frac{p}{q}$

OR

Simplify:$(3^{1/3})^4$.

2. Factorise: $a - b - a^2 + b^2$.
3. Fifty seeds were selected at random from each of 5 bags of seeds and were kept under standardised condition favourable to germination. After 20 days, the number of seeds

which had germinated in each collection were counted and recorded as follows.

Bag	1	2	3	4	5
Number of seeds germinated	40	48	42	39	41

What is the probability of 49 seeds in a bag?

4. Using protractor, draw a right angle. Bisect it to get an angle of measure 45°.
5. Find the area of isosceles triangle whose equal side is 6 cm, 6 cm and 8 cm

OR

Find the area of an isosceles triangle, whose equal sides are of length 15 cm each and third side is 12 cm.

6. Write the axis on which the given point lies: (0, -1)
7. Solve for x : $\left(\frac{2}{5}\right)^{2x-2} = \frac{32}{3125}$.

OR

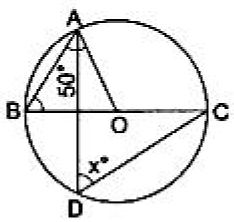
Add $(3\sqrt{2} + 7\sqrt{3})$ and $(\sqrt{2} - 5\sqrt{3})$.

8. Can all the angles of a quadrilateral be right angles? Give reason for your answer.
9. The radius of sphere is 2r, then find its volume.

OR

Find the total surface area of a cone whose radius is $\frac{r}{2}$ and slant height 2l.

10. Determine the degree of polynomial $x^3 - 9x + 3x^5$.
11. Write the equation in the form ax + by + c = 0 and indicate the values of a, b, c in case: x = 4y
12. Evaluate the following by using identities: $(97)^2$
13. If O is the centre of the circle, find the value of x in given figure:



14. Write the equation in the form ax + by + c = 0 and indicate the values of a, b, c in case: 3x = 2

15. If x = -1, y = 2 is a solution of the equation 3x + 4y = k, find the value of k.

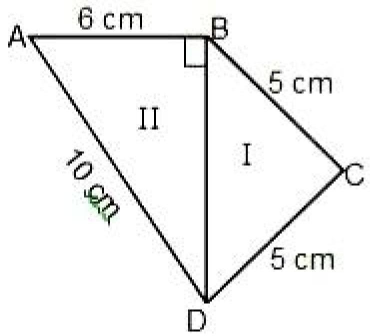
16. Write the decimal form and state the kind of decimal expansion: $\frac{261}{400}$

OR

Add $(2\sqrt{3} - 5\sqrt{2})$ and $(\sqrt{3} + 2\sqrt{2})$.

17. **Read the Source/Text given below and answer any four questions:**

Chocolate is in the form of a quadrilateral with sides 6 cm and 10 cm, 5 cm and 5 cm(as shown in the figure) is cut into two parts on one of its diagonal by a lady. Part-I is given to her maid and part II is equally divided among a driver and gardener.



i. Length of BD
   a. 9 cm
   b. 8 cm
   c. 7 cm
   d. 6cm

ii. Area of $\triangle ABD$
   a. 24 cm^2
   b. 12 cm^2
   c. 42 cm^2

d. 21 cm^2

iii. The sum of all the angles of a quadrilateral is equal to:

a. 180°

b. 270°

c. 360°

d. 90°

iv. A diagonal of a parallelogram divides it into two congruent:

a. Square

b. Parallelogram

c. Triangles

d. Rectangle

v. Each angle of the rectangle is:

a. More than 90°

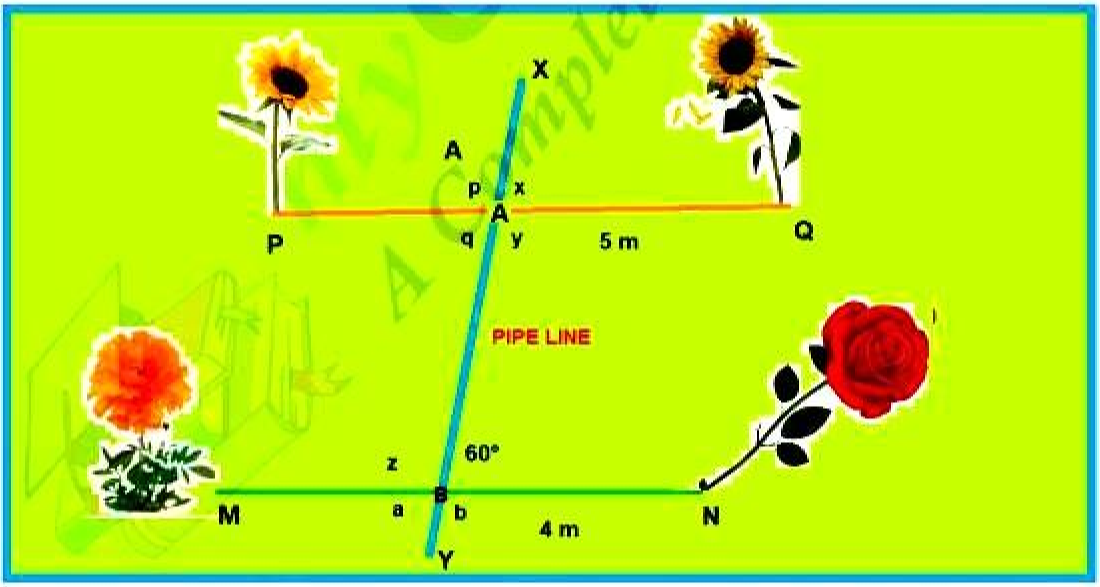
b. Less than 90°

c. Equal to 90°

d. Equal to 45°

18. **Read the Source/Text given below and answer any four questions:**

Once 4 students from class IX F were selected for plantation of flower plants in the school garden. The selected students were Pankaj, Raju, Deepak and Renu.



As shown PQ and MN are the parallel lines of the plants.

Pankaj planted a sunflower plant at P, then Raju planted another sunflower at Q.

Further, Deepak was called to plant any flowering plant at point M. He planted a marigold there.

Now it was the turn of Renu, She was told to plant a flowering plant different from the three planted one

So she planted a rose plat at N.

There was a water pipeline XY which intersects PQ and MN at A and B and ∠XBN = 60°

Answer the following questions

i. What is the value of ∠z?
   a. 60°
   b. 120°
   c. 180°
   d. 100°

ii. What is the value of ∠x?
   a. 60°
   b. 120°
   c. 180°
   d. 100°

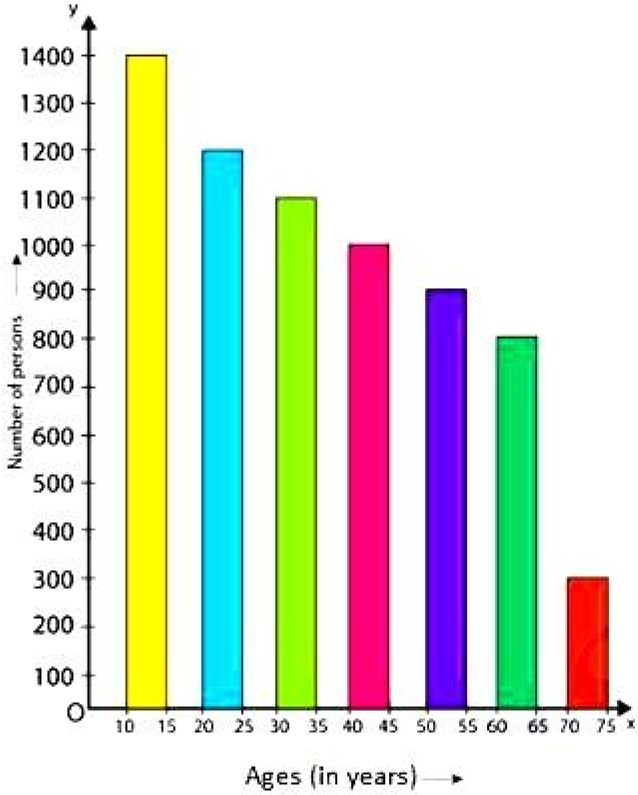
iii. What is the value of p + q?
   a. 60°
   b. 120°
   c. 180°
   d. 100°

iv. Which angle is the corresponding angle to ∠a?
   a. ∠z
   b. ∠p
   c. ∠b
   d. ∠q

v. What is the value of (p+q+a+z)/6?
   a. 60°
   b. 120°
   c. 180°
   d. 100°

19. **Read the Source/Text given below and answer any four questions:**

A healthcare survey was done by the state health and family welfare care board of the state of Punjab. The data is collected by forming age groups; i.e; 10-15, 20-25 .... and so on. The overall data from a town is given below in the form of a bar graph. Read the data carefully and answer the questions that follow.



i. What is the percentage of the youngest age-group persons over those in the oldest age group?
   a. 400.56%
   b. 466.67%
   c. 500%
   d. 500.67%
ii. What is the total population of the town?
   a. 6800
   b. 7000
   c. 6700
   d. 6600
iii. How many persons are more in the age-group 10-15 than in the age group 30-35?
   a. 100
   b. 200
   c. 250
   d. 300

iv. What is the age-group of exactly 1200 persons living in the town?

a. 20-25

b. 10-15

c. 15-20

d. 25-30

v. What is the total number of persons living in the town in the age-groups 10-15 and 60-65?

a. 2100

b. 2000

c. 2200

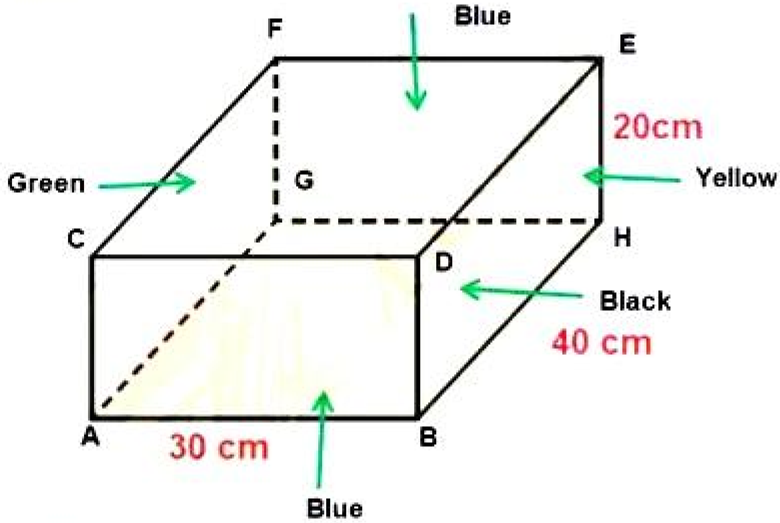
d. 2400

20. **Read the Source/Text given below and answer any four questions:**

Veena planned to make a jewellery box to gift her friend Reeta on her marriage. She made the jewellery box of wood in the shape of a cuboid.

The jewellery box has the dimensions as shown in the figure below. The rate of painting the exterior of the box is Rs 2 per cm^2. After making the box she took help from his friends to decorate the box.

The blue colour was painted by Deepak, Black by Suresh, green by Harsh and the yellow was painted by Naresh.



i. What is the volume of the box?

a. 24000 cm^3

b. 1200 cm^3

c. 800 cm^3

d. 600 cm^3

ii. How much area did Suresh paint?

a. 24000 cm^2

b. 1200 cm^2

c. 800 cm^2

d. 600 cm^2

iii. How much area did Deepak paint?

a. 24000 cm^2

b. 600 cm^2

c. 800 cm^2

d. 1200 cm^2

iv. What amount did Harsh charge?

a. Rs 800

b. Rs 1200

c. Rs 1600

d. Rs 2000

v. What amount did Veena pay for painting?

a. Rs 2600

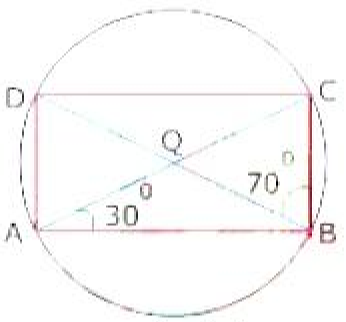
b. Rs 5200

c. Rs 5000

d. Rs 6000

Part - B

21. $\angle DBC = 70°$ and $\angle CAB = 30°$ find $\angle BCD$



22. Simplify: $\left(\frac{1}{5^3}\right)^4$

OR

Prove that: $\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b = 1$

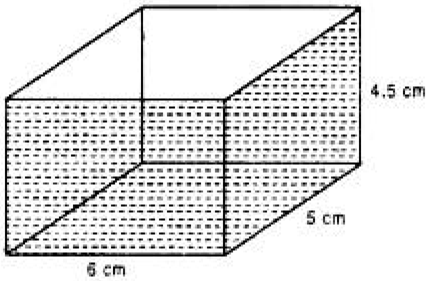
23. If x + 2k is a factor of $f(x) = x^4 - 4k^2 x^2 + 2x + 3k + 3$, find k.

24. A cylindrical vessel, without lid, has to be tin-coated including both of its sides. If the radius of its base is $\frac{1}{2}$ m and its height is 1.4 m, calculate the cost of tin-coating at the rate of Rs. 50 per 1000 cm^2.

25. Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.

OR

A cubical water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold? ($1m^3$ = 1000 litres)



26. The radius of a circle is 13 cm and the length of one of its chords is 24 cm. Find the distance of the chord from the centre.

27. In $\triangle ABC$, if bisectors of $\angle ABC$ and $\angle ACB$ intersect at O at angle of 120°, then find the measure of $\angle A$.

28. Construct an equilateral triangle whose each side is 4.5cm.

OR

Construct a square of side 3 cm.

29. Draw the graphs of the equations : $3x - 2y = 4$ and $x + y - 3 = 0$ in the same graph and find the co-ordinates of the point where two lines intersect.

30. Evaluate the product without multiplying directly: 103×107

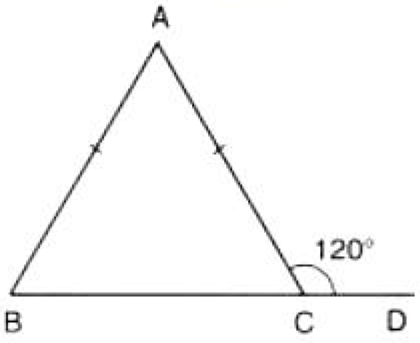
OR

Without actually calculating the cubes, find the value of: $\left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 - \left(\frac{5}{6}\right)^3$

31. Find the area of a rhombus whose perimeter is 80 m and one of whose diagonal is 24 m.

32. $\left(\frac{81}{16}\right)^{-3/4} \times \left[\left(\frac{9}{25}\right)^{3/2} \div \left(\frac{5}{2}\right)^{-3}\right]$

33. In Fig AB = AC and $\angle ACD = 120^\circ$. Find $\angle A$.



34. Draw the graph of the equation given below. Also, find the coordinates of the points where the graph cuts the coordinate axes.

-x + 4y = 8

OR

Draw the graph of the equation given below. Also, find the coordinates of the points where the graph cuts the coordinate axes.

3x + 2y + 6 = 0

35. On one page of a telephone directory, there were 200 telephone numbers. The frequency distribution of their unit's digits is given in the following table:

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

Out of the numbers on the page, a number is chosen at random. What is the probability that the unit's digit of the chosen number is

i. 6?
ii. a nonzero multiple of 3?
iii. a nonzero even number?
iv. an odd number?

36. ABCD is a rhombus and P, Q, R and S are the mid-points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rectangle.

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Solution

Part - A

1. We have, 8.0025 = $\frac{80025}{10000} = \frac{80025 \div 25}{10000 \div 25} = \frac{3201}{400}$

OR

$$\left(3^{\frac{1}{3}}\right)^4 = 3^{\frac{1}{3} \times 4} = 3^{\frac{4}{3}}$$

2. We have,

$a - b - a^2 + b^2$

$= (a - b) - (a^2 - b^2)$

$= (a - b) - (a - b)(a + b)$ [$\because a^2 - b^2 = (a - b)(a + b)$]

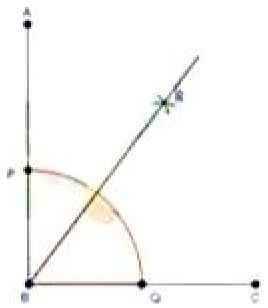
$= (a - b)(1 - a - b)$

3. No. of bags in which 49 seeds germinated = 0

Therefore Required probability $P(E) = \frac{0}{5} = 0$

4. Steps of Construction:-

   i. Draw an angle ABC of 90°.
   ii. With centre B and any radius, draw an arc which intersects AB at P and BC at Q.
   iii. With centres P and Q and radius more than $\frac{1}{2}$ PQ, draw two arcs which intersect each other at R.
   iv. Join RB.



$\therefore \angle RBC = 45^{\circ}$.

5. S = $\frac{6+6+8}{2}\ cm$
= $\frac{20}{2} = 10\ cm$
∴ Area of isosceles triangle = $\sqrt{10\ (10-6)\ (10-6)\ (10-8)}$
= $\sqrt{10 \times 4 \times 4 \times 2}$ sq cm
= 17.89 sq cm

OR

Length of equal sides of isosceles triangle = b= 15 cm
And the length of remaining side = a = 12 cm
Area of isosceles triangle= $= \frac{a}{4}\sqrt{4 \times b^2 - a^2} = \frac{12}{4}\sqrt{4 \times 15^2 - 12^2} = \frac{12}{4}\sqrt{900 - 144}$
$= 3\sqrt{756} = 3 \times 6\sqrt{21} = 18\sqrt{21}\,\text{cm}^2$
Therefore area of isosceles triangle is $18\sqrt{21}\,\text{cm}^2$.

6. The co-ordinates of every point on the y-axis are of the form (0, y).
So, (0, -1) lies on the y-axis.

7. $\left(\frac{2}{5}\right)^{2x-2} = \frac{32}{3125}$
$\Rightarrow \left(\frac{2}{5}\right)^{2x-2} = \frac{2^5}{5^5}$
$\Rightarrow \left(\frac{2}{5}\right)^{2x-2} = \left(\frac{2}{5}\right)^5$
⇒ 2x -2 =5 [Equating the exponent]
⇒ 2x = 7
$\Rightarrow x = \frac{7}{2}$

OR

$(3\sqrt{2} + 7\sqrt{3}) + (\sqrt{2} - 5\sqrt{3})$

=$(3\sqrt{2} + \sqrt{2}) + (7\sqrt{3} - 5\sqrt{3})$
=$(3+1)\sqrt{2} + (7-5)\sqrt{3}$
=$(4\sqrt{2} + 2\sqrt{3})$

8. Yes the angles of the quadrilateral can be right angles because the angle sum of a quadrilateral is 360°.

9. The radius of sphere = 2r

Volume of the sphere = $\frac{4}{3}\pi(\text{radius})^3$

= $\frac{4}{3}\pi(2r)^3$ = $\frac{4}{3}\pi 8r^3$

= $\frac{32}{3}\pi r^3$

OR

Given: Radius of cone is $\frac{r}{2}$ and slant height 2l

Total surface area of the cone =π radius (slant height + radius) = $\pi(\frac{r}{2})(2l + \frac{r}{2}) = \pi r(l + \frac{r}{4})$.

10. Since the highest power of x is 5, the degree of the polynomial $x^3 - 9x + 3x^5$ is 5.

11. We have x = 4y $\Rightarrow$ x - 4y = 0

$\Rightarrow$ x - 4y + 0 = 0.

This is of the form ax + by + c = 0, where a = 1, = - 4 and c = 0

12. We have,

$(97)^2 = (100 - 3)^2 = (100)^2 - 2 \times 100 \times 3 + (3)^2 = 10000 - 600 + 9 = 9409$

13. In $\triangle$OBA, we have OA = OB.

$\therefore \angle OBA = \angle OAB = 50^\circ \Rightarrow \angle CBA = 50^\circ$

now, $\angle CDA = x^\circ = \angle CBA = 50^\circ$ [$\angle$s in the same segment].

=> $x^o = 50^o$.

14. We have 3x = 2 $\Rightarrow$ 3x - 2 = 0

$\Rightarrow$ 3x + 0(y) - 2 = 0.

This is of the form ax + by + c = 0, where a = 3,b = 0 and c = - 2

15. We have,

3x + 4y = k

It is given that x = -1 and y = 2 is a solution of the equation 3x + 4y = k

$\therefore 3 \times (-1) + 4 \times 2 = k$

$\Rightarrow$ -3 + 8 = k

$\Rightarrow$ 5 = k

$\Rightarrow$ k = 5

16.

```
         0.6525
400) 261.0000
       2400
       ----
        2100
        2000
        ----
         1000
          800
         ----
          2000
          2000
          ----
             0
```

$\therefore \frac{261}{400} = 0.6525$ (terminating decimal expression)

OR

$(2\sqrt{3} - 5\sqrt{2}) + (\sqrt{3} + 2\sqrt{2})$

$= 2\sqrt{3} + \sqrt{3} - 5\sqrt{2} + 2\sqrt{2} = (3\sqrt{3} - 3\sqrt{2})$

17. i. (a) 8 cm
    ii. (a) 24 cm^2
    iii. (c) 360°
    iv. (c) Triangles
    v. (c) Equal to 90°
18. i. (b) 120°
    ii. (a) 60°
    iii. (c) 180°
    iv. (d) $\angle q$
    v. (a) 60°
19. i. (b) 466.67%
    ii. (c) 6700
    iii. (d) 300
    iv. (a) 20-25
    v. (c) 2200
20. i. (a) 24000 cm^3
    ii. (b) 1200 cm^2
    iii. (d) 1200 cm^2
    iv. (c) Rs 1600
    v. (b) Rs 5200

Part - B

21. ∠DBC = ∠DAC = 70° (Angle in same segment)

∠DAB = ∠DAC + ∠CAB

70° + 30° = 100°

∠DAB = ∠BCD + ∠180°

100° + ∠BCD = 180°

∠BCD = 180° - 100° = 80°

22. $\left(\frac{1}{5^3}\right)^4 = \frac{1^4}{(5^3)^4}$

$= \frac{1}{5^{3\times4}} = \frac{1}{5^{12}}$

OR

$\left(\frac{x^a}{x^b}\right)^c \times \left(\frac{x^b}{x^c}\right)^a \times \left(\frac{x^c}{x^a}\right)^b$

$= \left(x^{a-b}\right)^c \times \left(x^{b-c}\right)^a \times \left(x^{c-a}\right)^b$ [using $\frac{a^m}{a^n} = a^{m-n}$]

$= x^{(a-b)c} \times x^{(b-c)a} \times x^{(c-a)b}$

$= x^{ac-bc} \times x^{ba-ca} \times x^{cb-ab}$

$= x^{ac-bc+ba-ca+cb-ab}$ [using $a^m \times a^n = a^{m+n}$]

$= x^0$

= 1

Hence proved

23. Here, $f(x) = x^4 - 4k^2x^2 + 2x + 3k + 3$

Since (x + 2k) is a facotr of f(x), so by factor theorem,

$f(-2k) = 0$

$(-2k)^4 - 4k^2(-2k)^2 + 2(-2k) + 3k + 3 = 0$

$16k^4 - 16k^4 - 4k + 3k + 3 = 0$

⇒ -k + 3 = 0

⇒ -k = -3

⇒ k = 3

24. Radius of the base (r) = $\frac{1}{2}$ m

$= \frac{1}{2} \times 100$ cm = 50 cm

Height (h) = 1.4 m

= 1.4 × 100 cm = 140 cm

Surface area to be tin-coated = $2(2\pi rh + \pi r^2)$

= 2[2 × 3.14 × 50 × 140 + 3.14 × $(50)^2$]

= 2[43960 + 7850] = 2×51810 = 103620 cm^2

∴ Cost of tin-coating at the rate of Rs. 50 per 1000 cm^2

= Rs. $\frac{50}{1000}$ × 103620 = Rs. 5181.

25. a = 18 cm, b = 10 cm.

Perimeter = 42 cm.

⇒ a + b + c = 42

∴ 18 + 10 + c = 42

∴ 28 + c = 42

∴ c = 42 – 28

∴ c = 14 cm.

s = $\frac{42}{2}$ = 21 cm

∴ Aream of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-18)(21-10)(21-14)}$

$= \sqrt{21(3)(11)(7)}$

$= \sqrt{(7)(3)(3)(11)(7)}$

= (7)(3)$\sqrt{11}$

= 21$\sqrt{11}$ cm^2

OR

Volume of water in cuboidal tank

= length x breadth x height(depth)

= 6m × 5 × 4.5 m

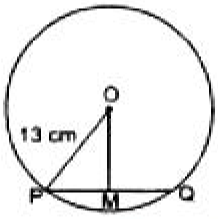
= 135 m^3

= 135 × 1000 litres , since 1m^3 = 1000 litres

= 135000 litres

Hence tank can hold 135000 litres of water.

26. The diagram can be represented as:



Let us suppose that PQ is a chord of a circle with center O and radius 13 cm such that PQ = 24 cm. From O, draw OM $\perp$ PQ and join OP.

As the perpendicular from the center of a circle to a chord bisects the chord, we can write

PM = MQ = $\frac{1}{2}$PQ = $\frac{1}{2} \times 24$

$\Rightarrow$ PM = 12 cm

Now in right angled triangle OMP, we have

$OP^2 = OM^2 + PM^2$

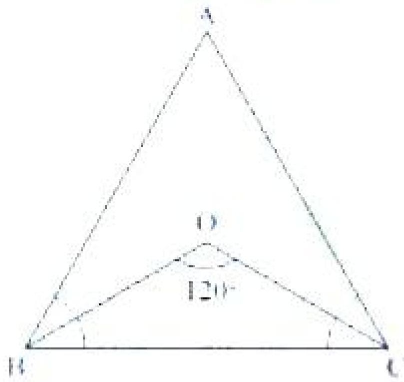
$\Rightarrow 13^2 = OM^2 + 12^2$

$\Rightarrow OM^2 = 169 - 144 = 25$

$\Rightarrow$ OM = 5 cm

Hence, the distance of the chord PQ from the centre is 5 cm, which completes the solution.

27. We need to find the measure of $\angle$A



So here, using the corollary, if the bisectors of $\angle$ABC and $\angle$ACB of a $\triangle$ABC meet at a point O, then $\angle$BOC = $90^\circ + \frac{1}{2}\angle A$

Thus, in $\triangle$ABC

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

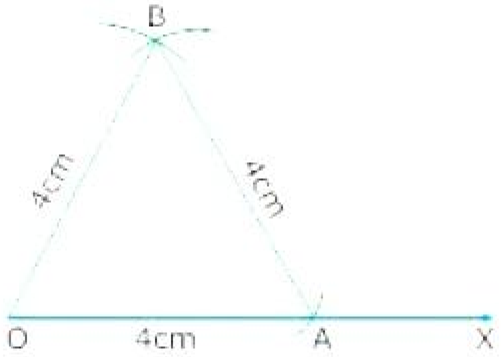
$120^\circ = 90^\circ + \frac{1}{2}\angle A$

$120^\circ - 90^\circ + \frac{1}{2}\angle A$

$\angle A = 2(30^\circ)$.

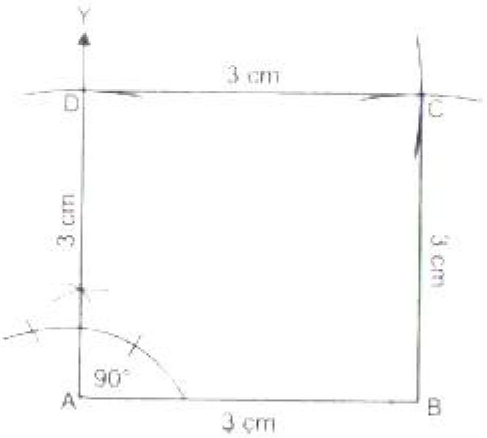
$\angle A = 60^\circ$

28. Steps of construction



i. Draw a ray OX
ii. Taking O as centre draw an arc of radius 4.5cm which cut OX at A
iii. Now taking O and A as a centre and with radius 4.5 cm, draw two arcs which intersect each other at B.
iv. Join OB and AB
v. ΔOAB is required triangle.

OR



Steps of construction:

1. Take AB = 3 cm.
2. At A, draw $AY \perp AB$.
3. With A as centre and radius = 3cm, describe an arc cutting AY at D.
4. With B and D as centres and radii equal to 3 cm, draw arc intersecting at C.
5. Join BC and DC, ABCD is the required square.

29. Graph of equation 3x - 2y = 4,

We have, 3x - 2y = 4, 3x - 4 = 2y

$\Rightarrow y = \frac{3}{2}x - 2$

Let x = 0 : $y = \frac{3}{2}(0) - 2 = 0 - 2 = -2$

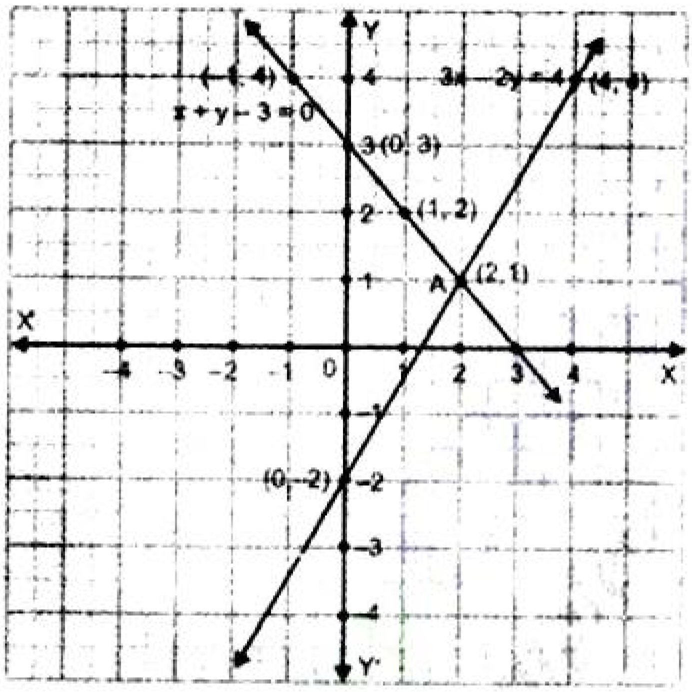
Let x = 2 : $y = \frac{3}{2}(2) - 2 = 3 - 2 = 1$

Let x = 4 : $y = \frac{3}{2}(4) - 2 = 6 - 2 = 4$

Thus, we have the following table :

x	0	2	4
y	-2	1	4

Now, plot the points (0, -2), (2, 1) and (4, 4) on a graph paper and join them by a line.



Graph of the equation x + y - 3 = 0

x + y - 3 = 0

$\Rightarrow y = -x + 3$

Let x = 0 : y = -0 + 3 = 3

Let x = 1 : y = -1 + 3 = 2

Let x = -1 : y = - (-1) + 3 = 1 + 3 = 4

Thus, we have the following table :

x	0	1	-1
y	3	2	4

By plotting the points (0, 3), (1, 2) and (-1, 4) on the graph paper and joining them by a line, we obtain the graph of x + y - 3 = 0

The lines represented by the equations 3x - 2y = 4 and x + y - 3 = 0 intersect at point A whose co-ordinates are (2, 1).

30. 103×107

103×107 can also be written as(100+3)(100+7).

We can observe that we can apply the identity $(x+a)(x+b)=x^2 + (a+b)x + ab$

$(100+3)(100+7)=(100)^2 + (3 + 7)(100) + 3\times7$

=10000 + 1000 + 21

= 11021

Therefore, we conclude that the value of the product 103×107 is 11021.

OR

Let $a = \frac{1}{2}, b = \frac{1}{3}, c = -\frac{5}{6}$

$\therefore\ a + b + c = \frac{1}{2} + \frac{1}{3} - \frac{5}{6}$

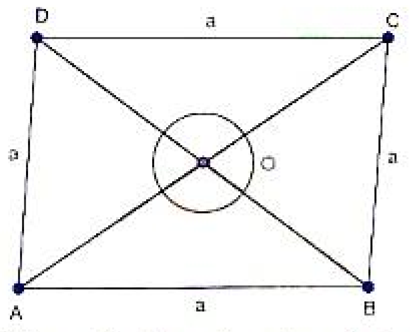
$= \frac{3+2-5}{6} = \frac{0}{6} = 0$

$\Rightarrow a^3 + b^3 + c^3 = 3abc$

$\therefore\ \left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 - \left(\frac{5}{6}\right)^3 = \left(\frac{1}{2}\right)^3 + \left(\frac{1}{3}\right)^3 + \left(-\frac{5}{6}\right)^3$

$= 3 \times \frac{1}{2} \times \frac{1}{3}\left(-\frac{5}{6}\right) = -\frac{5}{12}$

31.



Given that perimeter of rhombus = 80m

$\Rightarrow$ 4a = 80m [perimeter of rhombus = 4 $\times$ side]

$\Rightarrow$ a = 20m

Let AC = 24m

$\therefore$ OA = $\frac{1}{2}$AC = $\frac{1}{2} \times 24$ = 12m

In $\triangle$AOB,

$OB^2 = AB^2 - OA^2$ [pythagoras theorem]

$\Rightarrow OB = \sqrt{20^2 - 12^2} = \sqrt{400 - 144} = \sqrt{256} = 16m$

Also BO = OD [Diagonal of a rhombus bisect each other at 90^o]

$\therefore BD = 2OB = 2 \times 16 = 32m$

$\therefore$ Area of rhombus = $\frac{1}{2} \times 32 \times 24$ [Area of rhombus = $\frac{1}{2} \times BD \times AC$]

$= 384\ m^2$

32. $\left(\frac{81}{16}\right)^{-3/4} \times \left[\left(\frac{9}{25}\right)^{3/2} \div \left(\frac{5}{2}\right)^{-3}\right]$

$= \left[\left(\frac{3}{2}\right)^4\right]^{-3/4} \times \left[\frac{\left\{\left(\frac{3}{5}\right)^2\right\}^{3/2}}{\left(\frac{5}{2}\right)^{-3}}\right]$

$= \left(\frac{3}{2}\right)^{4\times -3/4} \times \left[\left(\frac{3}{5}\right)^{2\times 3/2}\right] \times \left(\frac{5}{2}\right)^3$

$= \left(\frac{3}{2}\right)^{-3} \times \left(\frac{3}{5}\right)^3 \times \left(\frac{5}{2}\right)^3$

$= \frac{2^3}{3^3} \times \frac{3^3}{5^3} \times \frac{5^3}{2^3} \left[\because \left(\frac{a}{b}\right)^{-m} = \left(\frac{b}{a}\right)^m\right]$

$= 1$

33. We have,

AB = AC

$\Rightarrow \quad \angle B = \angle C$ [$\because$ Angles opposite to equal sides are equal]

$\Rightarrow \quad \angle C + 120^\circ = 180^\circ$ [Angles of a linear pair]

$\Rightarrow \quad \angle C = 60^\circ$

$\Rightarrow \quad \angle B = 60^\circ$

Using angle sum property in $\triangle ABC$, we obtain

$\angle A + \angle B + \angle C = 180^\circ$

$\Rightarrow \quad \angle A + 60^\circ + 60^\circ = 180^\circ \left[\because \angle B = \angle C = 60^\circ\right]$

$\Rightarrow \quad \angle A = 60^\circ$

34. We have,

$-x + 4y = 8$

$\Rightarrow 4y - 8 = x$

$\Rightarrow x = 4y - 8$ .....(i)

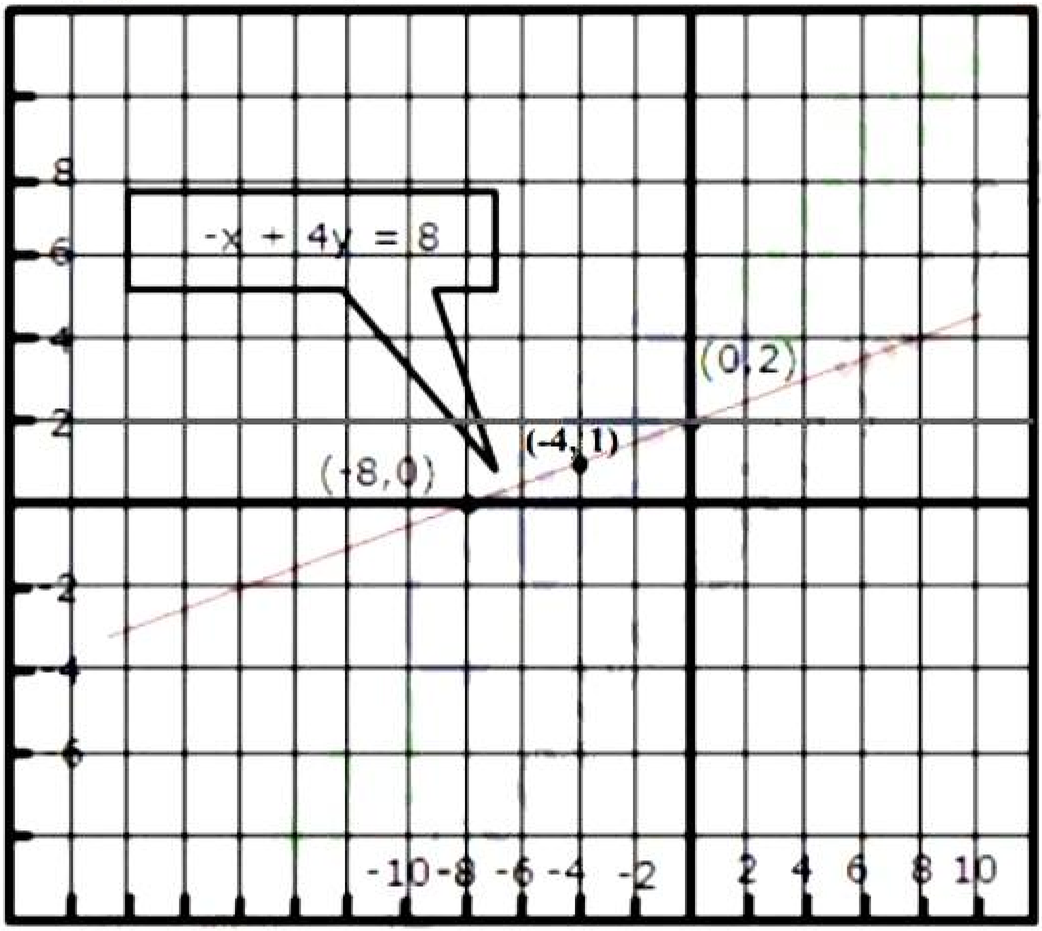
Putting y = 1 in (i), we get $x = 4 \times 1 - 8 = -4$

Putting y = 2 in (i), we get x = 4 × 2 - 8 = 0

Thus, we obtain the following table giving coordinates of two points on the line represented by the equation -x + 4y = 8.

x	-4	0
y	1	2

The graph of line -x + 4y = 8:



Clearly, the line intersects with the coordinate axes at (-8, 0) and (0, 2).

OR

We have,

3x + 2y + 6 = 0

⇒ 2y = - 6 - 3x

⇒ y = $\frac{-6-3x}{2}$ ....(i)

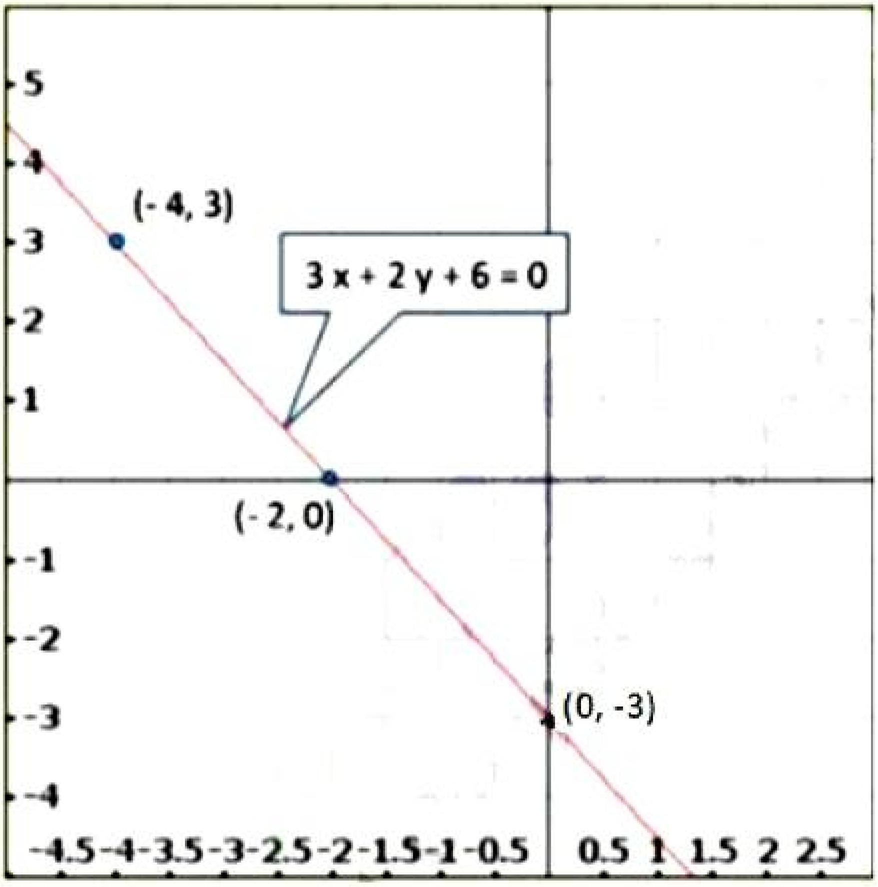
Putting x = -2 in (i), we get y = $\frac{6-3(-2)}{2}$ = 0

Putting x = -4 in (i), we get y = $\frac{-6-3(-4)}{2}$ = 3

Thus, we obtain the following table giving coordinates of two points on the line represented by the equation 3x - 2y + 6 = 0.

x	-2	-4
y	0	3

The graph of line 3x + 2y + 6 = 0:



Clearly, the line intersect with the coordinate axes at (-2,0) and (0, -3).

35. The number of all telephone numbers on the given page = 200

i. Let E_1 be the event of choosing a number with unit's digit 6.

Number of such numbers = 14.

P(getting a number with unit's digit 6)

= $P(E_1)$

$= \frac{\text{number of times 6 appears as unit's digit}}{\text{total number of numbers on the given page}}$

$= \frac{14}{200} = \frac{7}{100} = 0.07$

ii. Let E_2 be the event of choosing a number whose unit's digit is a nonzero multiple of 3

Each such number has unit's digits 3, 6 or 9

P(getting a number whose unit's digit is a nonzero multiple 0f 3)

$= P(E_2)$

$= \frac{\text{number of numbers with unit's digits 3,6 or 9}}{\text{total number of numbers on the given page}}$

$= \frac{22+14+20}{200} = \frac{56}{200} = 0.28$

iii. Let E_3, be the event of choosing a number whose unit's digit is a nonzero even number.....

Each such number has unit's digits 2,4, 6 or 8

P(getting a number whose unit's digit is a nonzero even number)

$= P(E_3)$

$= \frac{\text{number of numbers with unit's digits 2,4,6 or 8}}{\text{total number of numbers on the given page}}$

$= \frac{22+20+14+16}{200} = \frac{72}{200} = \frac{36}{100} = 0.36$

iv. Let E_4 be the event of choosing an odd number.

Each such number has unit's digits 1,3, 5, 7 or 9

P{getting a number whose unit's digit is an odd number) = $P(E_4)$

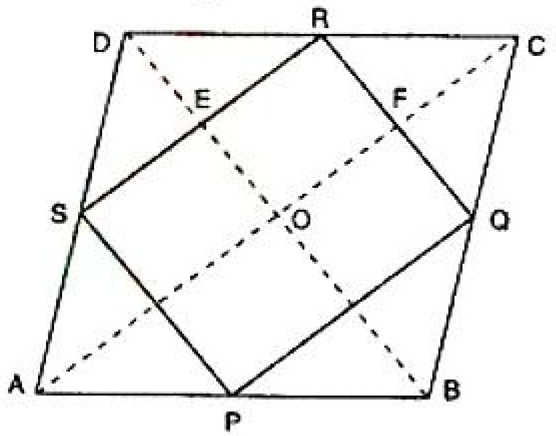
$= \frac{\text{number of numbers with unit's digits 1,3,5,7 or 9}}{\text{total number of numbers on the given page}}$

$= \frac{(26+22+10+28+20)}{200} = \frac{106}{200} = \frac{53}{100} = 0.53$

36. Given: ABCD is a rhombus, P, Q, R, S are the mid-points of AB, BC, CD, DA respectively. PQ, QR, RS and SP are joined.

To Prove: PQRS is a rectangle.

Construction: Join AC and BD.



Proof : In $\triangle RDS$ and $\triangle PBQ$

DS = QB . . .[Halves of opp. sides of || gm are equal]

DR = PB . . .[Halves of opp. sides of || gm are equal]

∠SDR = ∠QBP . . .[Opp. ∠s of || gm are equal]

∴ △RDS ≅ △PBQ . . . . [c.p.c.t.]

∴ SR = PQ

In △RCQ and △PAS

RC = AP . . .[Halves of opp. sides of || gm are equal]

CQ = AS . . .[Halves of opp. sides of || gm are equal]

∠RCQ = ∠PAS . . .[Opp. ∠s of || gm are equal]

∴ △RCQ ≅ △PAS . . . . [c.p.c.t.]

∴ RQ = SP

∴ In PQRS,

SR = PQ and RQ = SP

∴ PQRS is a parallelogram,

In △CDB,

As R and Q are the mid-points of DC and CB respectively.

△ RQ || DB ∴ RF || EO

Similarly, RE || FO

∴ OFRE is a || gm

As opp. ∠s of || gm are equal and diagonals of rhombus intersect at 90^o

∵ R = EOF = 90^o

Thus PQRS is a rectangle.