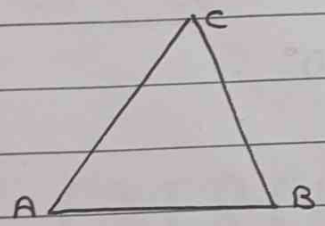
CHAPTER- 9

Triangle and its properties

Triangle- A triangle is a simple closed figure made with three line segment.

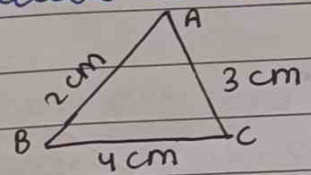


Elements of a triangle :-

Vertices of ΔABC - A, B, C
Sides of ΔABC - $\overline{AB}$, $\overline{BC}$, $\overline{AC}$
Angles of ΔABC - $\angle A$, $\angle B$ and $\angle C$ or $\angle CAB$, $\angle ABC$ and $\angle ACB$.

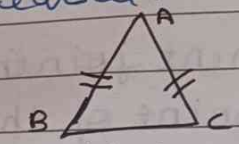
Types of triangle on basis of sides:-

- Scalene triangle - If all the sides of a triangle are unequal it is called a scalene triangle.



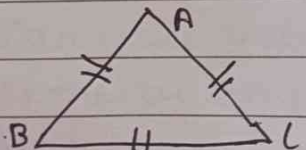
$\overline{AB} \neq \overline{BC} \neq \overline{AC}$

- Isaceles triangle - If any two sides of a triangle are equal, it is called an isoceles triangle.



$AB = AC$

- Equilateral triangle - If all three sides of a triangle are equal it is called equilateral triangle



$AB = BC = AC$

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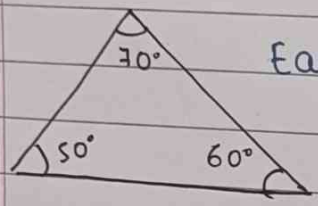
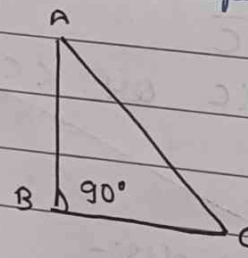
Types of triangles on the basis of angle :-

1) Acute angled triangle - If all three angles of a triangle are acute (less than 90°), it is called an acute angled triangle.



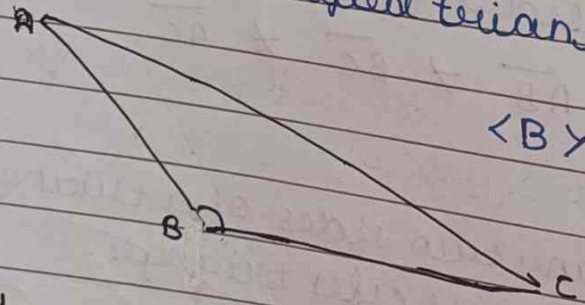
Each angle < 90°

2) Right angled triangle - If one angle of the triangle is right angle (= 90°), so it is called right angled triangle.



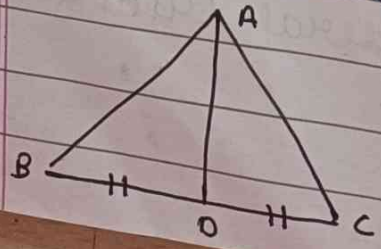
B = 90°

3) Obtuse angled triangle - If one angle of a triangle is greater than 90°, it is called an obtuse angled triangle.



< B > 90°

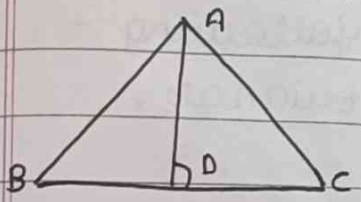
Median of a triangle - The line segment joining the vertex of a triangle to the mid-point of the opposite side is called median of the triangle.



AD is median

BD = DC

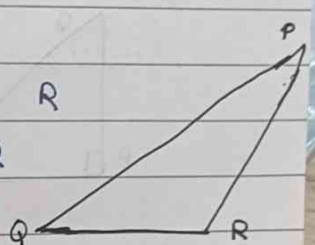
Altitudes of a triangle - The perpendicular line segment from a vertex of a triangle to the opposite side is called an altitude of triangle.



Altitude = height
Perpendicular
AD is ⊥ᵣ to BC

EXERCISE 9.1

1) In the adjoining figure:

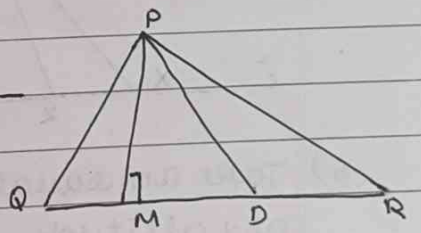


i) Name the vertex opposite to side PQ R
ii) Name the side opposite to vertex Q PR
iii) Name the angle opposite to side QR ∠P
iv) Name the side opposite to ∠R PQ

2) In the adjoining △PQR, if D is the mid point of $\overline{QR}$ and PM ⊥ QR then.

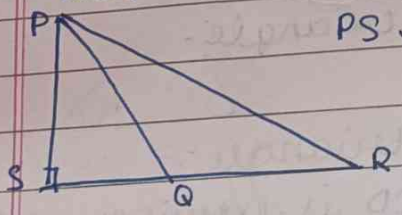
i) $\overline{PM}$ is _____
Is QM ≠ MR?
Altitude

ii) $\overline{PD}$ is _____
Median



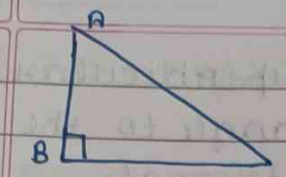
3) Will an altitude always lie in the interior of a triangle? If no, draw a rough sketch to show such a case.

No,



PS is the altitude.

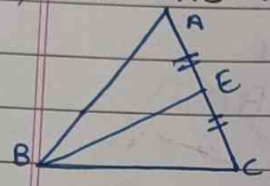
4) Can you think of a triangle in which two altitudes of the triangle are its sides? If yes draw a rough sketch to show such a case.



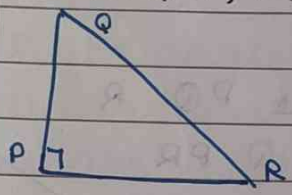
AB and BC are altitudes of ΔABC
Yes, it is right angled triangle.

5) Draw rough sketches for the following :-

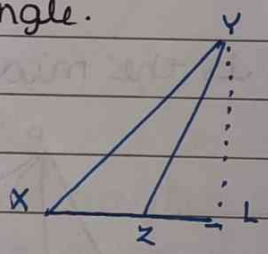
i) In ΔABC, BE is a median of the triangle.



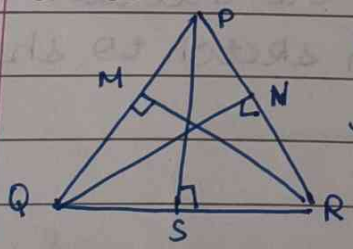
ii) In ΔPQR, PQ and PR are altitudes of the triang



iii) In ΔXYZ, YL is an altitude in the exterior of triangle.

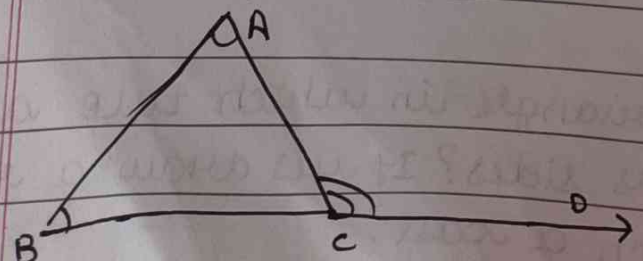


6) Take an equatorial triangle and draw its medi and altitude and check that the medians and altitudes are same.



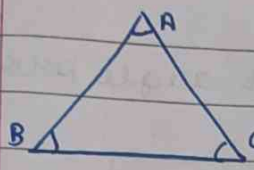
The altitude of an equilateral trian divide the sides into equal parts. Hence, altitude are also the medians of the triangle.

Exterior angle property of a triangle :-



∠ACD is exterior angl
∠ACD = ∠A + ∠B

Angle sum property of a triangle:-

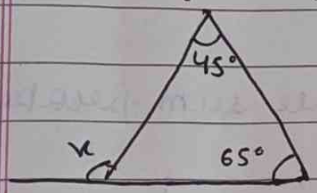


$\angle A + \angle B + \angle C = 180°$

EXERCISE 9.2

1) Find the value of the unknown exterior angle x in each of the following figures:

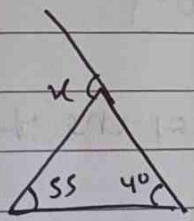
i)



$x = 45 + 65$ (Exterior angle property)

$\boxed{x = 110}$

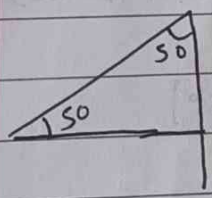
ii)



$x = 55 + 40$ (Exterior angle property)

$\boxed{x = 95°}$

iii)

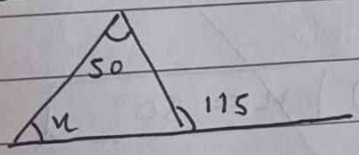


$x = 50 + 50$ (Exterior angle)

$x = 100°$

2) Find the value of the unknown interior angle x in each of the following figures:

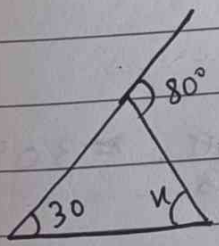
i)



$x + 50 = 115°$

$x = 115 - 50 = 65°$

ii)

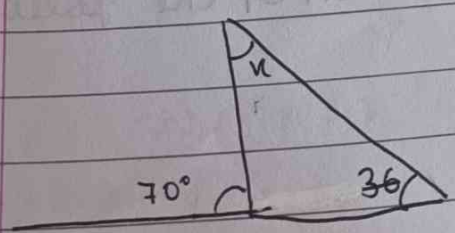


$x + 30 = 80$

$x = 80 - 30$

$x = 50°$

iii)



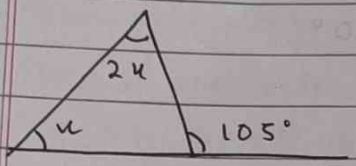
$x + 36 = 70$

$x = 70 - 36$

$x = 34°$

3) Find the value of x in each of the following figures:

i)

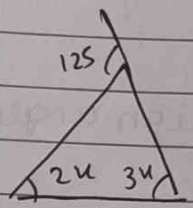


$x + 2x = 105$ (Ext angle prop)

$3x = 105$

$x = \frac{105}{3} = \boxed{x = 35}$

ii)

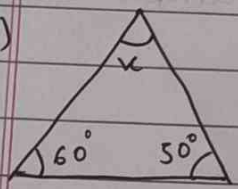


$2x + 3x = 125$ (Ext angle prop)

$5x = 125 \Rightarrow x = \frac{125}{5} 25$

$\boxed{x = 25°}$

iii)

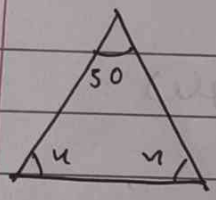


$x + 50 + 60 = 180°$ (Angle sum property)

$x + 110 = 180$

$x = 180 - 110 \Rightarrow \boxed{x = 70°}$

4) Find the value of unknown x in each of the following figures:

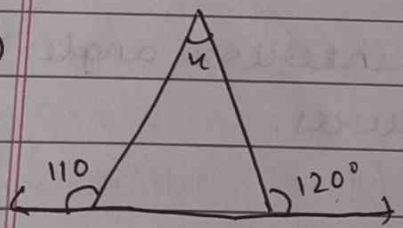


$x + x + 50 = 180°$ (Angle sum prop)

$2x = 180 - 50$

$x = \frac{130}{2} 65° \Rightarrow \boxed{x = 65°}$

i)



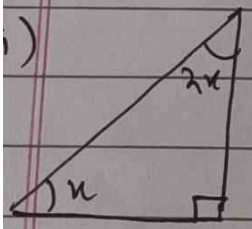
$\angle 1 + 116 = 180$

$\angle 1 = 180 - 110 \Rightarrow \angle 1 = 70°$

$x + 70 = 120$

$x = 120 - 70 \Rightarrow \boxed{x = 50°}$

)



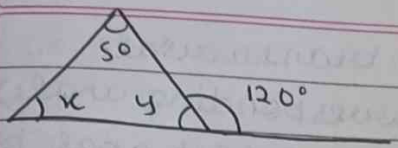
$90 + 2x + x = 180$

$90 + 3x = 180$

$3x = 180 - 90 \Rightarrow x = \frac{90}{3} = 30°$

$\boxed{x = 30°}$

Find the value of x and y in each of the following figures.

i) 

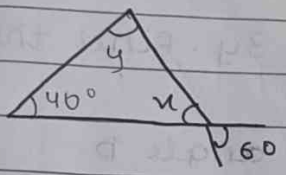
$y + 120 = 180$ (L.P)

$y = 180 - 120 \Rightarrow \boxed{y = 60}$

$x + y + 50 = 180°$ (ASP)

$x + 60 + 50 = 180$

$x = 180 - 110 \Rightarrow \boxed{x = 70°}$

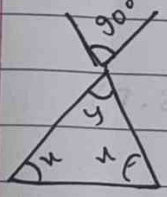
ii) 

$x = 60°$ (VOA

$60° + 40 + y = 180$

$100 + y = 180$

$y = 180 - 100 \quad \boxed{y = 80}$

iii) 

$y = 90°$ (VOA)

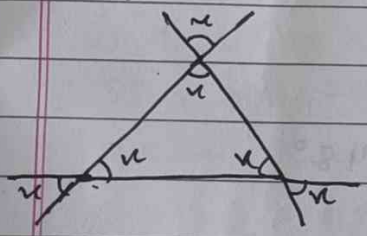
$x + x + y = 180$ (ASP)

$2x + 90 = 180$

$2x = 180 - 90$

$\boxed{x = 45°}$

5) Find the value of x and y in each of the following figures.

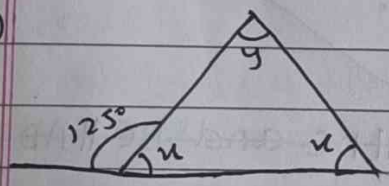


$y = x$

$x + x + y = 180°$ (Angle sum property)

$3x = 180 \Rightarrow x = \frac{180}{3} = 60°$

$\boxed{x = 60°}$

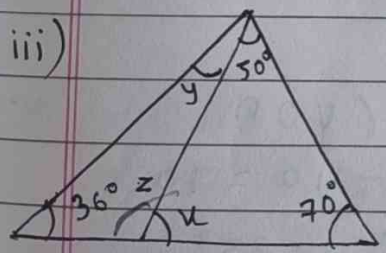
ii) 

(LP)

$x = 180 - 125 = 55°$ (x =

$55 + 55 + y = 180$

$y = 180 - 110 = 70°$

iii) 

$\angle z = 70 + 50 = 120°$ (Ext ang pro

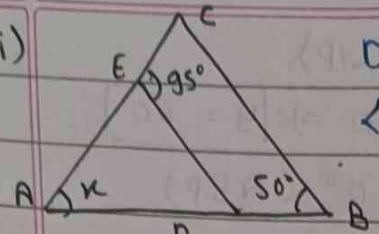
$x = 180 - 120 = 60°$

$y + 36 + 120 = 180$

$y = 180 - 156 = 24°$

7) a) In the fig (i) given below, DE ∥ BC. Find the value of x.

i)



DE ∥ BC, AB is transversal.

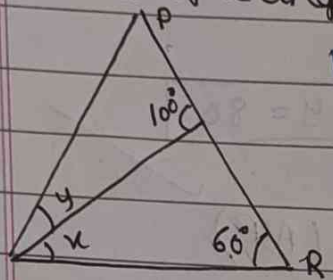
$\angle EDA = 50°$ (corresponding angles)

$\angle CED = x + \angle EDA$ (Ext angle th

$95° = x + 50°$

$\boxed{x = 45°}$

b) In the fig (ii) given below, $\angle P = 3y$. Find the values of x and y.



$100° = x + 60°$ (Ext angle p

$\boxed{x = 40°}$

In $\triangle PQM$

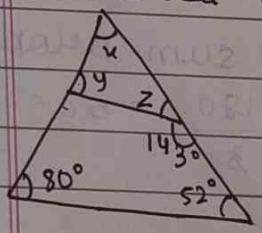
$y + \angle P + 100 = 180°$ (A.S.P)

$y + 3y + 100 = 180$

$4y = 180 - 100$

$y = \frac{80}{4} = 20$ | $\boxed{y = 20°}$

c) In the fig(iii) given below, find the size of each lettered angle.



$\angle z = 180 - 143 = 37°$

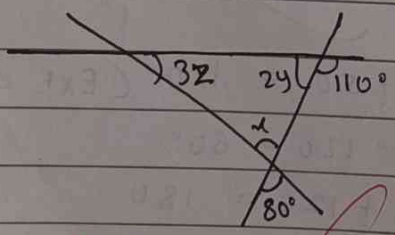
$\angle x = 180 - (80 + 52°) = 48°$

$y + 37 + 48 = 180°$

$\angle y = 180 - 85 = 95°$

8) In the fig 1) given below, ~~AB ∥ DC and BC ∥ AD.~~ Fi the value of x, y, z.

1)



$x = 80°$ (VOA

$2y = 180 - 110 = 70$

$y = \frac{70}{2} = 35°$

$x = 80°$

$y = 35°$

$z = 10°$

$3z + 2y + x = 180$

$3z + 70° + 80° = 180°$

$3z = 180 - 150$ ∴ 30

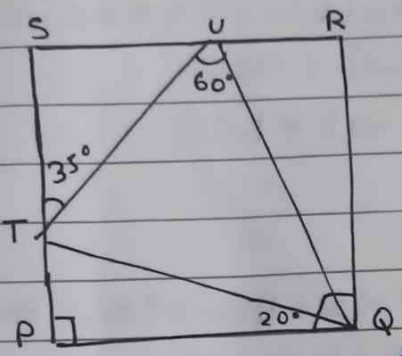
$z = \frac{30}{3} = 10°$

b) In the fig (2) given below find :-

i) $\angle PTQ$ ii) QTU iii) SUT

iv) $\angle RUQ$ v) $\angle RQU$ vi) $\angle UQT$

b)



i) $\angle PTQ$

$90° + 20° + \angle PTQ = 180°$ (A.S.P)

$110° + \angle PTQ = 180°$

$\boxed{\angle PTQ = 70°}$

ii) $\angle QTU$

$\angle PTQ + \angle QTU + \angle STU = 180$ (L.P)

$70 + \angle QTU + 35° = 180$

$\angle QTU = 180 - 105$ $\boxed{\angle QTU = 75°}$

iii) $\angle SUT$

$90 + 35 + \angle SUT = 180$ (A.S.P)

$125 + \angle SUT = 180$

$\angle SUT = 180 - 125$ $\boxed{\angle SUT = 55°}$

iv) $\angle SUT + \angle TUQ + \angle RUQ = 180$ (Linear pair)

$55 + 60 + \angle RUQ = 180°$

$115 + \angle RUQ = 180$

$\angle RUQ = 180 - 115$ $\boxed{\angle RUQ = 65°}$

v) $\angle RUQ$

$\angle R + \angle QUR + \angle RQU = 180°$ (A.S.P)

$90 + 65 + \angle RQU = 180$

$\angle RQU = 180 - 155$ $\boxed{\angle RQU = 25°}$

vi) $\angle UQT$

$\angle PQT + \angle TQU + \angle UQR = 90°$

$20° + \angle UQT + 25 = 90$

$\angle UQT = 90 - 45$ $\boxed{\angle UQT = 45°}$

9) a) In the fig i) given below, AB ∥ DC and BC ∥ AD. Find

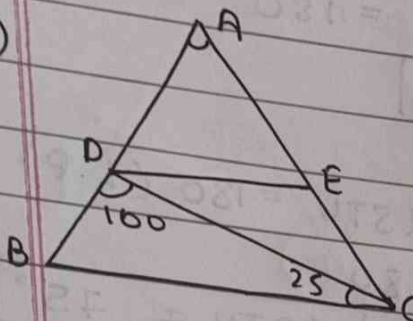
i) ∠DBC ii) ∠BDC iii) DBA iv) ∠A

b) In the given fig(2) given below, DE ∥ BC. Find

i) ∠B ii) ∠EDC iii) ∠ADE

iv) ∠AED v) DEC vi) ∠DCE

2)



i) B

$\angle B + \angle BDC + \angle DCB = 180°$ (A.SP)

$\angle B + 100° + 25° = 180$

$\angle B = 180 - 125$ $\boxed{\angle B = 55°}$

ii) ∠EDC ⇒ DE ∥ BC

∠EDC = 25 (Alternate angle)

iii) ∠ADE

∠ADE + 25 + 100 = 180 (L.P)

∠ADE = 180 − 125 = $\boxed{\angle ADE = 55°}$

iv) ∠AED ⇒ In ∠ADE

∠A + ∠ADE + ∠AED = 180° (A.SP)

55° + 55° + ∠AED = 180

∠AED = 180 − 110 $\boxed{\angle AED = 70°}$

v) ∠DEC

∠AED + ∠DEC = 180 (L.P)

70 + ∠DEC = 180

∠DEC = 180 − 70 $\boxed{\angle DEC = 110°}$

vi) ∠DCE

∠DCE + ∠DEC + ∠CDE = 180° (A.S.P)

110° + ∠DCE + 25 = 180°

∠DCE = 180 − 135 $\boxed{\angle DCE = 45°}$

10) One of the angles of a triangle measures 80° and the other two angles are equal. Find the measure of each of the equal angles.

Sol. Let the angle be x

$80 + x + x = 180$

$2x = 180 - 80$

$x = \frac{100}{2} = \boxed{x = 50°}$

11) If one angle of a triangle is 60° and the other two angles are in the ratio 2:3, find the angles.

Sol: Let the angle be x

Second angle be 2x

Third angle be 3x

$+ 2x + 3x = 180°$

$5x = 120°$

$\boxed{x = 24°}$

$2x = 2 \times 24 = 48°$

$3x = 3 \times 24 = 72°$

12) If the angles of a triangle are in the ratio 1:2:3, find the angles. Classify the angle in two different ways:-

Sol.. Let the angle be x

Second angle be 2x

Third angle be 3x

$x + 2x + 3x = 180°$

$6x = 180$

$\boxed{x = 30°}$

$2x = 2 \times 30 = 60°$

$3x = 3 \times 30 = 90°$

Scalene and right angle triangle.

13) Can a triangle have three angles whose measures are?

i) $65°, 74°, 39°$?

$65 + 74 + 39 \neq 180°$

$178° \neq 180°$

No!.

ii) $\frac{1}{3} \times 90 = 30$.

$30, 90, 60 \Rightarrow 30 + 90 + 60 = 180°$

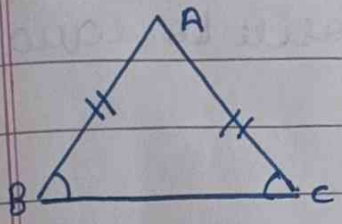
The sum of angles of triangles is $180°$.

Yes, it forms a triangle.

CONCEPT

ANGLE PROPERTY OF SPECIAL TRIANGLE :-

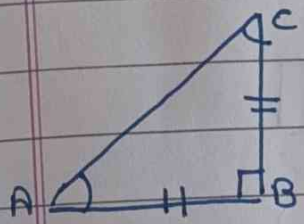
- **Isoceles triangle :-**



If $AB = AC$, $\angle C = \angle B$ } The angles opposite to equal sides are equal

If $\angle B = \angle C$, $AC = AB$ } The sides opposite to equal angles are equal.

- **Isoceles right angle triangle :-**



$\angle B = 90° \Rightarrow AB = BC$

$\angle C = \angle A$ (Angles opposite to equal sides are equal)

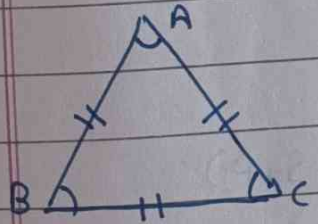
$\angle A + \angle B + \angle C = 180°$ (A.S.P)

$\angle A + 90° + \angle A = 180°$

$2\angle A = 90° \Rightarrow \angle A = \frac{90}{2} = 45°$

$\angle A = \angle C$, $\angle C = 45°$ $\Rightarrow \angle A = 45°, \angle B = 90°, \angle C = 45°$

- **Equilateral triangle :-**



$AB = BC = CA$

$\angle A + \angle B + \angle C = 180$

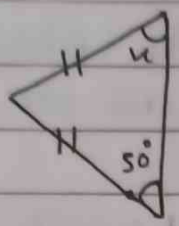
$\angle A + \angle A + \angle A = 180°$

$3\angle A = 180° \mid \angle A = 60°$

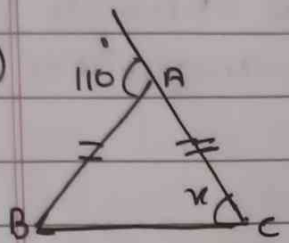
$\angle A = \angle B = \angle C = 60°$

EXERCISE 9.3

1) Find the value of x in each of the following:

i) 

$x = 50$ (Angles opposite to equal side are equal)

ii) 

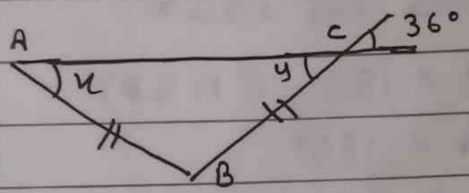
$AB = AC$

$\angle C = \angle B = x$

$110° = \angle B + \angle C$

$110° = x + x$

$2x = 110°$ | $\boxed{x = 55°}$

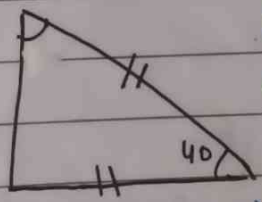
iii) 

$y = 36°$ (VOA)

$AB = BC$

$x = 36°$ (If sides of equal then angles are also equal)

2) Find the value of x in each of the following figures:

i) 

$AC = BC$

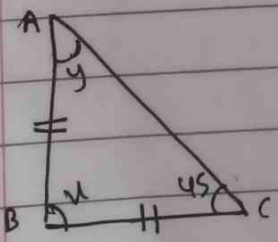
$\angle B = \angle A = x$

In $\triangle ABC$

$x + x + 40° = 180°$ (A.S.P)

$2x = 180 - 40$

$x = \frac{140}{2} \Rightarrow x = 70°$

ii) 

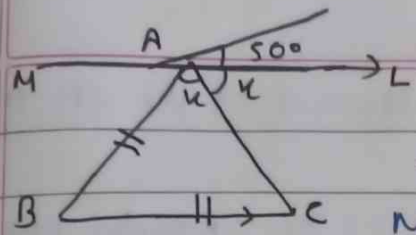
$AB = BC$

$y = 45°$

$x = 180 - 45 + 45$

$= 90°$

iii)



$AB = BC$

$\angle C = \angle A = x$

$ML \parallel BC$, AC is transversal

$\angle LAC = \angle BCA$ (Alternate angle)

$\angle LAC = x°$

$x + x + 50° = 180°$ (Linear pair)

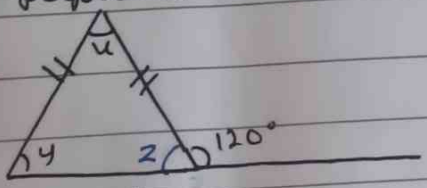
$2x + 50 = 180°$

$2x = 180 - 50°$

$2x = 130 \Rightarrow \boxed{x = 65°}$

3) Find the values of x and y in each of the following figures:

i)



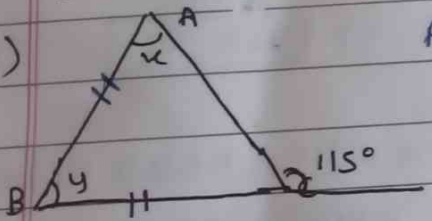
$\angle z = 180 - 120 = 60°$ $\boxed{z = 60°}$

$\angle y = 60°$ (as two sides are equal)

$x = 180 - 60 - 60$

$\boxed{x = 60°}$

ii)



$AB = BC$ (angle opposite are equal)

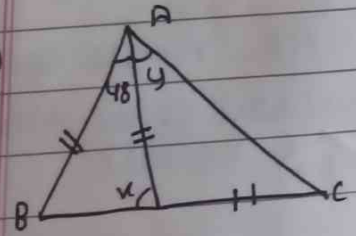
$x + 115 = 180$ (L.P)

$x = 180 - 115 \Rightarrow \boxed{x = 65°}$

In $\triangle ABC$

$\angle y = 115 - 65° = \boxed{y = 40°}$

iii)



In $\triangle ABC \Rightarrow AB = BC$ (Angles opposite to equal sides are equal)

$\angle ABC = \angle ACB = x$

In $\triangle ABC$

$48 + x + x = 180$ (A.S.P)

$2x = 180 - 48 \Rightarrow 2x = 132$

$x = \frac{132}{2} = \boxed{x = 66°}$

In $\triangle ACD \Rightarrow AC = CD$ (Angle opposite to equal sides are equal)

$\angle D = \angle CAD = y$

$\angle ACB + \angle ACD = 180$ (L.P)

$x = \angle ACD = 180°$

$66 + \angle ACD = 180° \Rightarrow \angle ACD = 180 - 66 = 114°$

In $\triangle ACD$ (A.S.P)

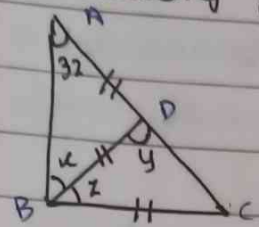
$y + y + 114 = 180$

$2y + 114 = 180$

$2y = 180 - 114$

$\boxed{y = 33°}$

4) Calculate the size of each lettered angle in the following figures:

i) 

In ΔABD $\Rightarrow$ AD = BD (Angle opposite to equal sides are equal)

$\boxed{x = 32°}$

In ΔABD

$32 + x + \angle BDA = 180$ (A.S.P)

$32° + 32° + \angle BDA = 180$

$\angle BDA = 180 - 64 \Rightarrow \boxed{\angle BDA = 116°}$

$y + 116 = 180°$ (L.P)

$y = 180 - 116 \Rightarrow \boxed{y = 64°}$

In BDC

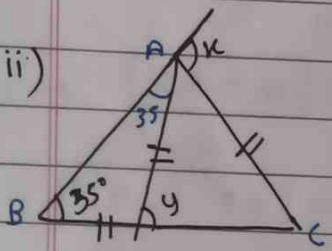
BD = BC (Angles opposite to equal sides are equal)

$\angle BCD = y = 64°$

In ΔBCD

$64 + 64 + z = 180$ (A.S.P)

$128 + z = 180 \Rightarrow z = 180 - 128 \Rightarrow \boxed{z = 52}$

ii) 

In ΔABC $\Rightarrow$ BC = AC (Angle opposite to equal sides are equal)

$\angle BAC = 35°$

$y = 35 + 55°$ (Ext angle property)

$\boxed{y = 70°}$

In ΔACD $\Rightarrow$ AC = AD (Angle opposite to equal sides are equal)

$y = \angle ADC = 70°$

$x = 35 + 70°$ (Ext angle property)

$\boxed{x = 105°}$

5) If the angles of a triangle are in the ratio 1:2:1, find all the angles of the triangle. Classify the triangle in two different ~~angles~~ ways.

Let the angle be x

$x + 2x + x = 180$ (A.S.P)

$4x = 180$

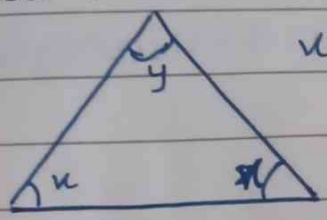
$\boxed{x = 45°}$

$2x = 2 \times 45 = 90°$

45°, 90°, 45°

Isaceles and right angle triangle

6) In an isoceles triangle, a base angle is four times its vertical angle. Find all the angles of the triangle.



x is a base angle. y is vertical angle

$x = 4y$

$x + x + y = 180°$ (A.S.P)

$4y + 4y + y = 180°$

$9y = 180$

$y = \frac{180}{9} 20 = 20°$ $\boxed{y = 20°}$

$x = 4y$

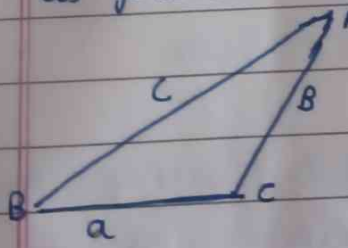
$x = 4 \times 2 = 80 \Rightarrow \boxed{x = 80°}$

Angles will be 80°, 20°, 80°

CONCEPT

SUM OF LENGTH OF TWO SIDES OF A TRIANGLE :-

The sum of length of any two sides of a triangle is greater than the length of the third side.



$a + b > c$

$b + c > a$

$a + c > b$

EXERCISE 9.4

1) Is it possible to have a triangle with the following sides:

i) 2cm, 3cm, 5cm

2cm + 3cm > 5cm

5cm > 5cm

No, it is not possible to form a triangle.

ii) 2.5 cm, 4.5 cm, 8 cm

$2.5 + 4.5 \not> 8$

$7 > 8$ Not possible to form a triangle.

iii) 10.2 cm, 5.8 cm, 4.5 cm

10.2 cm + 5.8 cm > 4.5 cm

16 cm > 4.5 cm

It is possible to form a triangle.

iv) 3.4 cm, 4.7 cm, 6.2 cm

$3.4 + 4.7 > 6.2$

8.1 cm > 6.2 cm

Yes, it forms a triangle.

2) If the length of two sides of a triangle are 7 cm and 10 cm, the what can be the lenth of the third side?

Given sides are 7 cm and 10 cm

Difference of sides = 10 cm − 7 cm = 3 cm

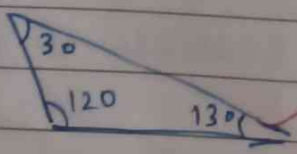
Sum of sides = 10 + 7 = 17 cm

then we, lenth of third side of a triangle must be greater than 3 cm and less than 17 cm.

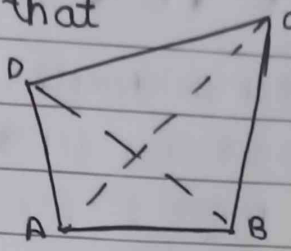
3) We know that in a triangle, the sum of the lengths of any two sides is greater than the length ~~than the length~~ of the third side. Is the sum of any angles of a triangle also greater than the third angle? If no, draw a rough sketch to show such a case.

No,

$30 + 30 = 60° < 120$



4) In the given figure, AC and BD are diagonals of a quadilateral ABCD. Show that



$AB+BC+CD+DA > AC+BD$

In ΔABC

$AB + BC > AC$ — eq ①

In ΔBCD

$BC + CD > BD$ — Eq ②

In ΔADC

$AD + CD > AC$ — Eq ③

In ΔBAD

$AB + AD > BD$ — eq ④

We know sum of two sides of a triangle is greater than the third side.

Now adding eqn ①, ②, ③, ④

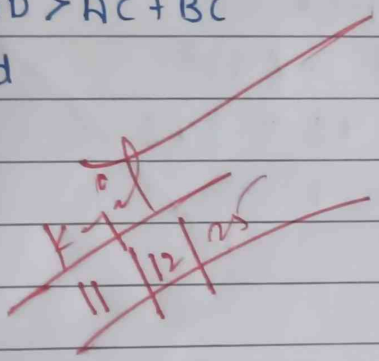
Adding eq ① ② ③ ④

$AB + BC + BC + CD + AD + CD + AB + AD > AC + BD + AC + BD$

$2(AB + BC + CD + AD) > 2(AC + BD)$

$AB + BC + CD + AD > AC + BC$

Hence proved



EXERCISE 9.5

1. PQR is a triangle, right angled at P. If PQ = 10 cm and PR = 24 cm, find QR.

$QR^2 = PQ^2 + PR^2$ (Pythagoras property)

$(10)^2 + (24)^2$

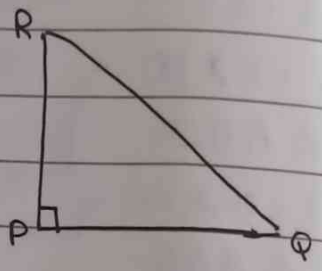
$= 100 + 576$

$= 676$

$= 26 \times 26$

$QR^2 = (26)^2$

$\boxed{QR = 26 \text{ cm}}$



2) ABC is a triangle, right angled at C. If AB = 25cm and AC = 7cm, find BC

$AB^2 = BC^2 + AC^2$

$BC^2 = AB^2 - AC^2$

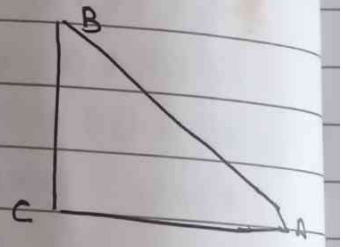
$BC^2 = (25)^2 - (7)^2$

$625 - 49 = 576$

$BC^2 = 24 \times 24$

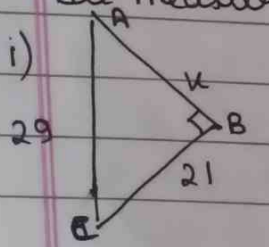
$BC^2 = (24)^2$

$\boxed{BC = 24 \text{ cm}}$



3) Find the value of x in each of the following figures. All measurements are in centimetres.

i)



$(AC)^2 = (AB)^2 + (BC)^2$

$(AC)^2 - (BC)^2 = (AB)^2$

$(AB)^2 = (AC)^2 - (BC)^2$

$(x)^2 = (29)^2 - (21)^2$

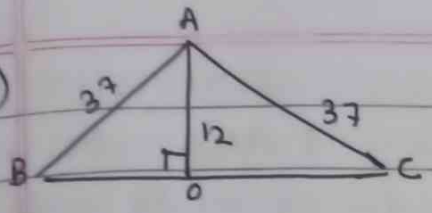
$(x)^2 = 841 - 441$

$(x)^2 = 400$

$(x)^2 = (20)^2$

$\boxed{x = 20}$

ii)



$(AB)^2 = (AO)^2 + (BO)^2$

$(BO)^2 = (AB)^2 - (AO)^2$

$= (37)^2 - (12)^2$

$1369 - 144 = 1225$

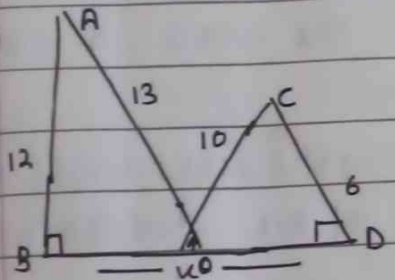
$(BO)^2 = (35)^2$

$\boxed{BO = 35}$

$BO = OC \Rightarrow 35$

$BC = 35 + 35 = 70 \quad \boxed{x = 70}$

iii)



$(AO)^2 = (AB)^2 + (BO)^2$

$(BO)^2 = (AO)^2 - (AB)^2$

$= (13)^2 - (12)^2$

$= 169 - 144 = 25$

$(BO)^2 = (5)^2$

$\boxed{BO = 5}$

~~$BO = OD = 5$~~ $(OC)^2 = (OD)^2 + (DC)^2$

~~$x = 5 + 5$~~ ~~$(10)^2 =$~~ $(OD)^2 = (OC)^2 - (DC)^2$

$(10)^2 - (6)^2$

$100 - 36 = 64$

$(OD)^2 = (8)^2 \Rightarrow \boxed{OD = 8}$

$x = BO + OD \Rightarrow 5 + 8 = 13$

4) Which of the following can be the sides of a right angled triangle?

1) 4 cm, 5 cm, 7 cm

(Longest side)^2 = Sum of the squares of other two sides

$(4)^2 + (5)^2 = (7)^2$

$16 + 25 = 49$

$41 \neq 49$ (Pythagoras property not satisfied, so given sides do not form a right angled triangle.

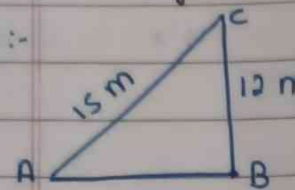
2) 1.5 cm, 2 cm, 2.5 cm.

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

$6.25 = 2.25 + 4$

$6.25 = 6.25$ A right angled triangle can be formed

5) A 15 m long ladder reaches a window 12 m high from the ground on placing it against a wall. How far is the foot of the ladder from the wall?



In right angled triangle ABC

$(AC)^2 = (AB)^2 + (BC)^2$

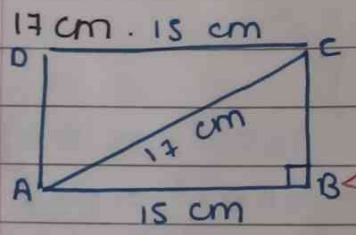
$(15)^2 = (AB)^2 + (12)^2$

$225 = (AB)^2 + 144$

$(AB)^2 = 81$ | $AB = 9$ m

The foot of the ladder from the wall is 9 m

6) Find the area and perimeter of the rectangle whose length is 15 cm and the length of one diagonal is 17 cm.



$\angle B = 90°$

$(AC)^2 = (AB)^2 + (BC)^2$

$(17)^2 = (15)^2 + (BC)^2$

$289 = 225 + (BC)^2$

$(BC)^2 = 289 - 225$ | $(BC) = \frac{64}{2}$

$BC = 8$ cm.

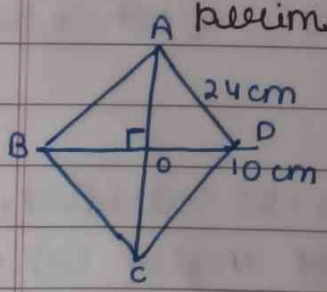
Perimeter of rectangle $= 2 \times (l + B)$

$= 2 \times (15 + 8 = 46$ cm

Area of rectangle $= l \times B \Rightarrow 15 \times 8$

$= 120$ cm^2

) If the diagonal measure 10 cm and 24 cm, find its perimeter.



ABCD is rhombus

$AO = 24$ cm

$BO = 10$ cm

$OA = \frac{AC}{2} = \frac{24}{2} = 12$ cm

$OB = \frac{OB}{2} = \frac{10}{2} = 5$ cm

In $\triangle AOB$

$(AB)^2 = (OA)^2 + (OB)^2$

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

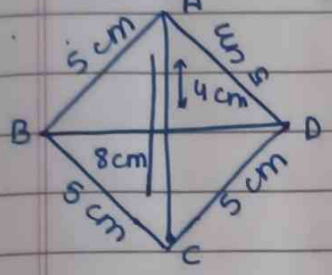
$(AB)^2 = 144 + 25 \Rightarrow (AB)^2 = 169$

$(AB) = 13$ cm

Perimeter $= 13 + 13 + 13 + 13$

$= 52$ cm.

8) The side of a rhombus is 5cm. If the length of one diagonal of the rhombus is 8 cm, then find the length of the other diagonal.



$AB = BC = CD = AD = 5$cm

$AC = 8$ cm

$OA = \frac{AC}{2} = \frac{8}{2} = 4$ cm

In ΔOAB

$(AB)^2 = (OB)^2 + (OA)^2$

$(5)^2 = (OB)^2 + (4)^2$

$(OB)^2 = 25 - 16 \Rightarrow (OB)^2 = 9$ cm

$OB = 3$ cm.

$BD = 2 \times OB \Rightarrow 2 \times 3$

BD = 6 cm

9) iii) ~~1.5 cm, 2 cm, 2.5~~

7 cm, 5.6, 4.2 cm

$(7)^2 = (5.6)^2 + (4.2)^2$

$49 = 31.36 + 17.64$

$49 = 49$

A right angled triangled can be formed.