# ICSE Board
# Class IX Mathematics
# Sample Paper 2

**Time: 2½ hrs** **Total Marks: 80**

**General Instructions:**

1. Answers to this paper must be written on the paper provided separately.
2. You will NOT be allowed to write during the first 15 minutes. This time is to be spent in reading the question paper.
3. The time given at the head of this paper is the time allowed for writing the answers.
4. This question paper is divided into two Sections.
   Attempt all questions from Section A and any four questions from Section B.
5. Intended marks for questions or parts of questions are given in brackets along the questions.
6. All working, including rough work, must be clearly shown and should be done on the same sheet as the rest of the answer. Omission of essential working will result in loss of marks.
7. Mathematical tables are provided.

## SECTION – A (40 Marks)

*(Answer **all questions** from this Section)*

**Q. 1.**

(a) Express $0.\overline{001}$ as a fraction in the simplest form. [3]

(b) Find the median of the following set of numbers: [3]
10, 75, 3, 81, 18, 27, 4, 48, 12, 47, 9, 15

(c) If the side of a square is $\frac{1}{2}(x+1)$ and its diagonal is $\frac{3-x}{\sqrt{2}}$ units. Find the length of the side of the square. [4]

**Q. 2.**

(a) Two concentric circles are of radii 6.5 cm and 2.5 cm. Find the length of the chord of the larger circle which touches the smaller circle. [3]

(b) Show that the following points A(8, 2), B(5, −3) and C(0, 0) are the vertices of an isosceles triangle. [3]

(c) If $\sin\theta = \frac{x}{y}$, find the value of $\cos\theta \times \tan\theta$ in terms of x and y. [4]

**Q. 3.**

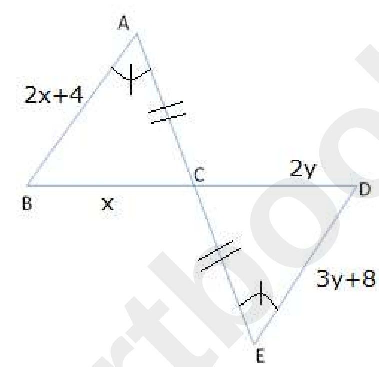
(a) Factorise: $a^2 + b^2 - c^2 - 2ab$ [3]

(b) Prove that : $9^{\log 4} = 16^{\log 3}$ [4]

(c) If $p^{\frac{1}{x}} = p^{\frac{1}{y}} = p^{\frac{1}{z}}$ and pqr = 1, prove that x + y + z = 0 [3]

**Q. 4.**

(a) In the following figure, find the value of x and y. [3]




(b) The amount at compound interest which is calculated yearly on a certain sum of money is Rs. 1250 in one year and Rs. 1375 in two years. Calculate the rate of interest. [3]

(c) Construct a rhombus ABCD, given diagonal AC = 6.0 cm and height = 3.5 cm. [4]

## SECTION – B (40 Marks)

*(Answer **any four questions** from this Section)*

**Q. 5.**

(a) Use graph paper for this question:

i. Draw the graph of $3x - y - 2 = 0$ and $2x + y - 8 = 0$. Take 1 cm = 1 unit on both the axes and plot only three points per line.

ii. Write down the co-ordinates of the point of intersection. [6]

(b) In the parallelogram ABCD, M is the midpoint of AC, X and Y are points on AB and DC respectively such that AX = CY. Prove that

(a) $\Delta AXM$ is congruent to $\Delta CYM$

(b) XMY is a straight line [4]

**Q. 6.**

(a) In a river, a boat covers 8 km in 40 min while travelling downstream, but takes 60 min for the return journey. If the speed of the boat and the flow of the river are uniform, find the speed of the boat in still water and speed of the stream. [4]

(b) Hamid built a cubical water tank lid for his house, with each outer edge 1.5 m long. He gets the outer surface area of the tank excluding the base covered with square tiles of sides 25 cm. How much will he spend on the tiles, if the cost of the tiles is Rs. 360 per dozen? [3]

(c) Solve: $3p - 2q = 5$, $q - 1 = 3p$ [3]

**Q. 7.**

(a) If $A = 60°$ and $B = 30°$, verify that [3]

$$\tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

(b) The dimensions of a rectangular field are 120 m × 70 m. The field is to be changed into a garden, leaving a path way of 5 m width around the garden. Find the expenses that are met when the cost per square meter is Rs. 10. [3]

(c) In a rectangle PQRS, prove that $PR^2 + QS^2 = PQ^2 + QR^2 + RS^2 + SP^2$ [4]

**Q. 8.**

(a) Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other, and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, then find the radius of the circle.

(b) If p + q = 1 + pq, prove that $p^3 + q^3 = 1 + p^3q^3$ [3]

(c) Construct a histogram of the frequency distribution given below: [4]

| Marks obtained | No. of students |
|---|---|
| Below 15 | 20 |
| Below 30 | 35 |
| Below 45 | 40 |
| Below 60 | 55 |
| Below 75 | 65 |
| Below 90 | 70 |

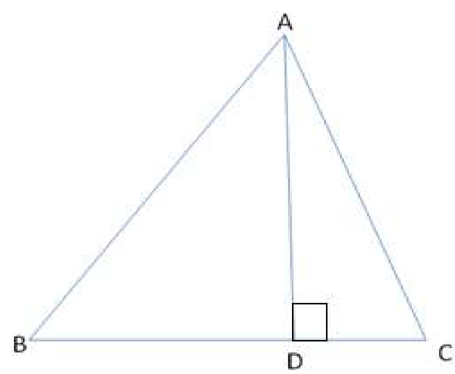
**Q. 9.**

(a) In the given figure, AD $\perp$ BC. Prove that

i. AB > BD

ii. AC > CD

iii. AB + AC > BC [3]

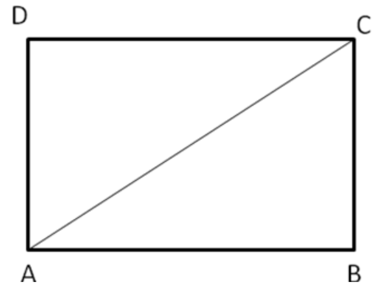



(b) If $\dfrac{9^n \times 3^2 \times \left(3^{-n/2}\right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \dfrac{1}{27}$, prove that m – n = 1 [3]

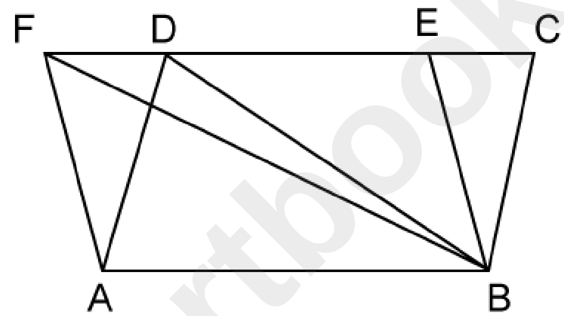
(c) If x = 30°, verify that $\tan 2x = \dfrac{2\tan x}{1 - \tan^2 x}$ [3]

**Q. 10.**

(a) In rectangle ABCD; AB = 15cm and m$\angle$BAC = 30°. Find the length of the BC. [3]




(b) In the given figure, area of ||gm ABCD is 80 cm$^2$. Find (i) ar(||gm ABEF) (ii) ar($\triangle$ ABD) and (iii) ar($\triangle$ BEF).




(c) Two alternate sides of a regular polygon, when produced, meet at right angles. [4]

Find:

i. Each external angle

ii. The number of sides



**Q. 11.**

(a) Find x: $\sqrt[3]{\frac{p}{q}} = \left(\frac{p}{q}\right)^{3-4x}$ [3]

(b) If a + b = 1 and a – b = 7, find the values of [3]

(1) $5(a^2 + b^2)$

(2) a

(c) In ΔAOB, A = (0, 4), O = (0, 0) and B = (3, 0). By plotting these points on a graph paper, find the area of ΔAOB. [4]

# Solution

**Time: 2½ hrs** **Total Marks: 80**

### SECTION – A

**Q. 1.**

(a) Let x= $0.\overline{001}$

Then, x = 0.001001001 ….(i)

Therefore, 1000x = 1.001001001 ….(ii)

Subtracting (i) from (ii), we get 999x = 1 ⇒ x = $\frac{1}{999}$

Hence, $0.\overline{001} = \frac{1}{999}$

(b) On arranging the numbers in ascending order, we get

3, 4, 9, 10, 12, 15, 18, 27, 47, 48, 75, 81

n = 12 (even)

$$\text{Median} = \frac{\frac{n}{2}^{\text{th}}\text{ term} + \left(\frac{n}{2}+1\right)^{\text{th}}\text{ term}}{2}$$

$$= \frac{\frac{12}{2}^{\text{th}}\text{ term} + \left(\frac{12}{2}+1\right)^{\text{th}}\text{ term}}{2}$$

$$= \frac{6^{\text{th}}\text{ term} + 7^{\text{th}}\text{ term}}{2}$$

$$= \frac{15+18}{2}$$

$$= 16.5$$

(c) Given, side of the square = $\left(\frac{x+1}{2}\right)$ units

And diagonal = $\frac{3-x}{\sqrt{2}}$ units = = $\sqrt{2}$ side

$$\Rightarrow \frac{3-x}{\sqrt{2}} = \sqrt{2}\left(\frac{x+1}{2}\right)$$

$$\Rightarrow 3 - x = x + 1$$

$$\Rightarrow 2x = 2 \Rightarrow x = 1$$

$$\therefore \text{length of side} = \frac{x+1}{2} = \frac{1+1}{2} = 1\text{unit}$$

**Q. 2.**

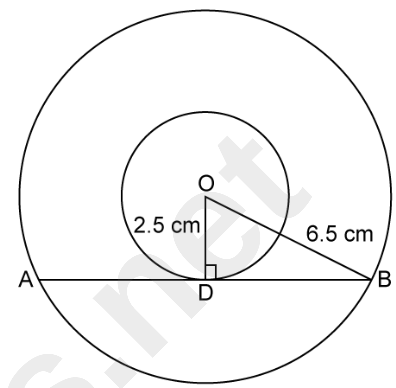
(a)

Since AB is a tangent to the inner circle.

$\angle ODB = 90^\circ$ ....(tangent is $\perp$ to the radius of a circle)

AB is a chord of the outer circle.

We know that, the perpendicular drawn from the centre to a chord of a circle, bisects the chord.




$\Rightarrow AB = 2DB$

In $\Delta ODB$,

By Pythagoras theorem,

$OB^2 = OD^2 + DB^2$

$\Rightarrow 6.5^2 = 2.5^2 + DB^2$

$\Rightarrow DB^2 = 6.5^2 - 2.5^2$

$\Rightarrow DB^2 = 42.25 - 6.25$

$\Rightarrow DB^2 = 36 \text{ cm}$

$\Rightarrow DB = 6 \text{ cm}$

$AB = 2DB = 2(6) = 12 \text{ cm}$

(b) Given points are A(8, 2), B(5, −3) and C(0, 0).

Using the distance formula, we get,

$AC = \sqrt{(8-0)^2 + (2-0)^2} = \sqrt{68}$

$BC = \sqrt{(5-0)^2 + (-3-0)^2} = \sqrt{34}$

$AB = \sqrt{(5-8)^2 + (-3-2)^2} = \sqrt{34}$

Since, BC = AB, ΔABC is an isosceles triangle.

(c) By Pythagoras theorem

$y^2 = x^2 + (\text{Base})^2$

$\Rightarrow (\text{Base})^2 = y^2 - x^2$

$\Rightarrow \text{Base} = \sqrt{y^2 - x^2}$

$\therefore \cos\theta = \frac{\sqrt{y^2 - x^2}}{y}, \tan\theta = \frac{x}{\sqrt{y^2 - x^2}}$

$\cos\theta \times \tan\theta = \frac{\sqrt{y^2 - x^2}}{y} \times \frac{x}{\sqrt{y^2 - x^2}} = \frac{x}{y}$

**Q. 3**

(a) $a^2 + b^2 - c^2 - 2ab = a^2 + b^2 - 2ab - c^2$

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

$$= (a-b+c)(a-b-c)$$

(b)

Let $x = 9^{\log 4}, y = 16^{\log 3}$

$\log x = \log 9^{(\log 4)}$

$\log x = \log 4 . \log 9$ ....(1)

$\log y = 16^{\log 3}$

$\Rightarrow \log y = \log 3 . \log 16 = \log 3 . \log 4^2$

$\Rightarrow$ log y = 2 log 3. Log 4

$\Rightarrow$ log y = log 9. Log 4 ....(2)

$\Rightarrow$ log x = log y [From (1) and (2)]

Hence x = y

(c)

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

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

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

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

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

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

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

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

$$= (1)^{-3}$$

$$= 1$$

**Q. 4.**

(a) In $\Delta ABC$ and $\Delta CDE$

$\angle BAC = \angle CED$ [Given]

AC = EC [Given]

$\angle ACB = \angle DCE$ [Vertically opposite $\angle$s]

Hence $\Delta ACB \cong \Delta ECD$ [$\because$ ASS – condition of congruency is satisfied]

$\therefore$ AB = ED [CPCT]

Then, 2x + 4 = 3y + 8

2x – 3y = 4 ....(1)

Also, BC = CD

x = 2y

x – 2y = 0 ....(2)

Solving (1) and (2), we get

x = 8 and y = 4

(b) Amount at the end of first year = Principal for second year

P = Rs. 1250, A = Rs. 1375, n = 1, rate = r%

$$1375 = 1250\left(1 + \frac{r}{100}\right)^1$$

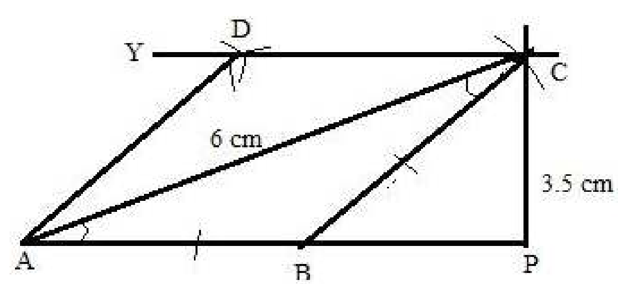
$$\frac{1375}{1250} = \frac{100 + r}{100}$$

$$\Rightarrow 125000 + 1250r = 137500$$

$$\Rightarrow 1250r = 137500 - 125000$$

$$\Rightarrow 1250r = 12500 \Rightarrow r = \frac{12500}{1250} = 10\%$$

(c) Steps of construction:




1) Draw a line AP.
2) Now draw AC = 6 cm and CP = 3.5 cm
3) Draw a line BC such that AB = BC.
4) Now at C draw a line CY parallel to AP.
5) At point C and A, taking radius same as AB draw arcs cutting each other at D.
6) Now join AD.

ABCD is the required rhombus.

## SECTION – B

**Q. 5.**

(a) (i) $3x - y - 2 = 0$

$\Rightarrow y = 3x - 2$

Taking convenient value of x

| x | 0 | 2 | 3 |
|---|---|---|---|
| y | −2 | 4 | 7 |

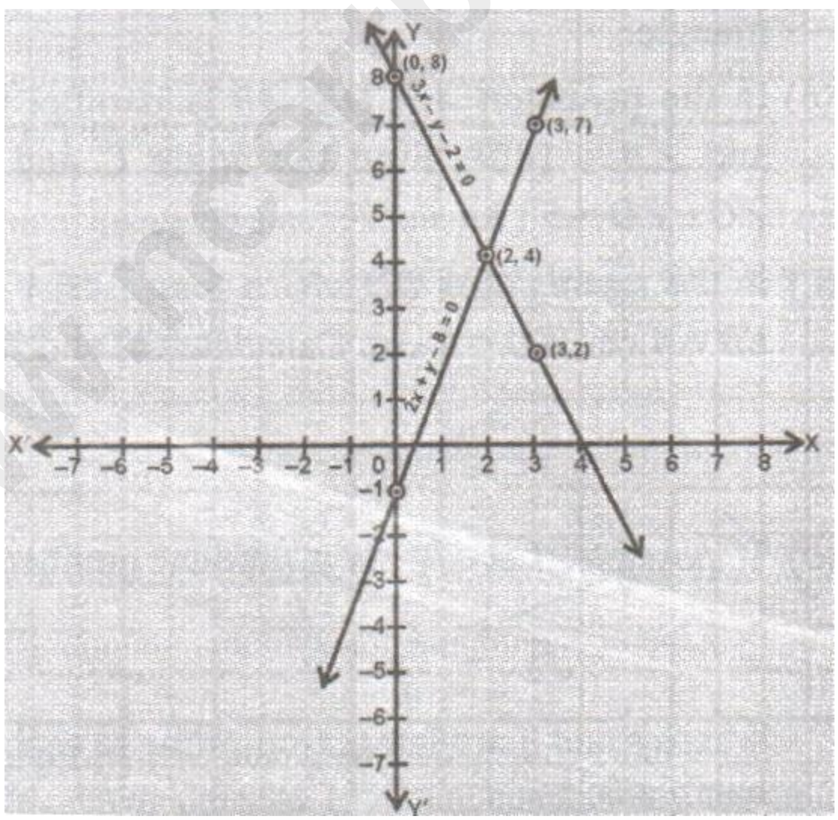
$2x + y - 8 = 0$

$y = 8 - 2x$

Taking convenient value of x

| x | 0 | 2 | 3 |
|---|---|---|---|
| y | 8 | 4 | 2 |

Now plot these points on the graph paper,

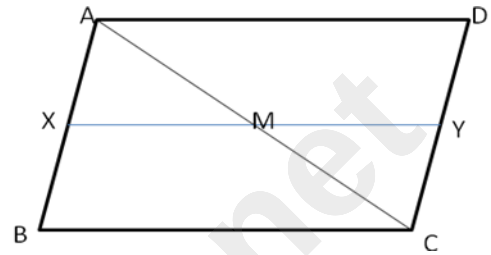



(ii) The coordinates of the point of intersection are (2, 4).

(b) Given: ABCD is a parallelogram, M is the midpoint of AC, X and Y are points on AB and DC respectively such that AX = CY.

To prove: (a)$\Delta AXM \cong \Delta CYM$ (b) XMY is a straight line

Construction: Join XM and MY




Proof:

(a) In $\Delta$s AMX and CMY

AM = MC [Given]

AX = CY [Given]

$\angle XAM = \angle YCM$ [Alternate angles]

So, $\Delta AXM \cong \Delta CYM$ [SAS]

(b) $\angle AMX = \angle CMY$ [Vertically opposite angles]

$\therefore$ XMY is a straight line.

**Q. 6.**

(a) Let the speed of boat in still water be = x kmph

And speed of the stream = y kmph

Speed of boat upstream = (x – y) kmph

Speed of boat downstream = (x + y) kmph

Time taken for upstream journey = $\frac{8}{x-y}$

Time taken for downstream journey = $\frac{8}{x+y}$

As per the problem, $\frac{8}{x-y}$ = 1 hr

x – y = 8 ....(1)

Also,

$\frac{8}{x+y}=\frac{40}{60}=\frac{2}{3}$

x + y = 12 ....(2)

Solving (1) and (2) we get

x = 10 kmph; y = 2 kmph

(b) Edge of the cubical tank = 1.5 m = 150 cm

Surface area of the tank = $5 \times 150 \times 150$ cm$^2$

Area of each square tile = side × side = $25 \times 25$ cm$^2$

$\therefore$ Number of tiles required $= \frac{\text{Surface area of the tank}}{\text{area of each tile}} = \frac{5 \times 150 \times 150}{25 \times 25} = 180$

Cost of 1 dozen tiles, i.e. cost of 12 tiles = Rs. 360

Cost of one tile = Rs. $\frac{360}{12}$ = Rs. 30

Thus, the cost of 180 tiles = 180 × 30 = Rs. 5400

(c) $3p - 2q = 5$ ....(1)

$q - 1 = 3p$ ....(2)

From equation (2),

$$p = \frac{q-1}{3}$$

Substituting the value of p in equation (1), we get

$$3\left(\frac{q-1}{3}\right) - 2q = 5$$

$$\Rightarrow q - 1 - 2q = 5$$

$$\Rightarrow -q = 5 + 1$$

$$\Rightarrow q = -6$$

Substituting the value of q in equation (2) we get,

$$\Rightarrow q - 1 = 3p$$

$$\Rightarrow -6 - 1 = 3p$$

$$\Rightarrow -7 = 3p$$

$$\Rightarrow p = -\frac{7}{3}$$

$$\Rightarrow p = -\frac{7}{3}, q = -6$$

**Q. 7.**

(a)

$A = 60^\circ$ and $B = 30^\circ$

$\Rightarrow A - B = 60^\circ - 30^\circ = 30^\circ$

$\therefore \tan(A - B) = \tan 30^\circ = \dfrac{1}{\sqrt{3}}$

And, $\dfrac{\tan A - \tan B}{1 + \tan A \tan B} = \dfrac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ}$

$$= \frac{\sqrt{3} - \frac{1}{\sqrt{3}}}{1 + \sqrt{3} \times \frac{1}{\sqrt{3}}}$$

$$= \frac{\frac{2}{\sqrt{3}}}{2}$$

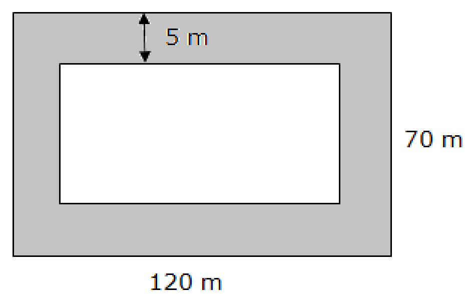
$$= \frac{1}{\sqrt{3}}$$

$\therefore \tan(A - B) = \dfrac{\tan A - \tan B}{1 + \tan A \tan B}$

(b) Length of garden = $120 - 2 \times 5$ and breadth = $70 - 2 \times 5$

$\Rightarrow$ l = 110 m, b = 60 m

Area of garden = $l \times b = 110 \times 60 = 600 m^2$




Given, rate = Rs. $10 m^2$

$\therefore$ Cost = Area $\times$ rate

Cost = Rs. 66000

(c) Given: A rectangle PQRS

To prove: $PR^2 + QS^2 = PQ^2 + QR^2 + RS^2 + SP^2$

Proof: In $\Delta PSR$

$PR^2 = PS^2 + SR^2$ ....(1) [Pythagoras theorem]

In $\Delta QRS$,

$QS^2 = QR^2 + RS^2$ ....(2)

Adding (1) and (2), we get

$PR^2 + QS^2 = PS^2 + SR^2 + QR^2 + RS^2$

$= RS^2 + QR^2 + PS^2 + PQ^2 \, [\because RS = PQ]$

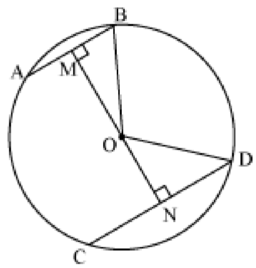
$PR^2 + QS^2 = PQ^2 + QR^2 + RS^2 + SP^2$

$= RS^2 + QR^2 + PS^2 + PQ^2 \, [\because RS = PQ]$

$\therefore PR^2 + QS^2 = PQ^2 + QR^2 + RS^2 + SP^2$

**Q. 8.**

(a) Construction: Draw OM $\perp$ AB and ON $\perp$ CD. Join OB and OD.




$BM = \frac{AB}{2} = \frac{5}{2}$ and $ND = \frac{CD}{2} = \frac{11}{2}$ (Perpendicular from centre bisects the chord)

Let ON be x, so OM will be $6 - x$.

In $\Delta MOB$, $OM^2 + MB^2 = OB^2$

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

$$\therefore 36 + x^2 - 12x + \frac{25}{4} = OB^2 \qquad ....(1)$$

In $\Delta NOD$, $ON^2 + ND^2 = OD^2$

$$\therefore OD^2 = x^2 + \left(\frac{11}{2}\right)^2 = x^2 + \frac{121}{4} \qquad ....(2)$$

We have $OB = OD$ ....(radii of same circle)

$$36 + x^2 - 12x + \frac{25}{4} = x^2 + \frac{121}{4} \text{ [From (1) and (2)]}$$

$$\therefore 12x = 36 + \frac{25}{4} - \frac{121}{4} = \frac{144 + 25 - 121}{4} = \frac{48}{4} = 12$$

$$\therefore 12x = 12 \Rightarrow x = 1$$

From equation (2),

$$OD^2 = (1)^2 + \left(\frac{121}{4}\right) = 1 + \frac{121}{4} = \frac{125}{4} \Rightarrow OD = \frac{5}{2}\sqrt{5}$$

Hence, the radius of the circle is $\frac{5}{2}\sqrt{5}$ cm.

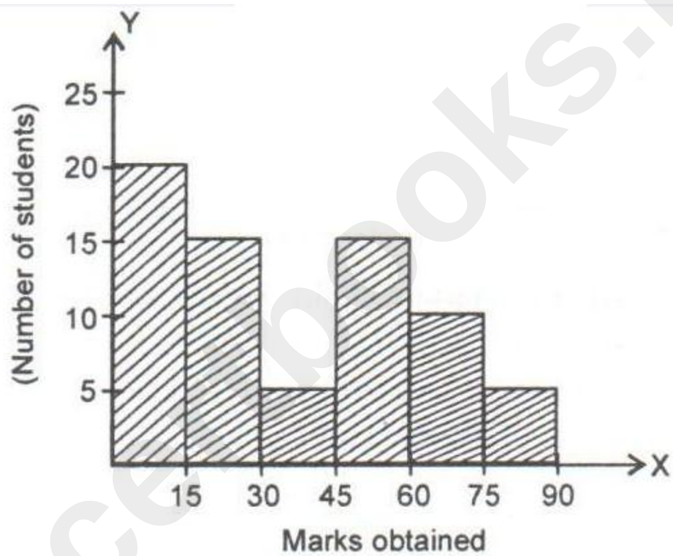
(b) We know,

$$p^3 + q^3 = (p+q)^3 - 3pq(p+q)$$
$$= (1+pq)^3 - 3pq(1+pq)$$
$$= (1+pq)^3 - 3pq(1+pq)$$
$$= 1 + p^3q^3 + 3pq(1+pq) - 3pq(1+pq)$$
$$= 1 + p^3q^3$$

Hence, $p^3 + q^3 = 1 + p^3q^3$

(c) Rewriting we get the continuous frequency distribution as following:

| C.I | Frequency (No. of students) |
|---|---|
| Below 15 | 20 |
| 15 – 30 | 35 – 20 = 15 |
| 30 – 45 | 40 – 35 = 5 |
| 45 – 60 | 55 – 40 = 15 |
| 60 – 75 | 65 – 55 = 10 |
| 75 - 90 | 70 – 65 = 5 |




**Q. 9.**

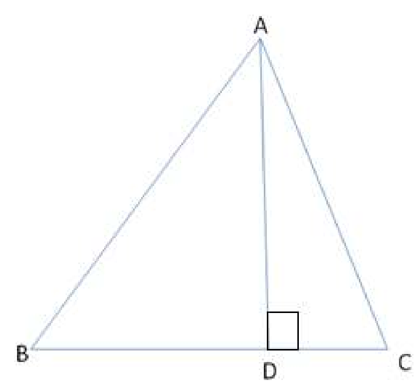
(a) Given: AD ⊥ BC

To prove:

AB > BD

AC > CD

AB + AC > BC




Proof: In ΔABD, ∠ADB is the greatest angle [There can be only one right angle]

i. So, the side opposite to ∠ADB in ΔABD is greatest

i.e., AB > BD ....(1)

ii. Similarly, ∠ADC is the greatest angle in ΔADC

So, AC > CD [∠ADC = 90°] ....(2)

iii. On adding (1) and (2), we get AB + AC > BD + CD

AB + AC > BC

(b) We have,

$$\frac{9^n \times 3^2 \times \left(3^{-n/2}\right)^{-2} - (27)^n}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{\left(3^2\right)^n \times 3^2 \times 3^{2n/2} - \left(3^3\right)^n}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{3^{2n} \times 3^2 \times 3^n - 3^{3n}}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{3^{2n+2+n} - 3^{3n}}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{3^{3n+2} - 3^{3n}}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{3^{3n}\left(3^2 - 1\right)}{3^{3m} \times 2^3} = \frac{1}{27}$$

$$\Rightarrow \frac{3^{3n} \times 8}{3^{3m} \times 8} = \frac{1}{27}$$

$$\Rightarrow 3^{3n-3m} = 3^{-3} \qquad \text{[on equating the exponents]}$$

$$\Rightarrow 3n - 3m = -3 \Rightarrow n - m = -1 \Rightarrow m - n = 1$$

(c) We have,

$$x = 30^o \Rightarrow 2x = 60^o$$

$$\therefore \tan 2x = \tan 60^o = \sqrt{3}$$

And, $\frac{2\tan x}{1-\tan^2 x} = \frac{2\tan 30^o}{1-\tan^2 30^o}$

$$= \frac{2 \times \frac{1}{\sqrt{3}}}{1 - \left(\frac{1}{\sqrt{3}}\right)^2}$$

$$= \frac{2/\sqrt{3}}{1 - \frac{1}{3}} = \frac{2/\sqrt{3}}{2/3}$$

$$= \frac{2}{\sqrt{3}} \times \frac{3}{2}$$

$$= \sqrt{3}$$

$$\therefore \tan 2x = \frac{2\tan x}{1-\tan^2 x}$$

**Q. 10.**

(a) In $\Delta ABC$, $\tan 30° = \frac{BC}{AB}$

$\Rightarrow \frac{1}{\sqrt{3}} = \frac{BC}{15}$

$\Rightarrow BC = \frac{AB}{\sqrt{3}} = \frac{15}{\sqrt{3}} = \frac{15\sqrt{3}}{\sqrt{3}} = 5\sqrt{3}$ cm

(b)

(i) Given that ABCD is a parallelogram.

So, AB||DE. That is, AB||FE.

Since the parallelograms have the same base AB, and the height on base AB is equal, the areas of ||gm ABCD and ||gm ABEF will be equal.

Hence, $ar(||gm\ ABEF) = ar(||gm\ ABCD) = 80\ cm^2$

(ii) We know that the diagonal of a parallelogram, divides the parallelogram into two triangles with equal areas.

So, $ar(\Delta ABD) = \frac{1}{2}ar(||gm\ ABCD) = \frac{1}{2}(80) = 40\ cm^2$

(iii) Similarly,

$ar(\Delta BEF) = \frac{1}{2}ar(||gm\ ABEF) = \frac{1}{2}(80) = 40\ cm^2$

(c) ABCD be a regular polygon

BC and ED when produced meet at P such that $\angle CPD = 90°$

$\angle CPD = 90°$

Let $\angle BCD = x°$

So, $\angle CDE = x°$

$\angle PCD = 180 - x$

$\angle PDC = 180 - x$

In $\Delta CPD$,

$180° - x° + 180° - x° + 90° = 180°$ [Sum of all $\angle$s of a $\Delta$]

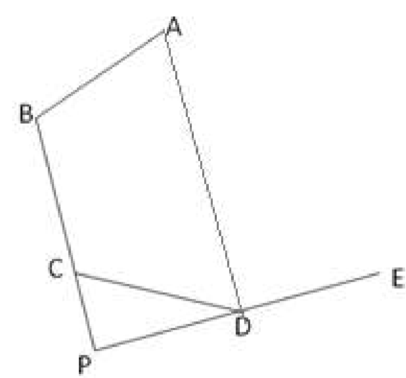
$270° - 2x° = 0$

$2x° = 270°$

$x° = 135°$

Each external angle = $180° - x° = 180 - 135 = 45°$

No. of sides = $\frac{360°}{45°} = 8°$



**Q. 11.**

(a)

$$\sqrt[3]{\frac{p}{q}}=\left(\frac{p}{q}\right)^{3-4x}=\left(\frac{p}{q}\right)^{4x-3}$$

$$\Rightarrow\left(\frac{p}{q}\right)^{1/3}=\left(\frac{p}{q}\right)^{-3+4x}$$

$$\Rightarrow\frac{1}{3}=-3+4x$$

$$\Rightarrow 4x=3+\frac{1}{3}$$

$$\Rightarrow 4x=\frac{10}{3}$$

$$\Rightarrow x=\frac{10}{12}$$

$$\Rightarrow x=\frac{5}{6}$$

(b) a + b = 1, a – b = 7

$$(a+b)^2-(a-b)^2=4ab$$

$$\Rightarrow 1^2-7^2=4ab$$

$$\Rightarrow 1-49=4ab$$

$$\Rightarrow 4ab=-48$$

$$\Rightarrow ab=-12 \quad ....(1)$$

Now, we know that

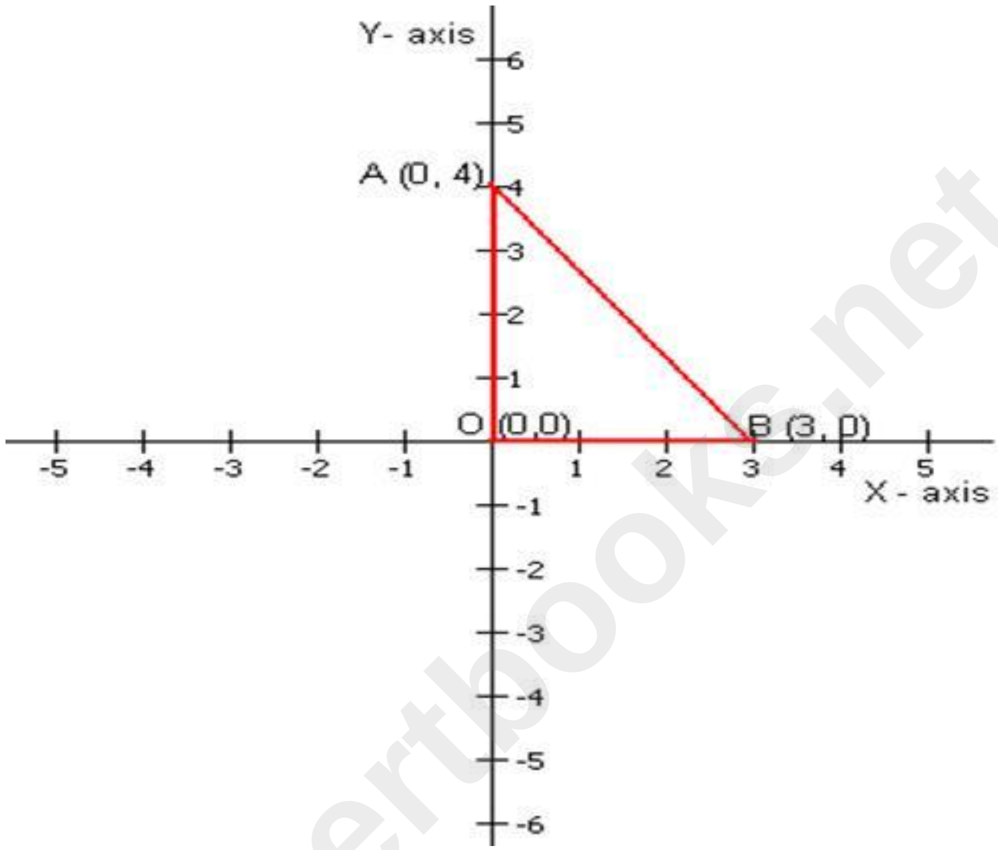
$$a^2+b^2=(a+b)^2-2ab=1^2-2\times(-12)$$

$$\Rightarrow a^2+b^2=1+24=25$$

(1) $5(a^2+b^2)=25\times5=125$

(2) ab = $-12$ [using equation (1)]

(c) The given points A(0, 4), O(0, 0), B(3, 0) can be plotted as follows:




Clearly, AOB is a right-angled triangle.

OA = 4 units, OB = 3 units.

Area of ΔAOB = $\frac{1}{2} \times \text{Base} \times \text{Height}$

$= \frac{1}{2} \times 3 \times 4$

= 6 square units