## SOLUTIONS

1.

$\frac{1}{\sqrt{7}-\sqrt{6}}$

We need to multiply the numerator and denominator of $\frac{1}{\sqrt{7}-\sqrt{6}}$ by $\sqrt{7}+\sqrt{6}, to get \frac{1}{\sqrt{7}-\sqrt{6}} \times \frac{\sqrt{7}+\sqrt{6}}{\sqrt{7}+\sqrt{6}} = \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7}-\sqrt{6})(\sqrt{7}+\sqrt{6})}$

We need to apply the formula $(a-b)(a+b) = a^2 - b^2$ in the denominator to get

$\frac{1}{\sqrt{7}-\sqrt{6}} = \frac{\sqrt{7}+\sqrt{6}}{(\sqrt{7})^2-(\sqrt{6})^2}$

$= \frac{\sqrt{7}+\sqrt{6}}{7-6}$

$= \sqrt{7}+\sqrt{6}.$

Therefore, we conclude that on rationalizing the denominator of $\frac{1}{\sqrt{7}-\sqrt{6}}$ we get $\sqrt{7}+\sqrt{6}$ .

2.

$8a^3 - b^3 - 12a^2b + 6ab^2$

$= (2a)^3 - b^3 - 6ab(2a-b)$

$= (2a)^3 - b^3 - 3(2a)\ (b)\ (2a-b)$

$= (2a-b)^3$ [Using $(a-b)^3 = a^3 - b^3 - 3ab\,(a-b)$ ]

= (2a-b) (2a-b) (2a-b)

3. We have, 2s = 50 m + 65 m + 65 m = 180 m

S = 180 ÷ 2 = 90 m

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

$= \sqrt{90(90-50)(90-65)(90-65)}$

$= \sqrt{90 \times 40 \times 25 \times 25} = 60 \times 25$

= 1500m$^2$.

Cost of laying grass at the rate of Rs7 per m$^2$ = Rs(1500 × 7) = Rs10,500.

4. $\therefore$ Area of quadrilateral ABC=area of $\triangle$ABC + area of $\triangle$ACD....(i)

For $\triangle$ABC, $s = \frac{3+4+5}{2} = 6cm$

$\therefore$ Area of $\triangle$ABC=$\sqrt{6(6-3)(6-4)(6-5)}$

$= \sqrt{6 \times 3 \times 2 \times 1}$ sq cm = 6sq cm ...(ii)

For $\triangle$ACD, s'=$\frac{5+4+5}{2}$ =7cm

$\therefore$ area of $\triangle$ACD = $\sqrt{7(7-5)(7-4)(7-5)}$

$= \sqrt{7 \times 2 \times 3 \times 2}$ sq cm = 4$\sqrt{21}$ sq cm ...(iii)

By (i), (ii) and (iii),

Area of Quadrilateral ABCD = (6 + 4$\sqrt{21}$) sq cm

5. Inner radius (r) of hemispherical bowl = $\left(\frac{10.5}{2}\right)$ cm = 5.25 cm

Surface area of hemispherical bowl = $2\pi r$

= [2 × $\frac{22}{7}$ × $(5.25)^2$] $cm^2$

= 173.25 $cm^2$

Cost of tin-plating 100 $cm^2$ area = Rs. 4

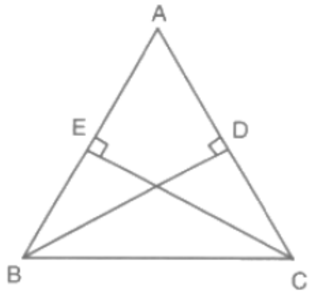
Cost of tin-plating 173.25 $cm^2$ area = Rs. $\left(\frac{4\times173.25}{100}\right)$,= Rs. 6.93

Thus, the cost of tin-plating the inner side of hemispherical bowl is Rs. 6.93

6. In $\triangle$ABC, we have

AB = AC [Given]

$\Rightarrow \angle B = \angle C$ [$\because$ Angles opp. to equal sides are equal] ...(i)




Now, in $\triangle$BCE and $\triangle$BCD, we have

$\angle B = \angle C$ [From (i)]

$\angle CEB = \angle BDC$ [Each equal to 90°]

and BC = BC [Common side]

So, by ASA(Angle Side Angle) criterion of congruence, we obtain

$\Delta BCE \cong \Delta BCD$

$\Rightarrow$ BD = CE [$\because$ Corresponding parts of congruent triangles are equal]

Hence, BD = CE

7. Side BC of triangle ABC is produced to D

$\therefore \angle ACD = \angle A + \angle B$ [Exterior angle property]

$\Rightarrow 128^\circ = \angle A + 43^\circ$

$\Rightarrow \angle A = (128 - 43)^\circ$

$\Rightarrow \angle A = 85^\circ$

$\Rightarrow \angle BAC = 85^\circ$

Also, in triangle ABC

$\angle BAC + \angle ABC + \angle ACB = 180^\circ$ [Sum of the angles of a triangle]

$\Rightarrow 85^\circ + 43^\circ + \angle ACB = 180^\circ$

$\Rightarrow 128^\circ + \angle ACB = 180^\circ$

$\Rightarrow \angle ACB = 52^\circ$ .

8.

Given LM is a line parallel to the Y-axis and its perpendicular distance from Y-axis is 3 units.

i. Coordinate of point P = (3,2)

Coordinate of point Q = (3,-1)

Coordinate of point R = (3, 0) [since its lies on X-axis, so its y coordinate is zero].

ii. Abscissa of point L = 3, abscissa of point M=3

$\therefore$ Difference between the abscissa of the points L and M = 3 – 3 = 0

9. a= $3-2\sqrt{2}$

$\Rightarrow a^2 = (3-2\sqrt{2})^2$

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

$= 9 - 12\sqrt{2} + 8$

$= 17 - 12\sqrt{2}$

$\frac{1}{x^2} = \frac{1}{17-12\sqrt{2}}$

$= \frac{1}{17-12\sqrt{2}} \times \frac{17+12\sqrt{2}}{17+12\sqrt{2}}$

$= \frac{17+12\sqrt{2}}{17^2-(12\sqrt{2})^2}$

$= \frac{17+12\sqrt{2}}{289-288}$

$= 17 + 12\sqrt{2}$

So $a^2 - \frac{1}{a^2} = (17-12\sqrt{2}) - (17+12\sqrt{2})$

$= 17 - 12\sqrt{2} - 17 - 12\sqrt{2}$

$= -24\sqrt{2}$