SOLUTIONS

SAMPLE QUESTION PAPER - 1

Solved

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

SECTION 'A'

1. (C) $\frac{\sqrt{98}}{\sqrt{2}} = \sqrt{\frac{98}{2}} = \sqrt{49} = 7$ **1**

2. (B) $x + 4$ is a factor of $x^2 + 3x + m$

$\Rightarrow \quad p(-4) = 0$

$\Rightarrow \quad (-4)^2 + 3(-4) + m = 0$

$\Rightarrow \quad 16 - 12 + m = 0$

$\Rightarrow \quad m = -4$ **1**

3. (C) If, $x + y + z = 0$

then, $x^3 + y^3 + z^3 = 3xyz$

Hence, $x^3 + y^3 + 8 = 3(x)(y)(2)$

$= 6xy$ **1**

4. (B) Degree of polynomial $\sqrt{3}$ is zero. **1**

SECTION 'B'

5. $x = 3 - 2\sqrt{2} \Rightarrow \frac{1}{x} = 3 + 2\sqrt{2}$ ½

$\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 = 8$ 1

$\sqrt{x} + \frac{1}{\sqrt{x}} = \pm 2\sqrt{2}$ ½

[CBSE Marking Scheme, 2012]

6. $x^4 - y^4 = (x^2)^2 - (y^2)^2$ ½

$= (x^2 - y^2)(x^2 + y^2)$ ½

$= (x - y)(x + y)(x^2 + y^2).$ 1

[CBSE Marking Scheme, 2012]

7. $(x + 2)$ is a factor of $p(x) = 2x^3 - kx^2 + 3x + 10$ ½

$\Rightarrow \quad p(-2) = 0$

$\Rightarrow \quad 2(-2)^3 - k(-2)^2 + 3(-2) + 10 = 0$ 1

$\Rightarrow \quad -16 - 4k - 6 + 10 = 0$

$k = -3$ **[CBSE Marking Scheme, 2014]** ½

8. Let AB has 2 mid points, say X and Y, then

½

Then $\dfrac{AB}{2} = AX$ and $\dfrac{AB}{2} = AY$ ½

$\therefore$ $AX = AY$ (Things which are equal to the same things are equal to one another) ½

Hence, X and Y coincide. Thus, every line segment has one and only one mid point ½

[CBSE Marking Scheme, 2013, 12, 11]

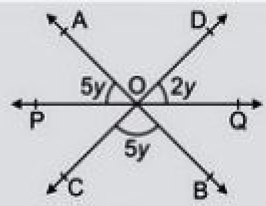
9. Let the two supplementary angles are $2x$ and $3x$, then

$2x + 3x = 180°$

$\Rightarrow \quad x = \dfrac{180°}{5} = 36°$ 1

Hence, the angles are $2x$ and $3x$ or $72°$ and $108°$. **[CBSE Marking Scheme, 2012]** 1

OR



$\angle POC = 2y,$ (Vertically opp. angles) ½

$\therefore \quad 5y + 2y + 5y = 180°$ (AOB is a st line) ½

$12y = 180°$ ½

$y = 15°.$ **[CBSE Marking Scheme, 2012]** ½

10. $s = \dfrac{120}{2} = 60$ ½

Sides $= 5x + 12x + 13x = 120$

$30x = 120$ ½

$x = 4$ cm

$5x = 20$ cm, $12x = 48$ cm, $13x = 52$ cm.

Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$ sq. cm ½

$= \sqrt{60 \times 40 \times 12 \times 8} = \sqrt{230400}$

$= 480 \text{ cm}^2$ **[CBSE Marking Scheme, 2012]** ½

SECTION 'C'

11. $\dfrac{4}{3\sqrt{3} - 2\sqrt{2}} + \dfrac{3}{3\sqrt{3} + 2\sqrt{2}} = \dfrac{4(3\sqrt{3} + 2\sqrt{2}) + 3(3\sqrt{3} - 2\sqrt{2})}{(3\sqrt{3} - 2\sqrt{2})(3\sqrt{3} + 2\sqrt{2})}$ ½

$= \dfrac{12\sqrt{3} + 8\sqrt{2} + 9\sqrt{3} - 6\sqrt{2}}{27 - 8}$ ½

$$= \frac{21\sqrt{3}+2\sqrt{2}}{19}$$ ½

$$= \frac{21\times 1.732+2\times 1.414}{19}$$ ½

$$= \frac{36.372+2.828}{19}$$ ½

$$= \frac{39.2}{19} = 2.063.$$ ½

[CBSE Marking Scheme, 2012]

OR

$$x = \frac{1}{p} = \frac{1}{5+2\sqrt{6}} = \frac{1}{5+2\sqrt{6}} \times \frac{(5-2\sqrt{6})}{(5-2\sqrt{6})}$$ ½

$$= \frac{5-2\sqrt{6}}{25-24} = 5-2\sqrt{6}$$ ½

$$p^2 + x^2 = (5+2\sqrt{6})^2 + (5-2\sqrt{6})^2$$ ½

$$= (5)^2 + (2\sqrt{6})^2 + 2\times 5\times 2\sqrt{6} + (5)^2 + (2\sqrt{6})^2 - 2\times 5\times 2\sqrt{6}$$ ½

$$= 25 + 24 + 20\sqrt{6} + 25 + 24 - 20\sqrt{6}$$ ½

$$= 98.$$ ½

[CBSE Marking Scheme, 2012]

12. $$\frac{5+\sqrt{3}}{7-4\sqrt{3}} = \frac{5+\sqrt{3}}{7-4\sqrt{3}}\times\frac{7+4\sqrt{3}}{7+4\sqrt{3}} = \frac{35+20\sqrt{3}+7\sqrt{3}+12}{49-48}$$

$$= \frac{47+27\sqrt{3}}{1}$$ 1

$$\frac{5+\sqrt{3}}{7+4\sqrt{3}} = \frac{(5+\sqrt{3})(7-4\sqrt{3})}{(7+4\sqrt{3})(7-4\sqrt{3})} = \frac{23-13\sqrt{3}}{1}$$ 1

$$\therefore \quad \frac{5+\sqrt{3}}{7-4\sqrt{3}} - \frac{5+\sqrt{3}}{7+4\sqrt{3}} = (47+27\sqrt{3}) - (23-13\sqrt{3})$$

$$= 24 + 40\sqrt{3}$$ 1

[CBSE Marking Scheme, 2012]

13. $27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$

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

$$= \left(3p - \frac{1}{6}\right)^3$$ ½

$$= \left(3p - \frac{1}{6}\right)\left(3p - \frac{1}{6}\right)\left(3p - \frac{1}{6}\right)$$ ½

[CBSE Marking Scheme, 2010, 2011, 2012]

OR

$$\left(\frac{x}{3}+\frac{y}{5}\right)^3-\left(\frac{x}{3}-\frac{y}{5}\right)^3=\left[\frac{x}{3}+\frac{y}{5}-\frac{x}{3}+\frac{y}{5}\right]$$

$$\left[\left(\frac{x}{3}+\frac{y}{5}\right)^2+\left(\frac{x}{3}-\frac{y}{5}\right)^2+\left(\frac{x}{3}+\frac{y}{5}\right)\left(\frac{x}{3}-\frac{y}{5}\right)\right] \quad 1$$

$$=\left(\frac{2y}{5}\right)\left[\frac{x^2}{9}+\frac{y^2}{25}+2\times\frac{x}{3}\times\frac{y}{5}+\frac{x^2}{9}+\frac{y^2}{25}-2\times\frac{x}{3}\times\frac{y}{5}+\frac{x^2}{9}-\frac{y^2}{25}\right] \quad 1$$

$$=\frac{2y}{5}\left[3\times\frac{x^2}{9}+\frac{y^2}{25}\right] \quad ½$$

$$=\frac{2y}{5}\left(\frac{x^2}{3}+\frac{y^2}{25}\right)$$ **[CBSE Marking Scheme, 2011]** ½

14. $f(x) = x^3 - 6x^2 + 11x - 6$

Factors of -6 are $\pm 1, \pm 2, \pm 3, \pm 6$

Now, $f(1) = (1)^3 - 6(1)^2 + 11(1) - 6$

$= 1 - 6 + 11 - 6 = 0$ **1**

$f(-1) = (-1)^3 - 6(-1)^2 + 11(-1) - 6$

$= -1 - 6 - 11 - 6 \neq 0$

$f(2) = (2)^3 - 6(2)^2 + 11(2) - 6$ **1**

$= 8 - 24 + 22 - 6 = 0$

Similarly, $f(-2) \neq 0$

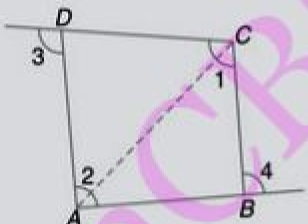
$f(3) = (3)^3 - 6(3)^2 + 11(3) - 6$

$= 27 - 54 + 33 - 6 = 0$ **1**

and $f(-3) \neq 0$

Hence, $(x - 1)(x - 2)(x - 3)$ are the factors.

15. Join AC ½



½

Ext. $\angle 4 = \angle ACB + \angle CAB$ ...(i) ½

Again, Ext. $\angle 3 = \angle DAC + \angle DCA$ ...(ii) ½

Adding (i) and (ii), we get

$\angle 3 + \angle 4 = (\angle ACB + \angle DCA) + (\angle CAB + \angle DAC)$ ½

$= \angle 1 + \angle 2$

$\therefore$ $\angle 3 + \angle 4 = \angle 1 + \angle 2.$ ½

[CBSE Marking Scheme, 2012]

OR

In ΔABC, $\angle A + \angle B + \angle C = 180°$ (Angle sum property)

$90° + \angle B + \angle C = 180°$ $(\angle A = 90°)$

$\therefore$ $\angle B + \angle C = 90°$

$\therefore$ $\angle C = \angle ACB = 90° - \angle B$ ...(i) **1**

Also, in ΔALB,

$$\angle ALB + \angle BAL + \angle B = 180°$$ (Angle sum property)

$$90° + \angle BAL + \angle B = 180°$$ 1

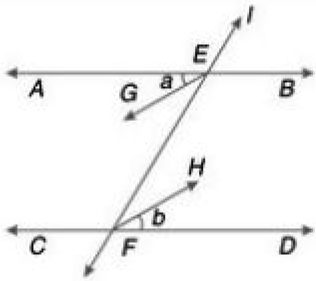
$$\angle BAL = 90° - \angle B$$ ...(ii) ½

Hence, from (i) and (ii), we get

$$\angle BAL = \angle ACB$$ ½

[CBSE Marking Scheme, 2012]

16.



EG is the bisector of $\angle AEF$

$\therefore$ $\angle AEG = \angle GEF = a$

Similarly, $\angle EFH = \angle HFD = b$ ½

$\therefore$ $\angle GEF = \angle EFH$ ($\because a = b$) ½

But these are alternate interior angles

$\therefore$ $EG \parallel FH$ ½

Again, $\angle AEF = 2a$ ½

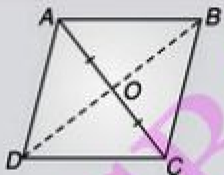
and $\angle EFD = 2b$ ½

$\therefore$ $\angle AEF = \angle EFD = 2a$ or $2b$ ½

But these are alternate angles.

$\therefore$ $AB \parallel CD$. ½

17.



Join OD and OB.

In ΔAOB and ΔCOB, ½

$AO = CO$ (Given)

$OB = OB$ (Common)

$AB = BC$ ($\because ABCD$ is a rhombus)

$\Delta AOB \cong \Delta COB$ (SSS Congruence.)

$\angle AOB = \angle COB$ (By c.p.c.t.) ...(1) ½

Similarly, $\Delta AOD \cong \Delta COD$ ½

$\angle AOD = \angle COD$ (By c.p.c.t.) ...(2) ½

But, $\angle AOD + \angle COD + \angle COB + \angle AOB = 360°$ ½

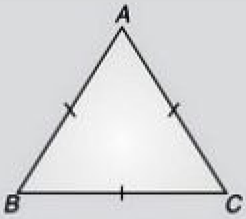
$2(\angle AOD + \angle AOB) = 360°$ ½

$\angle AOD + \angle AOB = 180°$ ½

$\Rightarrow D, O, B$ are collinear. ½

[CBSE Marking Scheme, 2012]

18.



½

$$AB = AC \quad \text{[sides opposite of equal angles are equal]} \; ½$$

∴ $\angle B = \angle C = x$

$BA = BC$ [....do.....]

∴ $\angle A = \angle C = x$

Also, $AC = BC$ ½

$\angle A = \angle B = x$ [....do.....]

But, $\angle A + \angle B + \angle C = 180°$ [Angle sum property] ½

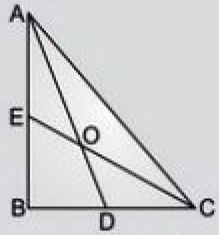
$3x = 180°$

$x = 60°$ ½

∴ $\angle A = \angle B = \angle C = 60°.$ ½

[CBSE Marking Scheme, 2012]

19. In ΔABC,



$\angle A + \angle B + \angle C = 180°$ [Angle sum property] ½

$\angle A + \angle C = 180° - \angle B = 180° - 90° = 90°$ ½

$\frac{1}{2}(\angle A + \angle C) = 45°$ ½

In ΔAOC,

$\frac{1}{2}\angle A + \frac{1}{2}\angle C + \angle AOC = 180°$ ½

$45° + \angle AOC = 180°$ ½

$\angle AOC = 180° - 45° = 135°.$ **[CBSE Marking Scheme, 2012]** ½

20. For triangle,

$s = \frac{a+b+c}{2} = \frac{26+28+30}{2} = \frac{84}{2} = 42$ ½

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

$= \sqrt{42(42-26)(42-28)(42-30)}$

$= \sqrt{42\,(16)\,(14)\,(12)}$

$= \sqrt{2\times3\times7\times4\times4\times7\times2\times2\times2\times3}$ ½

$= 2\times2\times3\times4\times7$

$= 336 \text{ cm}^2$ ½

Area of parallelogram = Area of triangle (Given)

$b \times h = 336$ ½

$28 \times h = 336$

$h = 12$ cm. **[CBSE Marking Scheme, 2012]** ½

SECTION 'D'

21. $$\frac{1}{1+x^{a-b}}+\frac{1}{1+x^{b-a}}=\frac{1}{1+\frac{x^a}{x^b}}+\frac{1}{1+\frac{x^b}{x^a}}$$ 1

$$=\frac{1}{\frac{x^b+x^a}{x^b}}+\frac{1}{\frac{x^a+x^b}{x^a}}$$ 1

$$=\frac{x^b}{x^b+x^a}=\frac{x^a}{x^a+x^b}$$ 1

$$=\frac{\left(x^b+x^a\right)}{\left(x^a+x^b\right)}=1.$$ 1

[CBSE Marking Scheme, 2012]

OR

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

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

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

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

$$=\left(\frac{3}{2}\right)^{-3}\times\left(\frac{3}{2}\right)^{3}$$ ½

$$=1$$ ½

[CBSE Marking Scheme, 2012, 2013]

22. $$LHS.=\frac{\left(2\sqrt{5}+\sqrt{3}\right)^2+\left(2\sqrt{5}-\sqrt{3}\right)^2}{\left(2\sqrt{5}-\sqrt{3}\right)\left(2\sqrt{5}+\sqrt{3}\right)}$$ 1

$$=\frac{4\times5+3+2\times2\sqrt{5}\times\sqrt{3}+4\times5+3-2\times2\sqrt{5}\times\sqrt{3}}{\left(2\sqrt{5}\right)^2-\left(\sqrt{3}\right)^2}$$ 1

$$=\frac{20+3+4\sqrt{15}+20+3-4\sqrt{15}}{20-3}$$

$$=\frac{46}{17}=\frac{46}{17}+\sqrt{15}\times(0)$$ 1

$$\because \qquad \frac{46}{17} + \sqrt{15}\,(0) = a + \sqrt{15}\,b = RHS$$

Comparing both sides, we get

$$a = \frac{46}{17},\ b = 0 \qquad 1$$

[CBSE Marking Scheme, 2012]

23. Volume of cuboid $= 8x^3 + 12x^2 - 2x - 3$

$= 4x^2(2x + 3) - 1\,(2x + 3)$ ½

$= (2x + 3)\,(4x^2 - 1)$ ½

$= (2x + 3)\,(2x - 1)\,(2x + 1)$ ½

The possible dimensions are : $(2x - 1)$, $(2x + 1)$ and $(2x + 3)$. ½

Verification : For $x = 5$

Dimensions are : $(2 \times 5 - 1)$, $(2 \times 5 + 1)$ and $(2 \times 5 + 3)$ *i.e.*, 9, 11, 13 units. ½

Volume $= 9 \times 11 \times 13$

$= 1287$ cubic units ½

Given volume $= 8(5)^3 + 12(5)^2 - 2(5) - 3$ ½

$= 1000 + 300 - 10 - 3$

$= 1287$ cubic units. ½

24. (i) (I) Possible length and breadth of the rectangle are the factors of its given area,

Area $= 25a^2 - 35a + 12$

$= 25a^2 - 15a - 20a + 12$ ½

$= 5a(5a - 3) - 4(5a - 3)$

$= (5a - 4)\,(5a - 3)$

So, possible length and breadth are $(5a - 3)$ and $(5a - 4)$ units, repectively. ½

(II) Area $= 35y^2 + 13y - 12$

$= 35y^2 + 28y - 15y - 12$ ½

$= 7y(5y + 4) - 3(5y + 4)$

$= (7y - 3)\,(5y + 4)$ ½

So, possible length and breadth are $(7y - 3)$ and $(5y + 4)$ units

(ii) Factorisation of polynomials. 1

(iii) Expression of one's desire and news is very necessary. 1

25.

$$\begin{array}{r|l} & x^2 + x + 1 \\ x + 2 & x^3 + 3x^2 + 3x + 5 \\ & \underline{x^3 + 2x^2} \quad (-\ -) \qquad 1 \\ & x^2 + 3x \\ & \underline{x^2 + 2x} \quad (-\ -) \qquad 1 \\ & x + 5 \\ & \underline{x + 2} \quad (-\ -) \qquad 1 \\ & 3 \end{array}$$

Hence, Quotient $= x^2 + x + 1$ ½

and Remainder $= 3$. ½

26. (i) The co-ordinate of $B = (-2, 3)$ 1

(ii) E is the point which is identified by the co-ordinates $(-3, -2)$ 1

(iii) The co-ordinate of the point D is $(6, 2)$

$\therefore$ Abscissa is 6. 1

(iv) The co-ordinate of the point C is $(3, -1)$

$\therefore$ Ordinate is -1. 1

27. (i) $\sqrt{\dfrac{(\sqrt{2}-1)}{(\sqrt{2}+1)}}$ is an irrational number

$$\sqrt{\frac{(\sqrt{2}-1)}{(\sqrt{2}+1)}} = \sqrt{\frac{(\sqrt{2}-1)}{(\sqrt{2}+1)} \times \frac{(\sqrt{2}-1)}{(\sqrt{2}-1)}} \quad ½$$

$$= \sqrt{\frac{(\sqrt{2}-1)^2}{2-1}} \quad ½$$

$$= \sqrt{\frac{(\sqrt{2}-1)^2}{1}} = \sqrt{2}-1 \quad ½$$

which is a rational number.

Let, there is a number x such that x^3 is an irrational number but x^5 is a rational number.

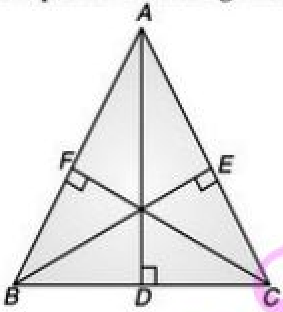
Let, $x = \sqrt[5]{7}$ is any number ½

$x^3 = (\sqrt[5]{7})^3 = (7)^{\frac{3}{5}}$ is an irrational number ½

But, $x^5 = (\sqrt[5]{7})^5 = (7)^{5/5} = 7$, is a rational number ½

(ii) Accepting own mistakes gracefully, co-operative learning among the classmates. **1**

28.



Since from a point $\perp^r$ line is the shortest.

$CF \perp AB$

$\therefore$ $CF < AC$ and $CF < BC$ ...(1) **1**

Similarly, BC is a line segment and A does not lie on it. $AD \perp BC$

$\therefore$ $AD < AB$ and $AD < AC$ ...(2) **1**

Also, AC is a line segment and B does not lie on it. $BE \perp AC$

$\therefore$ $BE < AB$ and $BE < BC$ ...(3) **1**

Adding (1), (2) and (3), we get

$$2(AD + BE + CF) < 2(AB + BC + CA)$$

$\therefore$ $AB + BC + CA > AD + BE + CF$ **1**

i.e., Perimeter is greater than the sum of three altitudes. **Proved.**

OR

Produce AD to E such that, $AD = DE$. Join EC. **1**

In triangles ADB and EDC, $AD = DE$ (Const) ½

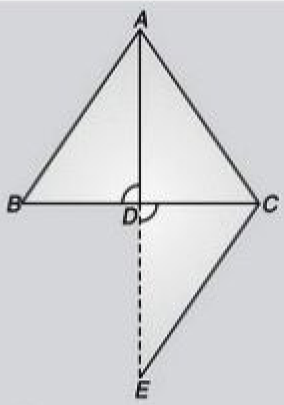
$BD = DC$ (Given)

$\angle ADB = \angle EDC$ (V.O.A) ½

$\therefore$ $\Delta ADB \cong \Delta EDC$

(*SAS* congruence axiom) ½

$\Rightarrow$ $AB = EC$ (By c.p.c.t.) ½

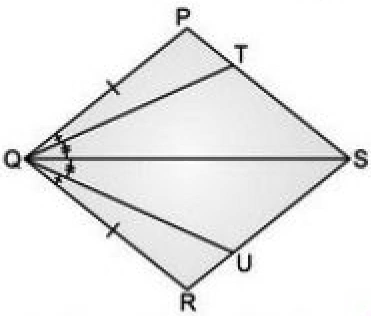


½

In ΔAEC,	$AC + EC > AE$	[Triangle Inequality Property] ½
$\therefore$	$AC + AB > AE$	$(\because EC = AB)$
	$AC + AB > AD + DE$	½
	$AC + AB > AD + AD$	$(\because DE = AD)$ ½
	$AC + AB > 2AD.$	**Proved.**

[CBSE Marking Scheme, 2012, 2013]

29.



$$\angle PQT = \angle RQU \text{ and } \angle TQS = \angle UQS$$

$\therefore$ $\angle PQT + \angle TQS = \angle RQU + \angle UQS$ **1**

$\Rightarrow$ $\angle PQS = \angle RQS$

$PQ = RQ,$

$QS = QS$ **1**

$\therefore$ $\Delta PQS \cong \Delta RQS$ (By *SAS*) ½

$\therefore$ $\angle P = \angle R$ (By c.p.c.t.)

Again, in ΔPQT and ΔRQU,

$\angle P = \angle R$

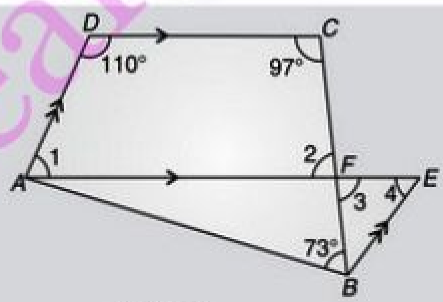
$\angle PQT = \angle RQU$

$PQ = QR$

$\therefore$ $\Delta PQT \cong \Delta RQU$ (By *ASA*) **1**

$\therefore$ $QT = QU.$ (By c.p.c.t.) ½

30.



Since, $AE \parallel DC$

$\angle D + \angle 1 = 180°$ (Angles on the same side of transversal)

$$\angle 1 = 180° - 110° = 70° \qquad \mathbf{1}$$

$$\angle 4 = \angle 1 = 70° \qquad \text{(Alternate angles) } \tfrac{1}{2}$$

Again,

$$97° + \angle 2 = 180° \qquad \text{(Angle on the same side of transversal) } \tfrac{1}{2}$$

$$\angle 2 = 180° - 97° = 83°$$

$$\angle 3 = \angle 2 = 83°$$

(Vertically opp. angles) ½

In ΔBEF,

$$\angle 3 + \angle 4 + \angle EBF = 180°$$

(Angle sum property) **1**

$$83° + 70° + \angle EBF = 180°$$

$$\angle EBF = 180° - 153°$$

$$\angle EBF = 27°. \qquad \tfrac{1}{2}$$

[CBSE Marking Scheme, 2012]

31. (i) If a, b, c be the length of sides BC, CA and AB of ΔABC and if $s = \frac{1}{2}(a + b + c)$ then,

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

∴ Here,

$$a = b = c\ (= a)$$

and

$$s = \frac{1}{2}(a + a + a) = \frac{3a}{2} \qquad \tfrac{1}{2}$$

$$s - a = \frac{3a}{2} - a = \frac{a}{2}$$

$$s - b = \frac{3a}{2} - a = \frac{a}{2}$$

$$s - c = \frac{3a}{2} - a = \frac{a}{2} \qquad \tfrac{1}{2}$$

$$\text{area} = \sqrt{\left(\frac{3a}{2}\right)\left(\frac{a}{2}\right)\left(\frac{a}{2}\right)\left(\frac{a}{2}\right)} \qquad \tfrac{1}{2}$$

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

$$= \frac{\sqrt{3}a^2}{4}. \qquad ...(1)\ \tfrac{1}{2}$$

(ii) To find the area, when its perimeter = 180 cm^2

Here,

$$a + a + a = 180$$

$$\Rightarrow \quad 3a = 180 \qquad \tfrac{1}{2}$$

$$\Rightarrow \quad a = \frac{180}{3} = 60$$

Hence,

$$\text{required area} = \frac{\sqrt{3}}{4} \times (60)^2$$

$$= 900\sqrt{3}\ \text{cm}^2. \qquad \tfrac{1}{2}$$

(iii) Heron's formula. ½

(iv) We should follow the traffic rules to save our life. ½