Section 'A'

1. $0.\bar{3} + 0.\bar{4} = (0.333.....) + (0.444.....)$

$= 0.777.....$

Let, $x = 0.777.....$

$10x = 7.777.....$

$\Rightarrow 10x - x = (7.777.....) - (0.777.....)$

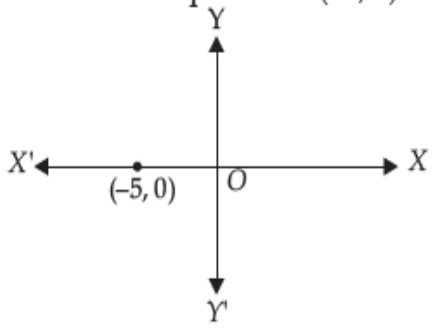
$\Rightarrow 9x = 7.0$

$\Rightarrow x = \frac{7}{9}$ 1

2. $x^2 - 3x = x(x-3)$ 1

[CBSE Marking Scheme, 2014]

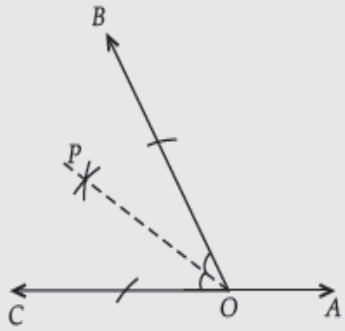
3. Co-ordinates of the point are (–5, 0)



1

4. From construction

$\angle BOP = \angle COP$



1

[CBSE Marking Scheme, 2017]

5. Volume of right circular cone $= \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times (6)^2 \times 7 = \frac{1}{3} \times \frac{22}{7} \times 36 \times 7 = 264 \text{ cm}^3$. 1

[CBSE Marking Scheme, 2012]

6. $2m - l$ 1

[CBSE Marking Scheme, 2012]

Section 'B'

7. $\because (x-1)$ is a factor of $f(x) = a^2x^3 - 4ax + 4a - 1$

$f(1) = 0$ 1

$\Rightarrow a^2(1)^3 - 4a(1) + 4a - 1 = 0$

$\Rightarrow a^2 - 4a + 4a - 1 = 0$

$\Rightarrow a^2 - 1 = 0$

$\Rightarrow a = \pm 1$ 1

[CBSE Marking Scheme, 2016]

COMMONLY MADE ERROR

Students make mistakes due to following reasons : Instead of using remainder and factor theorem, students divide the polynomial by $(x-1)$

ANSWERING TIP...

Try to solve the problem with the appropriate theorems.

8. $AB = CD$ (Given)

$\Rightarrow AB + BC = BC + CD$ ½+½

$\Rightarrow AC = BD$

Euclid's axiom used : If equals are added to equals, the wholes are equal. 1

[CBSE Marking Scheme 2012, 2014]

9. (i) Quadrant

(ii) Origin 1

ANSWERING TIP...

It is necessary to revise all the related terms.

10. $PQRS$ is a square

$\therefore$ Diagonals PR and SQ bisect each other at right angles

$\therefore$ $\Delta POQ = \Delta ROQ$

$\Delta ROQ \cong \Delta ROS$

and $\Delta ROS \cong \Delta POS$

$\Rightarrow$ $ar(POQ) = ar(ROQ)$

$= ar(ROS)$ 1

$= ar(POS)$

$\therefore$ $ar(PQRS) = 4\, ar(POQ)$

$= 4 \times 4$

$= 16 \text{ cm}^2$ 1

[CBSE Marking Scheme, 2017]

11. Let $AC = BC = x$

Perimeter $= 20\ cm$

Then, $x + x + 4 = 20$

$\Rightarrow$ $2x = 16$

$\Rightarrow$ $x = 8\ cm$

$\therefore$ Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ 1

$= \sqrt{10(10-8)(10-8)(10-4)}$

$= \sqrt{10 \times 2 \times 2 \times 6}$

$= 4\sqrt{15}\ \text{cm}^2.$ 1

[CBSE Marking Scheme, 2016]

12. (i) P (Even number in a trial)

$= \dfrac{20+18+10}{100}$

$= \dfrac{48}{100} = \dfrac{12}{25}$ or 0.48 1

(ii) P(Prime number in a trial)

$= \dfrac{20+12+15}{100}$

$= \dfrac{47}{100}$ or 0.47 1

[CBSE Marking Scheme, 2017]

Section 'C'

13. $x = \dfrac{[\sqrt{p+2q} + \sqrt{p-2q}]^2}{p+2q-p+2q}$ 1

$= \dfrac{1}{4q}\left(2p + 2\sqrt{p^2-4q^2}\right)$ 1

$\Rightarrow$ $2qx - p = \sqrt{p^2-4q^2}$

$\Rightarrow$ $4q\,(qx^2 - px) = -4q^2$

$\Rightarrow$ $qx^2 - px + q = 0.$ 1

[CBSE Marking Scheme, 2012]

Alternative Method :

$x = \dfrac{\sqrt{p+2q} + \sqrt{p-2q}}{\sqrt{p+2q} - \sqrt{p-2q}} \times \dfrac{\sqrt{p+2q} + \sqrt{p-2q}}{\sqrt{p+2q} + \sqrt{p-2q}}$ ½

$= \dfrac{(p+2q) + (p-2q) + 2 \times \sqrt{p+2q} \times \sqrt{p-2q}}{(p+2q) - (p-2q)}$ ½

$= \dfrac{2p + 2\sqrt{p^2-4q^2}}{p+2q-p+2q}$ ½

$= \dfrac{2\left(p + \sqrt{p^2-4q^2}\right)}{4q}$

$2qx = p + \sqrt{p^2-4q^2}$

$2qx - p = \sqrt{p^2-4q^2}$

Squaring both sides, we get

$4q^2x^2 + p^2 - 4pqx = p^2 - 4q^2$ ½

$4q\,(qx^2 - px) = -4q^2$ ½

$qx^2 - px + q = 0.$ ½

ANSWERING TIP....

Students must solve the problem step by step to avoid errors.

14. $2x^2 + 3\sqrt{5}\,x + 5 = 2x^2 + 2\sqrt{5}\,x + \sqrt{5}\,x + 5$

$= 2x\left(x + \sqrt{5}\right) + \sqrt{5}\left(x + \sqrt{5}\right)$

$2x^2 + 3\sqrt{5}\,x + 5 = \left(x + \sqrt{5}\right)\left(2x + \sqrt{5}\right)$ 3

OR

$x^3 - 2x^2 - x + 2$

$= x^2\,(x-2) - 1\,(x-2) \quad [\because a^2 - b^2 = (a-b)(a+b)]$

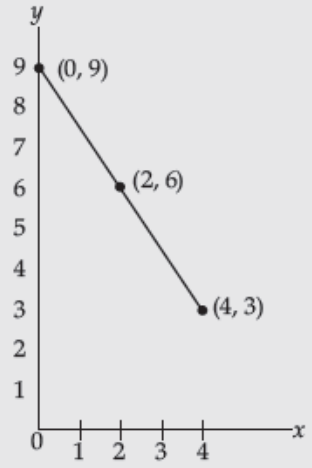
$= (x-2)\,(x^2-1)$

$= (x-2)\,(x-1)\,(x+1)$ 3

15. $3x + 2y = 18$

$\Rightarrow \quad 2y = -3x + 18$

$\Rightarrow \quad y = -\frac{3}{2}x + 9$

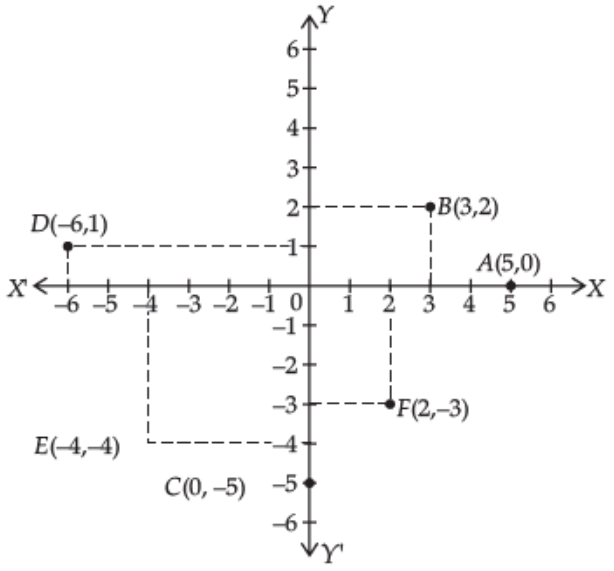


3

x	0	2	4
y	9	6	3

[CBSE Marking Scheme, 2017]

16.



3

ANSWERING TIP....

Sometimes students fail to plot the points correctly in Cartesian plane.

17. $AB = AC \Rightarrow \frac{AB}{2} = \frac{AC}{2}$ ½

$\Rightarrow \quad AE = AF,$

Since E and F are the mid-points of AB and AC.

In ΔABF and ΔACE,

$AB = AC$ (Given) ½

$\angle A = \angle A$ (Common) ½

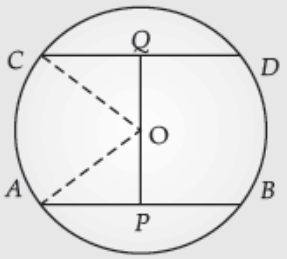
$AF = AE$ (Proved) ½

$\therefore \quad \Delta ABF \cong \Delta ACE$ (By SAS cong.) ½

$\therefore \quad BF = CE.$ (By c.p.c.t) ½

18. Construction : Join OA and OC.

Since, perpendicular from centre of the circle to the chord bisects the chord.



$$AP = PB = \frac{1}{2}AB = 4 \text{ cm}$$

$$CQ = QD = \frac{1}{2}CD = 3 \text{ cm} \quad 1$$

In ΔOAP,

$OP^2 = OA^2 - AP^2$

(Pythagoras theorem)

$\Rightarrow \quad OP^2 = 5^2 - 4^2$

$OP^2 = 25 - 16$

$OP^2 = 9$

$\therefore \quad OP = 3 \text{ cm}$ ½

In ΔOCQ, $OQ^2 = OC^2 - CQ^2$

(Pythagoras theorem)

$= 5^2 - 3^2$

$= 25 - 9$

$= 16$

$\therefore \quad OQ = 4$ ½

$\therefore \quad PQ = OP + OQ$

$= 3 + 4$

$= 7 \text{ cm}$ 1

[CBSE Marking Scheme, 2016]

19. Given : Base $BC = 7.5$ cm, the difference of the other two sides $AB - AC$ or $AC - AB = 2.5$ cm and one base angle 45°.

Let $AB > AC$

$AB - AC = 2.5 \text{ cm}$

Steps of construction :

(i) Draw a ray BX and cut off a line segment $BC = 7.5$ cm from it.

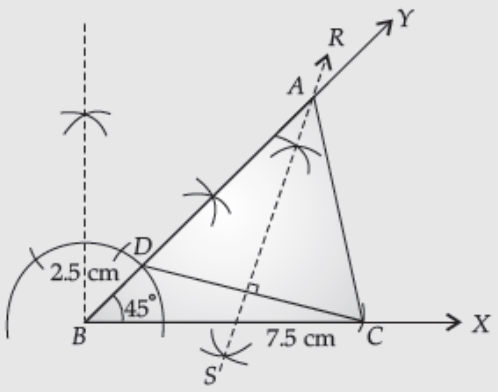
(ii) Construct $\angle YBC = 45°$

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

(iv) Join CD.

(v) Draw the perpendicular bisector RS of CD intersecting BY at a point A.

(vi) Join AC, then ABC is the required triangle. 1



1

Justification of Construction :

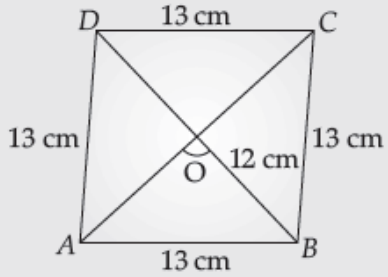
RS is the perpendicular bisector of DC.

So, $AD = AC$

$BD = AB - AD = AB - AC$. 1

[CBSE Marking Scheme, 2012]

20. Rhombus,



Perimeter $= 52$ cm 1

$$\text{Side} = \frac{52}{4} = 13 \text{ cm}$$

Diagonal $= 24$ cm 1

$OB = OD = 12$ cm

$OA = \sqrt{13^2 - 12^2} = \sqrt{169 - 144} = \sqrt{25} = 5$ cm ½

Area of rhombus $= 4 \times \frac{1}{2} \times 5 \times 12$ ½

Area $= 120 \text{ cm}^2$

[CBSE Marking Scheme, 2012]

21. Here $r = 5$ m, $h = 12$ m.

Slant height, $l = \sqrt{5^2 + 12^2} = 13$ m

Curved surface area of tent $= \pi rl$ 1

$$= \frac{22}{7} \times 5 \times 13 \text{ m}^2$$

$$= \frac{1430}{7} \text{ m}^2$$

$\therefore$ Area of cloth required $= \frac{1430}{7} \text{ m}^2$ 1

$$\text{Width of cloth} = 1\frac{4}{7} \text{ m} = \frac{11}{7} \text{ m}$$

$$\text{Length of cloth} = \frac{1430}{7} \div \frac{11}{7}$$

$= 130$ m. 1

[CBSE Marking Scheme, 2012]

22. Total no. of cars $= 100$

(i) P(exactly 5 occupants)

$$= \frac{5}{100} = \frac{1}{20}$$ 1

(ii) P(more than 2 occupants)

$$= \frac{23 + 17 + 5}{100} = \frac{45}{100} = \frac{9}{20}$$ 1

(iii) P(less than 5 occupants)

$$= \frac{29 + 26 + 23 + 17}{100} = \frac{95}{100} = \frac{19}{20}$$ 1

[CBSE Marking Scheme, 2012]

Section 'D'

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

$$= \left(\frac{16}{81}\right)^{\frac{3}{4}} \times \left[\left(\frac{9}{25}\right)^{\frac{3}{2}} \div \left(\frac{2}{5}\right)^{3}\right]$$ 1

$$= \left(\frac{2^4}{3^4}\right)^{\frac{3}{4}} \times \left[\left(\frac{3^2}{5^2}\right)^{\frac{3}{2}} \div \left(\frac{2}{5}\right)^{3}\right]$$ ½

$$= \left[\left(\frac{2}{3}\right)^{4}\right]^{\frac{3}{4}} \times \left[\left[\left(\frac{3}{5}\right)^{2}\right]^{\frac{3}{2}} \times \left(\frac{5}{2}\right)^{3}\right]$$ 1

$$= \left(\frac{2}{3}\right)^{3} \times \left[\left(\frac{3}{5}\right)^{3} \times \left(\frac{5}{2}\right)^{3}\right]$$ ½

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

$$= \frac{2^3}{3^3} \times \frac{3^3}{2^3}$$ ½

$= 1$ **[CBSE Marking Scheme, 2016]** ½

24.

$$y^2 + 4y + 2 \;\overline{)\; 4y^4 + 12y^3 + 6y^2 + 50y + 26 \;}\; 4y^2 - 4y + 14$$

$4y^4 + 16y^3 + 8y^2$ **1**

$-4y^3 - 2y^2 + 50y$ **1**

$-4y^3 - 16y^2 - 8y$

$14y^2 + 58y + 26$ **1**

$14y^2 + 56y + 28$

Remainder $2y - 2$ **1**

So, $2y - 2$ must be subtracted.

[CBSE Marking Scheme, 2015]

25. Let F be the force applied and a be the acceleration produced

$F \propto a$

or, $F = ka$, where k is constant **1**

Replace a by x and F by y.

$y = k(x)$

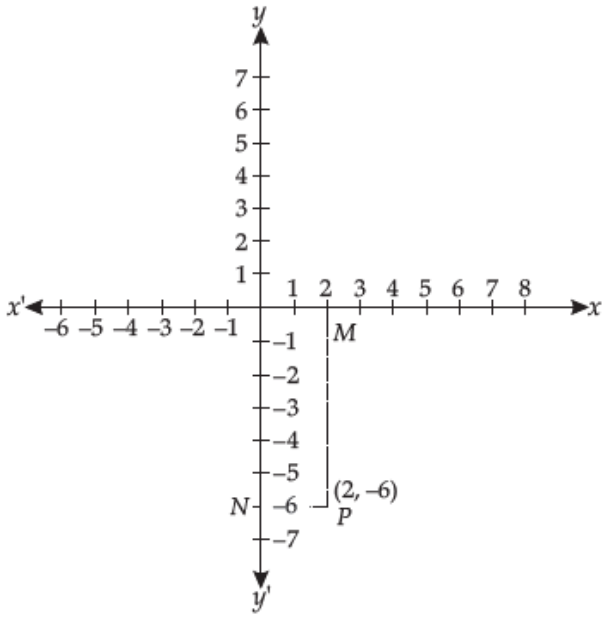
or, $y = xk$

Here, $k = 5$

or, $y = 5x$

x	0	1	–1
y	0	5	–5

1



2

26. Height of cylindrical reservoir = 12 m

Total cost of plastering it from inside = ₹ 5652

Cost of 1 m^2 = ₹ 15

$\therefore$ Surface area plastered $= \dfrac{\text{Total Cost}}{\text{Cost / m}^2}$

$2\pi rh = \dfrac{5652}{15}$

$\therefore \quad 2 \times \dfrac{22}{7} \times r \times 12 = \dfrac{5652}{15}$

$\therefore \quad r = \dfrac{5652 \times 7}{15 \times 2 \times 22 \times 12}$

$= 4.99 \text{ m} \approx 5 \text{ m}$ **2**

$\therefore$ Volume $= \pi r^2 h$

$= \dfrac{22}{7} \times 5 \times 5 \times 12$

$= 942.857 \text{ m}^3$

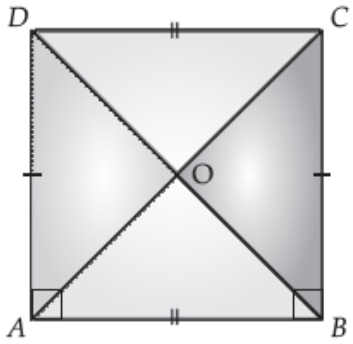
$= 942857$ litre **2**

[CBSE Marking Scheme, 2016]

27. Given a square $ABCD$ in which diagonal AC and BD intersects at O.

To Prove :

$AC = BD$ and $AC \perp BD$



Proof : In ΔADB and ΔBCA,

$AD = BC$ (sides of a square) **1**

$\angle BAD = \angle ABC$ (90° each)

$AB = BA$ (common)

$\Delta ADB \cong \Delta BCA$ (By SAS) **1**

$AC = BD$ (By c.p.c.t.)

Also,

In ΔAOB and ΔAOD

$OB = OD, AB = AD, AO = AO$ (By SSS)

$\Delta AOB \cong \Delta AOD$ (SSS)

$\angle AOB = \angle AOD$ **1**

$\angle AOB + \angle AOD = 180°$

$\angle AOB = \angle AOD = 90°$

$AO \perp BD, AC \perp BD$

Hence, $AC = BD$ and $AC \perp BD$. **Hence Proved.** **1**

28. $AP = PB = \dfrac{1}{2}AB = 6$ cm. **1**

$CQ = QD = \dfrac{1}{2}CD = 8$ cm **1**

In ΔOAP,

$OP = \sqrt{AO^2 - AP^2} = \sqrt{10^2 - 6^2}$

$= \sqrt{64} = 8$ cm **1**

In ΔOCQ

$$OQ = \sqrt{CO^2 - CQ^2} = \sqrt{10^2 - 8^2}$$

$$= \sqrt{36} = 6 \text{ cm} \quad 1$$

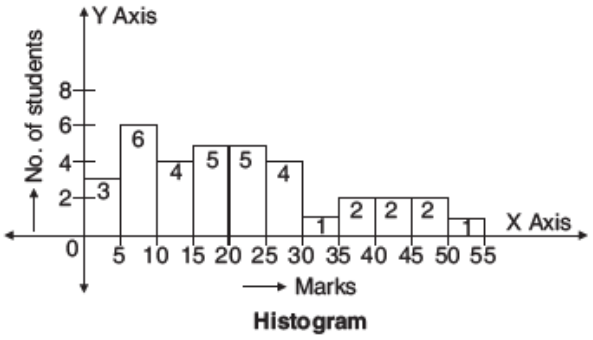
$$PQ = OP + OQ$$

$$= 8 + 6 = 14 \text{ cm.}$$

29.

Marks	No. of Students
0 – 5	3
5 – 10	6
10 – 15	4
15 – 20	5
20 – 25	5
25 – 30	4
30 – 35	1
35 – 40	2
40 – 45	2
45 – 50	2
50 – 55	1

2



Histogram **2**

COMMONLY MADE ERROR

Most of the students fail to mention the classes properly which led to errors.

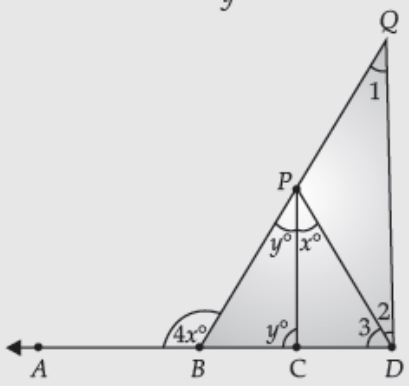
ANSWERING TIP...

Read the questions and given data carefully to avoid errors.

30. $BP = BC$ (Given)

$\therefore \quad \angle BCP = \angle BPC$

$= y^\circ$ **1**



$4x^\circ = 2y^\circ$ **1**

$2x^\circ = y^\circ$

$y = x^\circ + \angle 3$

i.e., $2x^\circ = x^\circ + \angle 3$

$x^\circ = \angle 3$ **1**

Also $CP \,||\, DQ$

$\angle x^\circ = \angle 2$

(Alternate interior angles)

$\angle 2 = \angle 3$

or, DP bisects $\angle CDQ$. **1**

[CBSE Marking Scheme 2016]