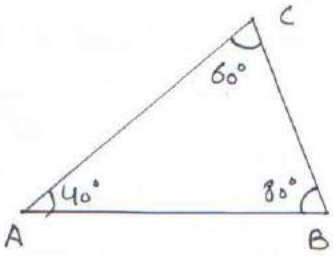
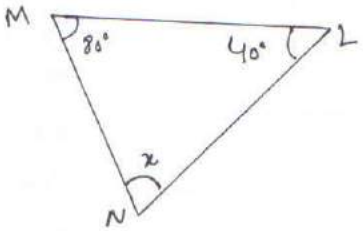
Unit 10

Congurent Triangles

Review Exercise 10 (Page No. 197)

3- If $\triangle ABC \cong \triangle LMN$, then find the unknown x.



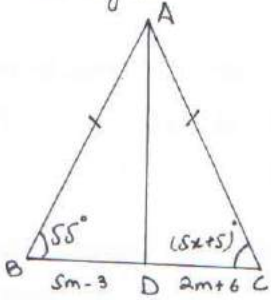


$\because \triangle ABC$ & $\triangle LMN$ are congurent, So

$m\angle A = m\angle L = 40^\circ$, $m\angle B = m\angle N = 80^\circ$

& $m\angle C = m\angle N \Rightarrow m\angle N = 60^\circ$ or $\boxed{x = 60^\circ}$

4- Find the value of unknown for the given triangle.



As $\triangle ADB$ & $\triangle ADC$ are congurent, so

$m\angle C = m\angle B$

$5x^\circ + 5^\circ = 55^\circ$

$5x^\circ = 55^\circ - 5^\circ$

$5x^\circ = 50^\circ$

$\boxed{x^\circ = 10^\circ}$

& $m\overline{BD} \cong m\overline{DC}$

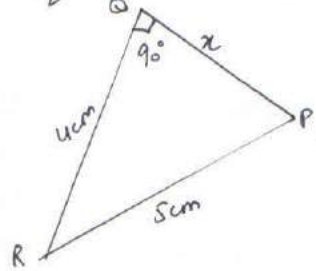
$5m - 3 = 2m + 6$

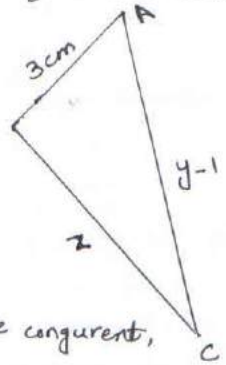
$5m - 2m = 6 + 3$

$3m = 9$

$\boxed{m = 3}$

5- If $\triangle PQR \cong \triangle ABC$, then find the unknowns.





As the $\triangle PQR$ & $\triangle ABC$ are congurent, so $m\overline{PQ} = m\overline{AB}$

$\boxed{x = 3cm}$

& $m\overline{BC} = m\overline{QR}$

$\boxed{z = 4cm}$

& $m\overline{AC} = m\overline{PR}$

$y - 1 = 5$

$y = 5 + 1$

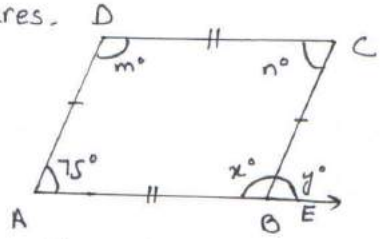
$\boxed{y = 6cm}$

Unit 11

Parallelograms and Triangles

Review Exercise 11 (page No. 208)

3- Find the unknown in the given figures.



As opposite angles of ||gram are equal, so

$n^\circ = 75^\circ$

As alternate angles are equal, so

$y^\circ = n^\circ$

$y^\circ = 75^\circ$

Adjacent supplementry angles $= x^\circ + y^\circ = 180^\circ$

$x^\circ + 75^\circ = 180^\circ$

$x^\circ = 180^\circ - 75^\circ$

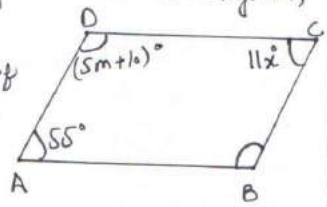
$x^\circ = 105^\circ$

As opposite angles of ||gram are equal, so

$m^\circ = x^\circ$

$m^\circ = 105^\circ$

4- If the given figure ABCD is a ||gram, then find x, m.



As opposite angles of ||gram are equal, so

$m\angle A = m\angle C$

or $55^\circ = 11^\circ x$

or $x = 5^\circ$

So $m\angle C = 11^\circ x = 11(5)^\circ$

$\angle C = 55^\circ$

As angles formed with same side of ||gram $= 180^\circ$

$m\angle D + m\angle C = 180^\circ$

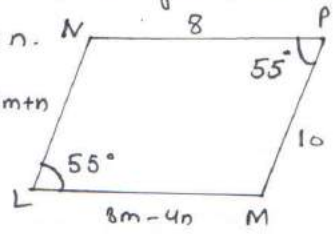
$5m^\circ + 10^\circ + 55^\circ = 180^\circ$

$5m^\circ = 180^\circ - 65^\circ$

$5m = 115^\circ$

$m = 23^\circ$

5- The given figure is a ||gram, Find the value of m & n.



As $\overline{LM} = \overline{NP}$

$8m - 4n = 8 \rightarrow (i)$

& $\overline{NL} = \overline{PM}$

$4m + n = 10 \rightarrow (ii)$

Simultaneously solving eq(i) & (ii)

$m = 2$

Put $m = 2$ in eq (i)

$8(2) - 4n = 8$

$-4n = 8 - 16$

$-4n = -8$

$n = 2$

$8m - 4n = 8$

$+\ 16m + 4n = 40$

$24m = 48$

$m = 2$

6- In Qs#5, sum of opposite angles of the ||gram is 110°, find the remaining angles.

As we know

Sum of all angles of ||gram $= 360^\circ$

$m\angle L + m\angle M + m\angle N + m\angle P = 360^\circ$

$55^\circ + m\angle M + m\angle N + 55^\circ = 360^\circ$

$m\angle M + m\angle N = 360^\circ - 110^\circ$

$m\angle M + m\angle N = 250^\circ$

As $m\angle M = m\angle N$

$\Rightarrow m\angle M + m\angle M = 250^\circ$

$2\, m\angle M = 250^\circ$

$m\angle M = 125^\circ$

& $m\angle N = 125^\circ$

Unit 12

Line Bisectors and Angle Bisectors

Review Exercise 12 (Page No. 216)

4- If the given triangle ABC is equilateral triangle & AD is bisector of angle A, then find the values of unknowns $x°$, $y°$ & $z°$.

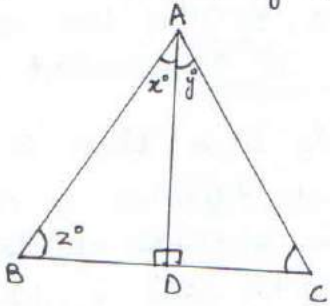
As $\triangle ABC$ is an equilateral triangle, so

$$\angle A = \angle B = \angle C = 60°$$

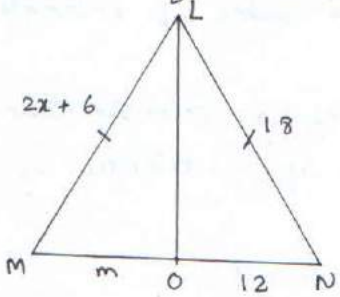
As $\overline{AD}$ is bisector of angle A

$$\Rightarrow \quad x° = y° = \frac{\angle A}{2} \quad \text{or} \quad x° = y° = \frac{60°}{2}$$

or $\boxed{x° = 30°}$, $\boxed{y° = 30°}$, $\boxed{z° = 60°}$



5- In the given congurent triangles LMO & LNO, find the unknown x & m.



As $\triangle LMO$ & $\triangle LNO$ are congurent, so

$$m\overline{LM} \cong \overline{LN}$$

$$2x + 6 = 18$$

$$2x = 18 - 6$$

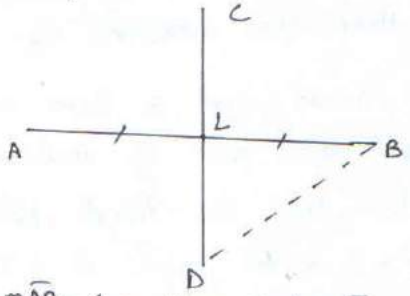
$$2x = 12$$

$$\boxed{x = 6}$$

& $\overline{MO} \cong ON$

$$\boxed{m = 12}$$

6- $\overline{CD}$ is the right bisector of the line segment $\overline{AB}$.



(i) If $m\overline{AB} = 6cm$, then find $m\overline{AL}$ & $m\overline{LB}$

As 'L' is the mid-point of AB, so it will divide $\overline{AB}$ into two equal parts.

$$\Rightarrow \quad m\overline{AL} = \frac{1}{2}\overline{AB} = \frac{1}{2}(6cm)$$

$$\boxed{mAL = 3cm}$$

& $m\overline{LB} = \frac{1}{2}(\overline{AB}) = \frac{1}{2}(6cm)$

$$\boxed{mLB = 3cm}$$

(ii) If $m\overline{BD} = 4cm$, then find $m\overline{AD}$

As $m\overline{BD} = 4cm$

But $m\overline{AD} = m\overline{BD}$

$$\Rightarrow \quad \boxed{mAD = 4cm}$$

∵ Any point on the right bisector of a line segment is equidistant from its arms.

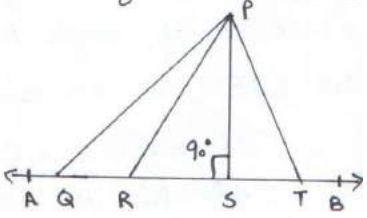
$\therefore m\overline{AD} = m\overline{BD}$

Unit 13
Sides and Angles of A Triangle

Review Exercise 13 (Page No. 227)

2. What will be the angle for shortest distance from an outside point to the line?

The angle for stortest distance from an outside point to the line is 90°. In the figure $m\overline{PS}$ is the smallest distance.



3. If 13 cm, 12 cm & 5 cm are the lengths of a triangle, then verify that difference of measures of any two sides of triangle is less than the measures of the third side.

$13 - 12 < 5$; $12 - 5 < 13$; $13 - 5 < 12$

$\Rightarrow 1 < 5$; $\Rightarrow 7 < 13$; $\Rightarrow 8 < 12$

Hence, the difference of measures of any two sides of triangle is less than the measure of third side.

4. If 10cm, 6cm & 8cm are the lengths of a triangle, then verify that sum of measures of two sides of a triangle is greater than the third side.

$10 + 8 > 6$; $6 + 8 > 10$; $10 + 6 > 8$

$\Rightarrow 18 > 6$; $\Rightarrow 14 > 10$; $16 > 8$

Hence verified.

5. 3cm, 4cm & 7cm are not the lengths of the triangle. Give reason.

$3 + 4 \not> 7$, As the sum of measure of any two sides of triangle is not greater than the third side. So given measures are not the lengths of triangle.

6. If 3cm & 4cm are lengths of two sides of a triangle then what should be the third length of the triangle?

Let $a = 3cm$, $b = 4cm$, $c = ?$

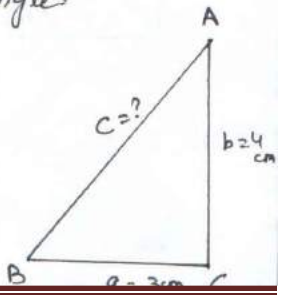
According to Pythagoras theorem,

$c^2 = a^2 + b^2$

$c^2 = (3)^2 + (4)^2$

$c^2 = 9 + 16$

$c^2 = 25\ cm^2$ or $\boxed{c = 5\ cm}$



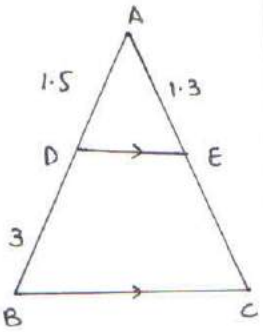
Unit 14

Ratio and Proportion

Exercise 14.1 (Page No. 232)

1- In $\triangle ABC$, $\overline{DE} \parallel \overline{BC}$

(i) If $m\overline{AD} = 1.5\,cm$, $m\overline{BD} = 3\,cm$, $m\overline{AE} = 1.3\,cm$ then find $m\overline{CE}$.



As $\overline{DE} \parallel \overline{BC}$

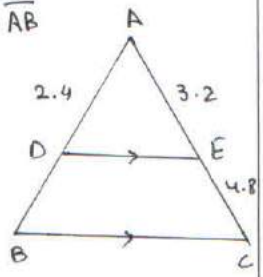
So $\frac{m\overline{AD}}{m\overline{BD}} = \frac{m\overline{AE}}{m\overline{EC}}$

$\frac{1.5}{3} = \frac{1.3}{m\overline{EC}}\ cm$

$m\overline{EC} = 1.3 \times \frac{3}{1.5}\ cm$

$\boxed{m\overline{CE} = 2.6\,cm}$

(ii) If $m\overline{AD} = 2.4\,cm$, $m\overline{AE} = 3.2\,cm$, $m\overline{EC} = 4.8\,cm$, find $m\overline{AB}$



As $\overline{DE} \parallel \overline{BC}$

So $\frac{m\overline{AE}}{m\overline{EC}} = \frac{m\overline{AD}}{m\overline{BD}}$

$\frac{3.2}{4.8} = \frac{2.4\,cm}{m\overline{BD}}$

$m\overline{BD} = 2.4 \times \frac{4.8}{3.2}\ cm$

$m\overline{BD} = 3.6\,cm$

$m\overline{AB} = m\overline{AD} + m\overline{BD}$

$= 2.4\,cm + 3.6\,cm$

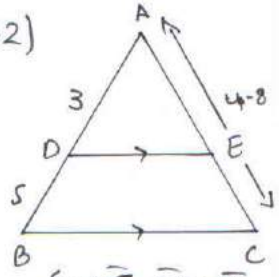
$\boxed{m\overline{AB} = 6\,cm}$

(iii) If $\frac{m\overline{AD}}{m\overline{DB}} = \frac{3}{5}$ & $m\overline{AC} = 4.8\,cm$, find $m\overline{AE}$.

As $\overline{DE} \parallel \overline{BC}$

$\frac{m\overline{AD}}{m\overline{DB}} = \frac{m\overline{AE}}{m\overline{EC}}$

$\frac{3}{5} = \frac{m\overline{AE}}{(m\overline{AC} - m\overline{AE})}$



$\because A\overline{C} = \overline{AE} + \overline{EC}$

$\overline{EC} = \overline{AC} - \overline{AE}$

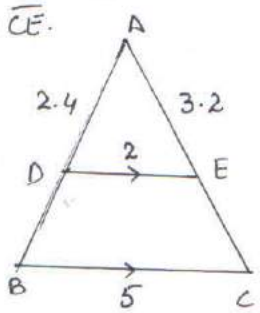
$3\overline{AC} - 3\overline{AE} = 5\overline{AE}$

$3(4.8) = 5\overline{AE} + 3\overline{AE}$

$14.4\,cm = 8\overline{AE}$

$\boxed{\overline{AE} = 1.8\,cm}$

(iv) If $m\overline{AD} = 2.4\,cm$, $m\overline{AE} = 3.2\,cm$, $m\overline{DE} = 2\,cm$, $m\overline{BC} = 5\,cm$, find $m\overline{AB}$, $m\overline{DB}$, $m\overline{AC}$, $m\overline{CE}$.



As $\overline{DE} \parallel \overline{BC}$

So $\frac{m\overline{AD}}{m\overline{DB}} = \frac{m\overline{AE}}{m\overline{BC}}$

$\frac{2.4\,cm}{m\overline{DB}} = \frac{3.2\,cm}{m\overline{EC}}$

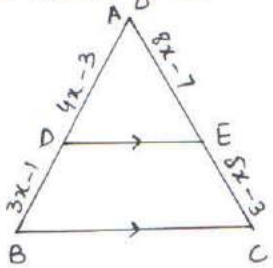
$\frac{m\overline{CE}}{m\overline{DB}} = \frac{3.2\,cm}{2.4\,cm}$

$\Rightarrow \boxed{m\overline{CE} = 3.2\,cm}$ & $\boxed{m\overline{DB} = 2.4\,cm}$

Now $m\overline{AB} = m\overline{AD} + m\overline{DB}$

$= 2.4\,cm + 2.4$

(v) If $\overline{AD} = 4x-3$, $\overline{AE} = 8x-7$, $\overline{BD} = 3x-1$, $\overline{CE} = 5x-3$, find the value of x.



As $\overline{DE} \parallel \overline{BC}$

So $\frac{m\overline{AD}}{m\overline{BD}} = \frac{m\overline{AE}}{m\overline{EC}}$

$\frac{4x-3}{3x-1} = \frac{8x-7}{5x-3}$

$(4x-3)(5x-3) = (8x-7)(3x-1)$

$20x^2 - 12x - 15x + 9 = 24x^2 - 8x - 21x + 7$

$20x^2 - 27x + 9 = 24x^2 - 29x + 7$

$20x^2 - 24x^2 - 27x + 29x + 9 - 7 = 0$

$-4x^2 + 2x + 2 = 0$

$-2(2x^2 - x - 1) = 0$

or $2x^2 - x - 1 = 0$

$2x^2 - 2x + x - 1 = 0$

$2x(x-1) + 1(x-1) = 0$

$(x-1)(2x+1) = 0$

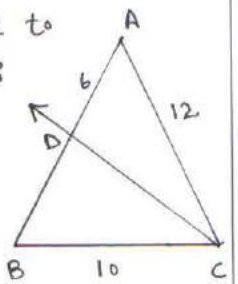
$\Rightarrow x - 1 = 0$ or $2x + 1 = 0$

$\boxed{x = 1}$ or $x = -\frac{1}{2}$ (not possible)

Exercise 14.2 (page No. 236)

1. In $\triangle ABC$, $\overline{CD}$ bisects $\angle C$ & meets $\overline{AB}$ at D, $m\overline{BD}$ is equal to

(a) 5 (b) 16 (c) 10 (d) 18



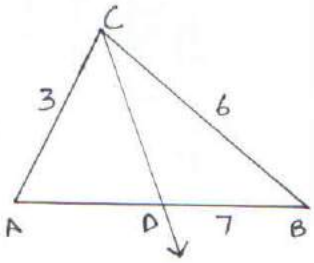
As we know that

$\frac{m\overline{AC}}{m\overline{BC}} = \frac{m\overline{AD}}{m\overline{BD}}$

$\frac{12}{10} = \frac{6}{m\overline{BD}}$

$m\overline{BD} = 6 \times \frac{10}{12} \Rightarrow \boxed{mBD = 5 \text{ units}}$

2. In $\triangle ABC$, $\overline{CD}$ bisects $\angle C$, If $m\overline{AC} = 3$, $m\overline{CB} = 6$ & $m\overline{AB} = 7$, then find $m\overline{AD}$ & $m\overline{DB}$.



As, $\frac{m\overline{AC}}{m\overline{CB}} = \frac{m\overline{AD}}{m\overline{DB}}$

$\frac{m\overline{AC}}{m\overline{CB}} = \frac{(m\overline{AB} - m\overline{DB})}{m\overline{DB}}$

$\frac{3}{6} = \frac{7 - m\overline{DB}}{m\overline{DB}}$

$\frac{1}{2} = \frac{7 - m\overline{DB}}{m\overline{DB}}$

$m\overline{DB} = 14 - 2\overline{DB}$

$\overline{DB} + 2\overline{DB} = 14$

$3\overline{DB} = 14$

$\boxed{m\overline{DB} = \frac{14}{3}}$

$m\overline{AD} = m\overline{AB} - m\overline{DB}$

$= 7 - \frac{14}{3}$

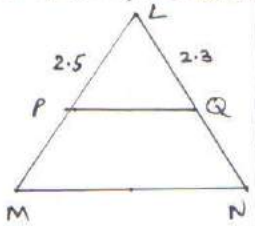
$= \frac{21 - 14}{3}$

$\boxed{m\overline{AD} = \frac{7}{3}}$

Note:- All the questions of ex 14.1 are solved according to theorem 14.1.1, stated as "A line parallel to one side of a triangle & intersecting the other two sides divides them proportionally." Ex 14.2 is solved according to theorem 14.1.3

Review Exercise 14 (Page No. 236-237)

3. In ΔLMN shown in the figure, $\overline{MN} \parallel \overline{PQ}$, then (i) find $m\overline{LN}$ if $m\overline{LM} = 5cm$, $m\overline{LP} = 2.5cm$, $m\overline{LQ} = 2.3cm$



As we know,

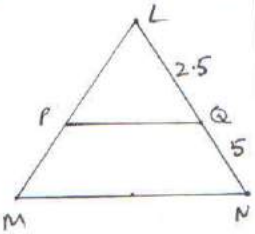
$$\frac{m\overline{LM}}{m\overline{LP}} = \frac{m\overline{LN}}{m\overline{LQ}}$$

$$\frac{5}{2.5} = \frac{m\overline{LN}}{2.3}$$

$$m\overline{LN} = \frac{5}{2.5} \times 2.3$$

$$\boxed{m\overline{LN} = 4.6\ cm}$$

(ii) If $\overline{LM} = 6cm$, $m\overline{LQ} = 2.5cm$, $m\overline{QN} = 5cm$ then find $m\overline{LP}$



As we know,

$$\frac{m\overline{LM}}{m\overline{LP}} = \frac{m\overline{LN}}{m\overline{LQ}}$$

$$\frac{6}{m\overline{LP}} = \frac{m\overline{LQ} + m\overline{QN}}{2.5}$$

$$\frac{6 \times 2.5}{m\overline{LP}} = 2.5 + 5$$

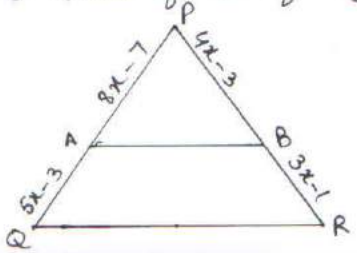
$$\frac{15}{m\overline{LP}} = 7.5$$

$$m\overline{LP} = \frac{15}{7.5}$$

$$\boxed{m\overline{LP} = 2\ cm}$$

4. In the shown figure, let $m\overline{PA} = 8x-7$, $m\overline{PB} = 4x-3$, $m\overline{AQ} = 5x-3$, $m\overline{BR} = 3x-1$

Find the value of x if $\overline{AQ} \parallel \overline{QR}$



As, $\overline{AQ} \parallel \overline{QR}$

So $$\frac{m\overline{PA}}{m\overline{AQ}} = \frac{m\overline{PB}}{m\overline{BR}}$$

$$\frac{8x-7}{5x-3} = \frac{4x-3}{3x-1}$$

$$(8x-7)(3x-1) = (4x-3)(5x-3)$$

$$24x^2 - 8x - 21x + 7 = 20x^2 - 12x - 15x + 9$$

$$24x^2 - 29x + 7 = 20x^2 - 27x + 9$$

$$24x^2 - 20x^2 - 29x + 27x + 7 - 9 = 0$$

$$4x^2 - 2x - 2 = 0$$

$$2(2x^2 - x - 1) = 0$$

$$\Rightarrow 2x^2 - x - 1 = 0$$

$$2x^2 - 2x + x - 1 = 0$$

$$2x(x-1) + 1(x-1) = 0$$

$$(x-1)(2x+1) = 0$$

$$\Rightarrow x - 1 = 0 \quad \text{or} \quad 2x + 1 = 0$$

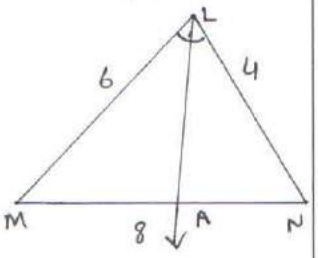
$$x = 1 \quad \text{or} \quad 2x = -1$$

$$x = -\frac{1}{2}$$

(not possible)

Hence $\boxed{x = 1}$

5- In ΔLMN shown in the figure, $\overline{LA}$ bisects $\angle L$. If $m\overline{LN} = 4$, $m\overline{LM} = 6$, $m\overline{MN} = 8$, then find $m\overline{MA}$ & $m\overline{AN}$.



As, $\frac{m\overline{ML}}{m\overline{LN}} = \frac{m\overline{MA}}{m\overline{AN}}$

$\frac{6}{4} = \frac{(m\overline{MN} - m\overline{AN})}{m\overline{AN}}$

$\frac{3}{2} = \frac{8 - m\overline{AN}}{m\overline{AN}}$

$3m\overline{AN} = 16 - 2m\overline{AN}$

$3m\overline{AN} + 2m\overline{AN} = 16$

$5m\overline{AN} = 16$

$\boxed{m\overline{AN} = \frac{16}{5}}$

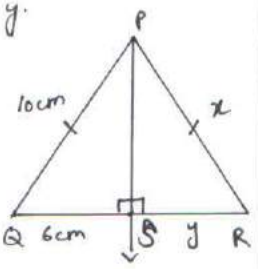
$m\overline{MA} = m\overline{MN} - m\overline{AN}$

$= 8 - \frac{16}{5}$

$= \frac{40-16}{5}$

$\boxed{m\overline{MA} = \frac{24}{5}}$

6- In Isoceles ΔPQR shown in the figure, find the value of x & y.



As ΔPQR is an isoceles triangle.

So, $m\overline{PQ} = m\overline{PR}$

$\Rightarrow$ $10cm = x$

or $\boxed{x = 10cm}$

As the bisector of $\overline{QR}$ divides it into two equal parts;

So, $m\overline{QS} = m\overline{SR}$

$\Rightarrow$ $6cm = y$

or $\boxed{y = 6cm}$

Unit 15

Pythagoras' Theorem

Exercise 15 (Page No.241)

1- Verify that Δs having the following measures of sides are right-angled.

(i) $a = 5cm$, $b = 12cm$, $c = 13cm$

We know that

$c^2 = a^2 + b^2$

$(13)^2 = (5)^2 + (12)^2$

$169 = 25 + 144$

$169 = 169$ True

Hence, given sides represents right angle triangle.

(ii) $a = 1.5cm$, $b = 2cm$, $c = 2.5cm$

According to Pythagoras theorem,

$c^2 = a^2 + b^2$

$(2.5)^2 = (1.5)^2 + (2)^2$

$6.25 = 2.25 + 4$

$6.25 = 6.25$ True.

Hence, given sides represent right angle triangle

(iii) $a = 9cm$, $b = 12cm$, $c = 15cm$

According to Pythagoras theorem,

$c^2 = a^2 + b^2$

$(15)^2 = (9)^2 + (12)^2$

$225 = 81 + 144$

$225 = 225$ True

Hence, given sides represent right angle triangle.

(iv) $a = 16cm$, $b = 30cm$, $c = 34cm$

According to Pythagoras theorem,

$c^2 = a^2 + b^2$

$(34)^2 = (16)^2 + (30)^2$

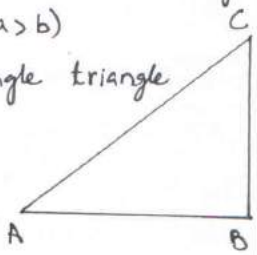
$1156 = 256 + 900$

$1156 = 1156$ True

Hence, given sides represent ~~side~~ right angle triangle.

2- Verify that a^2+b^2, a^2-b^2 & $2ab$ are the measures of the sides of a right angled triangle where a & b are any two real numbers $(a>b)$

If ABC is a right angle triangle then according to Pythagoras theorem,



$|\overline{AC}|^2 = |\overline{AB}|^2 + |\overline{BC}|^2$

Let $\overline{AC} = a^2+b^2$, $AB = a^2-b^2$, $\overline{BC} = 2ab$

$\Rightarrow (a^2+b^2)^2 = (a^2-b^2)^2 + (2ab)^2$

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

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

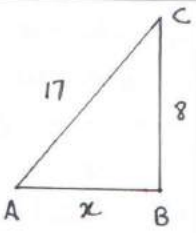
$(a^2+b^2)^2 = (a^2+b^2)^2$ True

Hence, Pythagoras theorem holds, therefore given sides represent right angle triangle.

3- The three sides of a triangle are of measure 8, x & 17 respectively. For what value of x will it become base of a right angle triangle?

In $\triangle ABC$

$\overline{AB} = x$, $\overline{BC} = 8$, $\overline{AC} = 17$



According to Pythagoras theorem,

$|\overline{AC}|^2 = |\overline{AB}|^2 + |\overline{BC}|^2$

$(17)^2 = x^2 + (8)^2$

$289 = x^2 + 64$

$x^2 = 289 - 64$

$x^2 = 225$

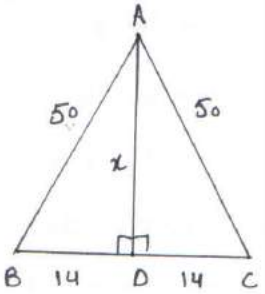
$\sqrt{x^2} = \sqrt{225}$

$\boxed{x = 15}$

4- In an isosceles $\triangle$, the base $m\overline{BC} = 28cm$ & $m\overline{AB} = m\overline{AC} = 50cm$. If $\overline{AD} \perp \overline{BC}$ then find (i) length of $\overline{AD}$ (ii) area of $\triangle ABC$

(i)

As $\overline{AD} \perp \overline{BC}$



$\Rightarrow m\overline{BD} = m\overline{DC} = \frac{m\overline{BC}}{2}$

$m\overline{BD} = m\overline{DC} = \frac{28}{2} = 14$

In $\triangle ADB$

$|\overline{AB}|^2 = |\overline{BD}|^2 + |\overline{AD}|^2$

$(50)^2 = (14)^2 + (\overline{AD})^2$

$|\overline{AD}|^2 = (50)^2 - (14)^2$

$|\overline{AD}|^2 = 2500 - 196$

$|\overline{AD}|^2 = 2304$

$\sqrt{(\overline{AD})^2} = \sqrt{2304}$

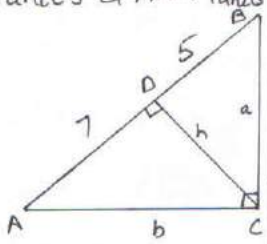
$\boxed{m\overline{AD} = 48\ cm}$

(ii) area of $\triangle ABC = \frac{1}{2}$ (Base) (Altitude)

$= \frac{1}{2}(28)(48)$

$\boxed{\text{area of } \triangle ABC = 672\ cm^2}$

6-(i) In $\triangle ABC$ as shown in figure, $m\angle ACB = 90°$ & $\overline{CD} \perp \overline{AB}$. Find the lengths a, h & b. If $m\overline{BD} = 5$ units & $m\overline{AD} = 7$ units



In $\triangle BDC$

$(\overline{BC})^2 = (\overline{BD})^2 + (\overline{DC})^2$

$a^2 = (5)^2 + h^2$

$a^2 = 25 + h^2 \rightarrow$ (i)

In $\triangle ADC$

$(\overline{AC})^2 = (\overline{AD})^2 + (\overline{DC})^2$

$b^2 = (7)^2 + h^2$

$b^2 = 49 + h^2 \rightarrow$ (ii)

Subtract eq (i) from eq (ii)

$b^2 - a^2 = (49 + h^2) - (25 + h^2)$

$b^2 - a^2 = 49 + h^2 - 25 - h^2$

$b^2 - a^2 = 24 \rightarrow$ (iii)

In $\triangle ABC$

$(\overline{AB})^2 = (\overline{AC})^2 + (\overline{BC})^2$

$(7+5)^2 = b^2 + a^2$

$(12)^2 = b^2 + a^2$

$b^2 + a^2 = 144 \rightarrow$ (iv)

adding eq (iii) & eq (iv)

$b^2 - a^2 + b^2 + a^2 = 24 + 144$

$2b^2 = 168$

$b^2 = \frac{168}{2}$

$b^2 = 84$

$\boxed{b = 2\sqrt{21}}$

Put $b^2 = 2\sqrt{21} = 84$ in eq (iv)

$2\sqrt{21} + a^2 = 144$

$a^2 = 144 - 2\sqrt{}$

$a^2 = 60$

$\boxed{a = \sqrt{60} = 2\sqrt{15}}$

Put $a^2 = 60$ in eq (i)

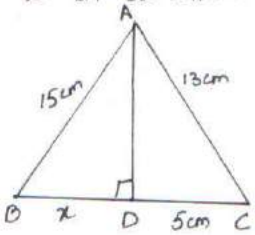
$60 = 25 + h^2$

$h^2 = 60 - 25$

$h^2 = 35$

$\boxed{h = \sqrt{35}}$

(ii) Find the value of x in the shown figure:



In $\triangle ACD$

$(\overline{AC})^2 = (\overline{AD})^2 + (\overline{DC})^2$

$(13)^2 = (\overline{AD})^2 + (5)^2$

$169 = (\overline{AD})^2 + 25$

$(\overline{AD})^2 = 169 - 25$

$(\overline{AD})^2 = 144$

$\sqrt{(\overline{AD})^2} = \sqrt{144}$

$\boxed{\overline{AD} = 12 \text{ cm}}$

In $\triangle ADB$

$(\overline{AB})^2 = (\overline{AD})^2 + (\overline{BD})^2$

$(15)^2 = x^2 + (12)^2$

$225 = x^2 + 144$

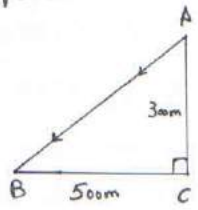
$x^2 = 225 - 144$

$x^2 = 81$

$\sqrt{x^2} = \sqrt{81}$

$\boxed{x = 9 \text{ cm}}$

7- A plane is at a height of 300m & is 500m away from the airport as shown in fig. How much distance will it travel to land at the airport?



By Pythagoras theorem,

$(\overline{AB})^2 = (\overline{AC})^2 + (\overline{BC})^2$

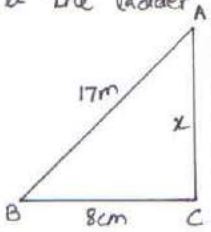
$= (300)^2 + (500)^2$

$= 90000 + 250000$

$(\overline{AB})^2 = 340000$

$\overline{AB} = \sqrt{340000} = \boxed{100\sqrt{34} \text{ m}}$

8- A ladder 17m long rest against a vertical wall. The foot of the ladder is 8cm away from the base of the wall. How high up the wall will the ladder reach?



By Pythagoras theorem,

$(\overline{AB})^2 = (\overline{AC})^2 + (\overline{BC})^2$

$(17)^2 = x^2 + (8)^2$

$289 = x^2 + 64$

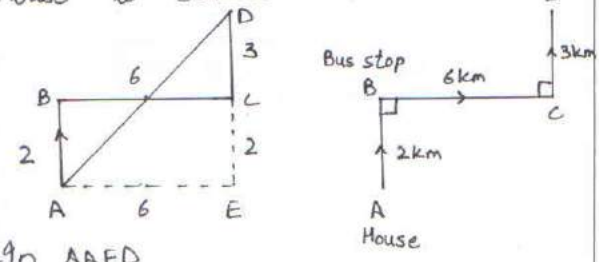
$x^2 = 289 - 64$

$x^2 = 225$

$\sqrt{x^2} = \sqrt{225}$

$\boxed{x = 15m}$

9- A student travels to his school by the route as shown in fig. Find $m\overline{AD}$, the direct distance from his house to school.



In $\triangle AED$

$(\overline{AD})^2 = (\overline{AE})^2 + (\overline{DE})^2$

$(\overline{AD})^2 = (6)^2 + (m\overline{DC} + m\overline{CE})^2$

$(\overline{AD})^2 = 36 + (3+2)^2$

$(\overline{AD})^2 = 36 + (5)^2$

$(\overline{AD})^2 = 36 + 25$

$(\overline{AD})^2 = 61$

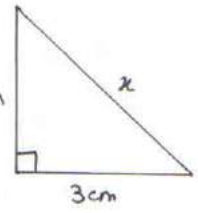
$\sqrt{(\overline{AD})^2} = \sqrt{61}$

$\boxed{m\overline{AD} = \sqrt{61}}$

Review Exercise 15 (Page No. 242)

2- Find the unknown value in each of the following figures.

(i)



By Pythagoras theorem,

$(hyp)^2 = (Base)^2 + (Perpendicular)^2$

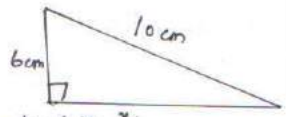
$x^2 = (3)^2 + (4)^2$

$x^2 = 9 + 16$

$x^2 = 25$

$\boxed{x = 5\ cm}$

(ii)



By Pythagoras theorem,

$(hyp)^2 = (Base)^2 + (Perpendicular)^2$

$(10)^2 = x^2 + (6)^2$

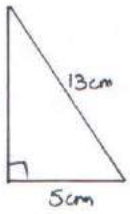
$100 = x^2 + 36$

$x^2 = 100 - 36$

$x^2 = 64$

$\boxed{x = 8\ cm}$

(iii)



By Pythagoras theorem,

$(hyp)^2 = (Base)^2 + (Perpendicular)^2$

$(13)^2 = (5)^2 + x^2$

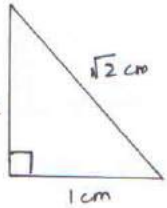
$169 = 25 + x^2$

$x^2 = 169 - 25$

$x^2 = 144$

$\boxed{x = 12\ cm}$

(iv)



By Pythagoras theorem,

$(hyp)^2 = (Base)^2 + (Perpendicular)^2$

$(\sqrt{2})^2 = (1)^2 + x^2$

$2 = 1 + x^2$

$x^2 = 2 - 1$

$x^2 = 1$

$\Rightarrow \boxed{x = 1\ cm}$

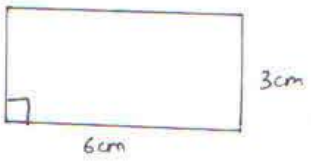
Unit 16

Theorems Related With Area

Review exercise 16 (Page No. 250)

2- Find the area of the following:

(i)-



Solution:

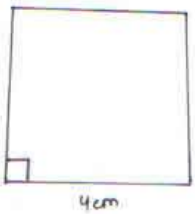
Given fig. is a rectangle.

Area of rectangle = base x height

= 6 cm x 3cm

area = 18 cm²

(ii) -



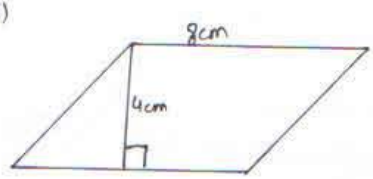
Given fig. is a square

Area of square = (length of a side)²

area = $(4cm)^2$

area = 16cm²

(iii)

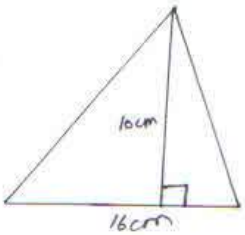


Area of parallelogram = (base)(height)

= 8cm X 4cm

area = 32 cm²

(iv)



Area of triangle = $\frac{1}{2}$ (base)(height)

= $\frac{1}{2}$ (16cm)(10cm)

area = 80 cm²