SOLUTIONS

SAMPLE QUESTION PAPER - 5

Solved

Time : 3 Hours **Maximum Marks : 90**

SECTION 'A'

1. (C)

$$(81)^{-1/4} \times \sqrt[4]{81} = \left(3^4\right)^{-1/4} \times \left(3^4\right)^{1/4}$$ **1**

$$= (3)^{-1} \times (3)^1$$
$$= (3)^{-1+1} = 3^0 = 1$$

2. (C)

$$\frac{x}{y} + \frac{y}{x} = -1$$

$$\frac{x^2+y^2}{xy} = -1$$

$$x^2 + y^2 = -xy$$
$$x^2 + y^2 + xy = 0$$
$$x^3 - y^3 = (x-y)(x^2+y^2+xy) = (x-y) \times 0 = 0$$ **1**

3. (C)

$$p(x) = 3x^3 - 2x^2 - x + 4$$
$$p(-1) = 3(-1)^3 - 2(-1)^2 - (-1) + 4$$
$$= -3 - 2 + 1 + 4$$
$$= 0.$$ **1**

4. (B) (5, 0) **1**

SECTION 'B'

5. $\sqrt{50} - \sqrt{98} + \sqrt{162}$

$$= \sqrt{5\times5\times2} - \sqrt{7\times7\times2} + \sqrt{3\times3\times3\times3\times2}$$ **1**

$$= 5\sqrt{2} - 7\sqrt{2} + 9\sqrt{2}$$ **½**

$$= 7\sqrt{2}$$ **½**

[CBSE Marking Scheme, 2012]

6. $$\left(x+\frac{1}{x}\right)\left(x-\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}\right)\left(x^4+\frac{1}{x^4}\right) = \left(x^2-\frac{1}{x^2}\right)\left(x^2+\frac{1}{x^2}\right)\left(x^4+\frac{1}{x^4}\right)$$ **½**

as $(a+b)(a-b) = a^2 - b^2$ **½**

$$= \left(x^4 - \frac{1}{x^4}\right)\left(x^4 + \frac{1}{x^4}\right)$$ ½

$$= \left(x^8 - \frac{1}{x^8}\right)$$ ½

[CBSE Marking Scheme, 2011, 2012]

7. $m(m-1) - n(n-1) = m^2 - m - n^2 + n$ ½

$= m^2 - n^2 - m + n$

$= (m-n)(m+n) - (m-n)$ **1**

$= (m-n)(m+n-1)$ ½

[CBSE Marking Scheme, 2012]

8. $AB = CD$ (Given)

$AB + BC = BC + CD$ ½+½

$AC = BD$

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

[CBSE Marking Scheme, 2012, 2014]

9. $a + b = 180°$ (Linear pair) ½

$a - b = 80°$ (Given)

Adding, $2a = 260°$ ½

$a = 130°$ ½

$b = 180° - a = 180° - 130°$

$= 50°.$ ½

[CBSE Marking Scheme, 2010, 2011, 2012]

OR

Let, $\angle a = 2x$ and $\angle b = 3x$ ½

Then, $\angle a + \angle b = 90°$

$2x + 3x = 90°$

$x = 18°$ ½

$a = 2 \times 18° = 36°$

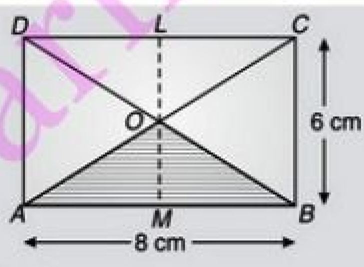
$b = 3 \times 18° = 54°$

$\therefore$ $c = 180° - b = 180° - 54°$

$= 126°.$ **1**

[CBSE Marking Scheme, 2012]

10.



Diagonals bisect each other at O

Draw, $LOM \perp AB$ and CD $OL = OM = 3$ cm **1**

Area of shaded region $OAB = \frac{1}{2} \times 8 \times 3$

$= 12 \text{ cm}^2.$ **1**

[CBSE Marking Scheme, 2012]

SECTION 'C'

11. $$\left[5^2\left(8^{1/3}+27^{1/3}\right)^3\right]^{1/5} = \left[5^2\left\{\left(2^3\right)^{1/3}+\left(3^3\right)^{1/3}\right\}^3\right]^{1/5}$$ **1**

$$= \left[25(2+3)^3\right]^{1/5}$$

$$= \left[5^2 \times 5^3\right]^{1/5}$$ **1**

$$= \left(5^5\right)^{1/5}$$

$$= 5$$ **1**

OR

$$LHS = \frac{1}{3-\sqrt{8}} - \frac{1}{\sqrt{8}-\sqrt{7}} + \frac{1}{\sqrt{7}-\sqrt{6}} - \frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{5}-2}$$

$$= \frac{1}{(3-\sqrt{8})} \times \frac{(3+\sqrt{8})}{(3+\sqrt{8})} - \frac{1}{(\sqrt{8}-\sqrt{7})} \times \frac{(\sqrt{8}+\sqrt{7})}{(\sqrt{8}+\sqrt{7})} + \frac{1}{(\sqrt{7}-\sqrt{6})} \times \frac{(\sqrt{7}+\sqrt{6})}{(\sqrt{7}+\sqrt{6})} - \frac{1}{(\sqrt{6}-\sqrt{5})} \times \frac{(\sqrt{6}+\sqrt{5})}{(\sqrt{6}+\sqrt{5})}$$

$$+ \frac{1}{\sqrt{5}-2} \times \frac{\sqrt{5}+2}{\sqrt{5}+2}$$ **1**

$$= \frac{(3+\sqrt{8})}{9-8} - \frac{(\sqrt{8}+\sqrt{7})}{8-7} + \frac{(\sqrt{7}+\sqrt{6})}{7-6} - \frac{(\sqrt{6}+\sqrt{7})}{6-5} + \frac{(\sqrt{5}+2)}{5-4}$$

$$= (3+\sqrt{8}) - (\sqrt{8}+\sqrt{7}) + (\sqrt{7}+\sqrt{6}) - (\sqrt{6}+\sqrt{5}) + \sqrt{5}+2$$

$$= 3+\sqrt{8} - \sqrt{8}-\sqrt{7} + \sqrt{7}+\sqrt{6} - \sqrt{6}-\sqrt{5} + \sqrt{5}+2$$ **1**

$= 3 + 2$

$= 5$ **1**

$= RHS$

12. Given, $x + y = 5$

then, $x^3 + y^3 + 15xy - 125 = x^3 + y^3 - 125 + 15xy$

$= x^3 + y^3 + (-5)^3 - 3xy(-5)$ **½**

$= (x + y - 5)\,[(x)^2 + (y)^2 + (-5)^2 - x(-5) - y(-5) - xy]$ **1**

$= (5 - 5)\,(x^2 + y^2 + 25 + 5x + 5y - xy)$ $(\because x + y = 5)$ **½**

$= 0\,(x^2 + y^2 + 25 + 5x + 5y - xy)$ **½**

$= 0$ **½**

13. $125x^3 - 27y^3 + z^3 + 45xyz = (5x)^3 + (-3y)^3 + (z)^3 - 3 \times (5x)(-3y)(z)$ **1**

$= (5x - 3y + z)\,[(5x)^2 + (-3y)^2 + (z)^2 - (5x)(-3y) - (-3y)(z) - (5x)(z)]$ **1**

$= (5x - 3y + z)\,[25x^2 + 9y^2 + z^2 + 15xy + 3yz - 5xz]$ **1**

[CBSE Marking Scheme, 2012]

OR

Let, $p(x) = x^6 - ax^5 + x^4 - ax^3 + 3x - a + 2$

$(x - a)$ is a factor of the polynomial $p(x)$, then

$p(a) = 0$ **1**

$a^6 - a \times a^5 + a^4 - a \times a^3 + 3 \times a - a + 2 = 0$ **1**

$a^6 - a^6 + a^4 - a^4 + 3a - a + 2 = 0$ **½**

$2a = -2 \Rightarrow a = -1.$ **½**

14. $$\frac{3}{4\sqrt{5}-\sqrt{3}}+\frac{2}{4\sqrt{5}+\sqrt{3}} = \frac{3\left(4\sqrt{5}+\sqrt{3}\right)+2\left(4\sqrt{5}-\sqrt{3}\right)}{\left(4\sqrt{5}\right)^2-\left(\sqrt{3}\right)^2}$$ ½

$$= \frac{12\sqrt{5}+3\sqrt{3}+8\sqrt{5}-2\sqrt{3}}{80-3}$$ 1

$$= \frac{20\sqrt{5}+\sqrt{3}}{77}$$ ½

On comparing we get, $a = \frac{20}{77}$ and $b = \frac{1}{77}$ 1

15. Given, $\angle POR : \angle ROQ = 5:7$

Let, $\angle POR = 5x$ ½

and $\angle ROQ = 7x$ ½

$5x + 7x = 180°$

$\Rightarrow$ $12x = 180°$

$\Rightarrow$ $x = \frac{180}{12} = 15°$ 1

$\angle POR = d = b = 5x = 5 \times 15° = 75°$

$\angle ROQ = c = a = 7x = 7 \times 15° = 105°$. 1

[CBSE Marking Scheme, 2012]

OR

$$x + 9° + 5\left(\frac{x}{2}-1°\right)+\frac{1}{2}x = 180°$$ (Linear pair) 1

$$x + 9° + \frac{5x}{2} - 5° + \frac{1}{2}x = 180°$$

$4x = 176°$ 1

$x = 44°$

$$a + b = \frac{1}{2}x° + 5\left(\frac{x°}{2}-1°\right)$$ (Exterior angle)

$$= \frac{1}{2}x° + \frac{5x°}{2} - 5°$$

$= 3x° - 5°$

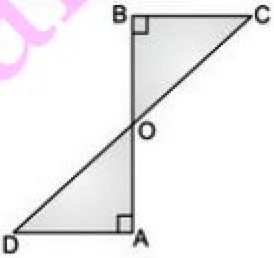
$= 3 \times 44° - 5°$

$= 132° - 5° = 127°$. 1

[CBSE Marking Scheme, 2012]

16. (i) AB and CD intersect at O.

$\therefore$ $\angle AOD = \angle BOC$ (Vertically opp. angles) ...(i) ½



In ΔAOD and ΔBOC, we have ½

$\angle AOD = \angle BOC$ [From (i)]

$\angle DAO = \angle CBO = 90°$ (Given) ½ and $AD = BC$ (Given)

$\therefore$ $\Delta AOD \cong \Delta BOC$ (By *AAS* congruence criterion)

$\Rightarrow$ $OA = OB$ (By c.p.c.t.)

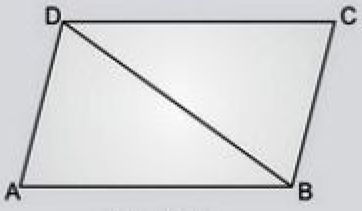
i.e. *O* is the mid-point of *AB*.

Hence, *CD* bisects *AB*. ½

(ii) Congruence of triangles. ½

(iii) Equality is the sign of democracy. ½

17. In ΔABD and ΔCDB,



$AB = CD$ (Given) **1**

$\angle ABD = \angle CDB$ (Given)

$BD = BD$ (Common) **1**

$\therefore$ $\Delta ABD \cong \Delta CDB$ (By SAS)

$\Rightarrow$ $AD = CB.$ (By c.p.c.t.) **1**

[CBSE Marking Scheme, 2012]

18. Semi-perimeter of ΔABC,

$$s = \frac{34+20+42}{2}$$

$$= \frac{96}{2} = 48 \text{ cm}$$

$$\text{Area of } \Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$$ ½

$$= \sqrt{48 \times 14 \times 28 \times 16}$$

$$= 6 \times 8 \times 7 = 336 \text{ cm}^2$$ **1**

Area of Parallelogram $= 2 \times \text{Area of } \Delta ABC$ ½

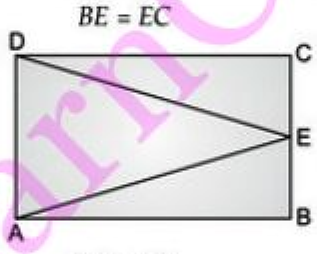
$= 2 \times 336 = 672 \text{ cm}^2$ **1**

[CBSE Marking Scheme, 2012]

19. *ABCD* is a rectangle.

$\Rightarrow$ $AB = DC$ and $AD = BC$

E bisects $BC \Rightarrow$ $BE = EC$ **1**



In ΔECD and *EBA*, $DC = AB$

$EC = BE$

$\angle DCE = \angle ABE = 90°$

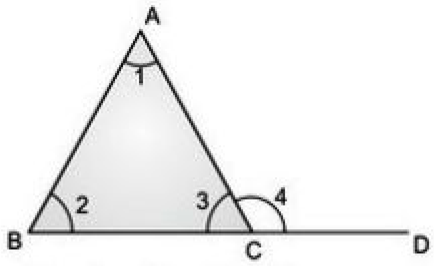
$\Rightarrow$ $\Delta ECD \cong \Delta EBA$ (By *SAS*) **1**

$\Rightarrow$ $AE = DE$ (By c.p.c.t.) **1**

20. Proof : In ΔABC, $\angle 1 + \angle 2 + \angle 3 = 180°$ (Asp.) ...(i) **1**

and $\angle 3 + \angle 4 = 180°$ (lp.) ...(ii) **1**

From equations (i) and (ii)



$$\angle 1 + \angle 2 + \angle 3 = \angle 3 + \angle 4$$

$\Rightarrow$ $$\angle 4 = \angle 1 + \angle 2$$

Hence, $$\angle A + \angle B = \angle ACD$$ 1

SECTION 'D'

21. $$a\sqrt{5} - \frac{b}{11} = \frac{(3-\sqrt{5})}{(3+2\sqrt{5})} \times \frac{(3-2\sqrt{5})}{(3-2\sqrt{5})}$$ ½

$$= \frac{9-6\sqrt{5}-3\sqrt{5}+2\times 5}{(3)^2-(2\sqrt{5})^2}$$ 1

$$= \frac{9-9\sqrt{5}+10}{9-20}$$ ½

$$= \frac{19-9\sqrt{5}}{-11}$$ ½

$$= \frac{19}{-11} - \frac{9\sqrt{5}}{-11} = \frac{9\sqrt{5}}{11} - \frac{19}{11}$$ ½

$$a\sqrt{5} - \frac{b}{11} = \frac{-19}{11} + \frac{9\sqrt{5}}{11}$$

$\Rightarrow$ $$a\sqrt{5} - \frac{b}{11} = \frac{9}{11}\sqrt{5} - \frac{19}{11}$$ ½

On comparing both sides, we get

$$a = \frac{9}{11}, b = 19.$$ ½

[CBSE Marking Scheme, 2012]

OR

(i) We know that between two rational numbers x and y, such that $x < y$ there is a rational number $\frac{x+y}{2}$.

i.e, $$3 < \frac{7}{2} < 4$$ ½

Now, a rational number between 3 and $\frac{7}{2} < 4$ is :

$$\frac{1}{2}\left(3+\frac{7}{2}\right) = \frac{1}{2}\times\left(\frac{6+7}{2}\right) = \frac{13}{4}$$ ½

A rational number between $\frac{7}{2}$ and 4 is :

$$\frac{1}{2}\left(\frac{7}{2}+4\right) = \frac{1}{2}\times\left(\frac{7+8}{2}\right) = \frac{15}{4}$$

$\therefore$ $$3 < \frac{13}{4} < \frac{7}{2} < \frac{15}{4} < 4$$ ½

Further a rational number between 3 and $\frac{13}{4}$ is :

$$\frac{1}{2}\left(3+\frac{13}{4}\right) = \frac{1}{2}\times\left(\frac{12+13}{4}\right) = \frac{25}{8}$$

A rational number between $\frac{15}{4}$ and 4 is :

$$\frac{1}{2}\left(\frac{15}{4}+4\right) = \frac{1}{2}\times\frac{15+16}{4} = \frac{31}{8}$$ ½

A rational number between $\frac{31}{8}$ and 4 is :

$$\frac{1}{2}\left(\frac{31}{8}+4\right) = \frac{1}{2}\times\left(\frac{31+32}{8}\right) = \frac{63}{16}$$ ½

$\therefore$ $$3 < \frac{25}{8} < \frac{13}{4} < \frac{7}{2} < \frac{15}{4} < \frac{13}{8} < \frac{63}{16} < 4$$

Hence, six rational numbers between 3 and 4 are :

$$\frac{25}{8}, \frac{13}{4}, \frac{7}{2}, \frac{15}{4}, \frac{31}{8} \text{ and } \frac{63}{16}$$ ½

(ii) Number system. ½

(iii) Rationality is always welcomed. ½

22. $$\left(\frac{x^a}{x^b}\right)^{\frac{1}{ab}} \times \left(\frac{x^b}{x^c}\right)^{\frac{1}{bc}} \times \left(\frac{x^c}{x^a}\right)^{\frac{1}{ca}} = \left(x^{a-b}\right)^{\frac{1}{ab}} \times \left(x^{b-c}\right)^{\frac{1}{bc}} \times \left(x^{c-a}\right)^{\frac{1}{ca}}$$ 1

$$= x^{\frac{a-b}{ab}} \times x^{\frac{b-c}{bc}} \times x^{\frac{c-a}{ca}}$$ ½

$$= x^{\frac{a-b}{ab}+\frac{b-c}{bc}+\frac{c-a}{ca}}$$ ½

$$= x^{\frac{ac-bc+ab-ca+bc-ab}{abc}}$$ 1

$$= x^{\frac{0}{abc}} = x^0$$ ½

$$= 1$$ ½

[CBSE Marking Scheme, 2012]

23. Let, $a^2 - 2a = x$ ½

$$x^2 - 23x + 120 = (x-15)(x-8)$$ 1

$$= (a^2 - 2a - 15)(a^2 - 2a - 8)$$

Now, $$a^2 - 2a - 15 = a^2 - 5a + 3a - 15$$

$$= (a-5)(a+3)$$ 1

$$a^2 - 2a - 8 = (a-4)(a+2)$$ 1

$$(a^2 - 2a)^2 - 23(a^2 - 2a) + 120 = (a-5)(a+3)(a-4)(a+2)$$ ½

[CBSE Marking Scheme, 2012]

24.

$$f(x) = x^4 - 2x^3 + 3x^2 - 9x + 3a - 7$$

Put $x + 1 = 0$ or $x = -1$ in $f(x)$, we get

$$f(-1) = 20$$

$\Rightarrow (-1)^4 - 2(-1)^3 + 3(-1)^2 - 9(-1) + 3a - 7 = 20$ **1**

$\Rightarrow 1 + 2 + 3 + 9 + 3a - 7 = 20$

$\therefore 3a = 20 - 8 \Rightarrow 3a = 12$

$a = 4$ **1**

Again put, $x + 2 = 0$ or $x = -2$ in $f(x)$, we get

Remainder $= f(-2)$

$= (-2)^4 - 2(-2)^3 + 3(-2)^2 - 9(-2) + 3 \times (4) - 7$ **1**

$= 16 + 16 + 12 + 18 + 12 - 7$

$= 74 - 7 = 67.$ **1**

[CBSE Marking Scheme, 2012]

25.

$RHS = (x - y)(x^2 + xy + y^2)$

$= x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3$ **2**

$= x^3 - y^3 = LHS$

$216x^3 - 125y^3 = (6x)^3 - (5y)^3$ **1**

$= (6x - 5y)[(6x)^2 + (5y)^2 + (6x)(5y)]$

$= (6x - 5y)[36x^2 + 25y^2 + 30xy]$ **1**

26. Let, $p(x) = x^2 + px + q$

and $q(x) = x^2 + mx + n$

Since $x + a$ is a factor of $p(x)$ and $q(x)$, then

$p(-a) = 0$ and $q(-a) = 0$

$p(-a) = 0 \Rightarrow (-a)^2 + p(-a) + q = 0$

$a^2 - pa + q = 0$ ...(1) **1**

$q(-a) = 0 \Rightarrow (-a)^2 + m(-a) + n = 0$

$a^2 - ma + n = 0$ ...(2) **1**

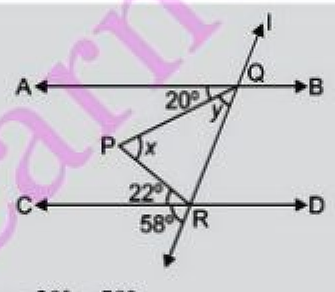
Subtracting eqn. (2) from eqn. (1), we get

$a^2 - pa + q - a^2 + ma - n = 0$ **1**

$\Rightarrow a(m - p) = n - q$

$\Rightarrow a = \dfrac{n-q}{m-p}.$ **[CBSE Marking Scheme, 2012] 1**

27.



$y + 20° = 58°$ (Corr. angles)

$\Rightarrow y = 58° - 20° = 38°$ **1½**

$\angle PRQ = 180° - (58° + 22°)$ (Linear pair)

$= 180° - 80° = 100°$ **1½**

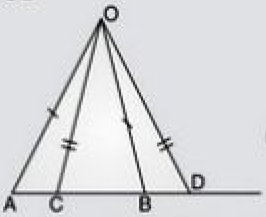
$x = 180° - (100° + 38°)$ (Angle sum property)

$= 180° - 138° = 42°.$ **[CBSE Marking Scheme, 2012] 1**

28. $\angle AOB = \angle COD$ (Given)

$\angle AOB - \angle COB = \angle COD - \angle COB$ ½

$\angle AOC = \angle BOD$ ½



In ΔAOC and ΔBOD, $AO = OB$ (Given) ½

$OC = OD$ (Given)

$\angle AOC = \angle BOD$ (Proved above) ½

$\therefore$ $\Delta AOC \cong \Delta BOD$ (*SAS*) 1

$AC = BD.$ (By c.p.c.t.) 1

[CBSE Marking Scheme, 2012]

OR

As $\angle ABC$ and $\angle CBE$ form a linear pair. ½

$\therefore$ $\angle ABC + \angle CBE = 180°$

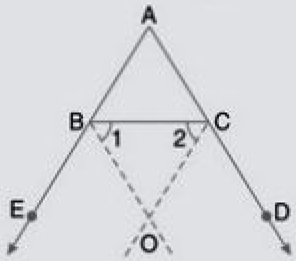
$\therefore$ *BO* is the bisector of $\angle CBE$.

$\angle CBE = 2\angle 1$

Therefore, $\angle ABC + 2\angle 1 = 180°$

$\Rightarrow$ $2\angle 1 = 180° - \angle ABC$

$\Rightarrow$ $\angle 1 = 90° - \frac{1}{2}\angle ABC$ ...(i) ½



Again, $\angle ACB$ and $\angle BCD$ form a linear pair.

$\therefore$ $\angle ACB + \angle BCD = 180°$

As *CO* is the bisector of $\angle BCD$, therefore

$\angle BCD = 2\angle 2$

$\therefore$ $\angle ACB + 2\angle 2 = 180°$

$\Rightarrow$ $2\angle 2 = 180° - \angle ACB$

$\Rightarrow$ $\angle 2 = 90° - \frac{1}{2}\angle ACB$ ...(ii) ½

In ΔOBC, we have $\angle 1 + \angle 2 + \angle BOC = 180°$ ...(iii) ½

From Eqn. (i), (ii) and (iii), we have

$90° - \frac{1}{2}\angle ABC + 90° - \frac{1}{2}\angle ACB + \angle BOC = 180°$ ...(iv) ½

Now, in ΔABC, we have $\angle A + \angle B + \angle C = 180°$

$\Rightarrow$ $\angle B + \angle C = 180° - \angle A$ ...(v) ½

From Eqn. (iv) and (v), we have

$180° - \frac{1}{2}(180° - \angle A) + \angle BOC = 180°$

$\Rightarrow$ $\angle BOC = 180° - 180° + \frac{1}{2}(180° - \angle A)$ ½

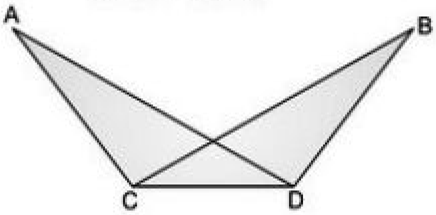
$\Rightarrow$ $\angle BOC = \frac{1}{2}(180° - \angle A)$

$\Rightarrow$ $\angle BOC = 90° - \frac{1}{2}\angle A = 90° - \frac{1}{2}\angle BAC$ ½

[CBSE Marking Scheme, 2012]

29. $\angle BCD + \angle ACB = \angle ADC + \angle BDA$

$\angle ACD = \angle BDC$ **1**



In ΔACD and ΔBDC,

$\angle BCD = \angle ADC$ Given

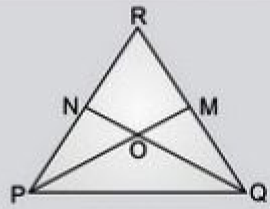
$\angle ACD = \angle BDC$ **1**

$DC = DC$ **1**

$\Rightarrow$ $\Delta ACD \cong \Delta BDC$ (By *ASA*)

$\Rightarrow$ $A = \angle B$ and $AD = BC$ (By c.p.c.t.) **1**

30.



$RP = RQ$ (Given)

$\Rightarrow$ $\angle RQP = \angle RPQ$ (Proved) **1**

$\Rightarrow$ $\angle MQP = \angle NPQ$

In ΔPQN and ΔQPM,

$\angle NPQ = \angle MQP$ **1**

$PN = QM$ (Given)

$PQ = PQ$ (Common)

$\therefore$ $\Delta PQN \cong \Delta QPM$ (By *SAS*) **1**

$\Rightarrow$ $\angle PQN = \angle QPM$ (By c.p.c.t.)

$\Rightarrow$ $\angle PQO = \angle QPO$ **1**

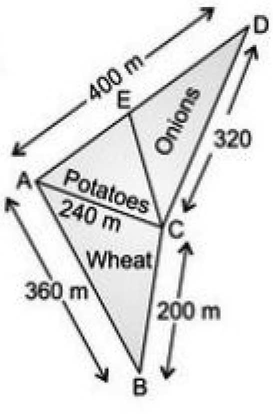
$\Rightarrow$ $OP = OQ$ (Sides opposite to equal angles are equal) **Proved.**

[CBSE Marking Scheme, 2012]

31. Let ABC be the triangular field where wheat is grown. Let ACD be the adjacent field which has been divided in two parts by joining C to the mid-point of AD.

For area of ΔABC $S = \dfrac{AB + BC + CA}{2}$

$= \dfrac{360 + 200 + 240}{2}$



$= 400 \text{ m}$

Area of ΔABC $= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{400(400-360)(400-200)(400-240)}$

$= \sqrt{400 \times 40 \times 200 \times 160}$

$= 16000 \times \sqrt{2} \text{ m}^2$ ½

$= 1.6 \times \sqrt{2}$ hectares ½

$= 2.26$ hectares.

Hence, area used for growing wheat = area of ΔABC

$= 2.26$ hectares.

Again since CE is a median of ΔACD

$\therefore$ It divides ΔACD in two triangles of equal area

i.e. area of ΔACE = area of ΔCDE ½

For area of ΔACD $s = \dfrac{AC + CD + DA}{2}$

$= \dfrac{240 + 320 + 400}{2}$

$= 480 \text{ m}$

Area of ΔACD $= \sqrt{s(s-a)(s-b)(s-c)}$ ½

$= \sqrt{480(480-240)(480-320)(480-400)}$

$= \sqrt{480 \times 240 \times 160 \times 80}$

$= 3.84$ hectares

So, area of ΔACE = area of ΔCDE ½

$= \dfrac{1}{2} \times$ area of ΔACD ½

$= \dfrac{3.84}{2}$

$= 1.92$ hectares ½

Hence area used for growing potatoes = area of ΔACE

$= 1.92$ hectares.

and area used for growing onions = area of ΔCDE

$= 1.92$ hectares. ½