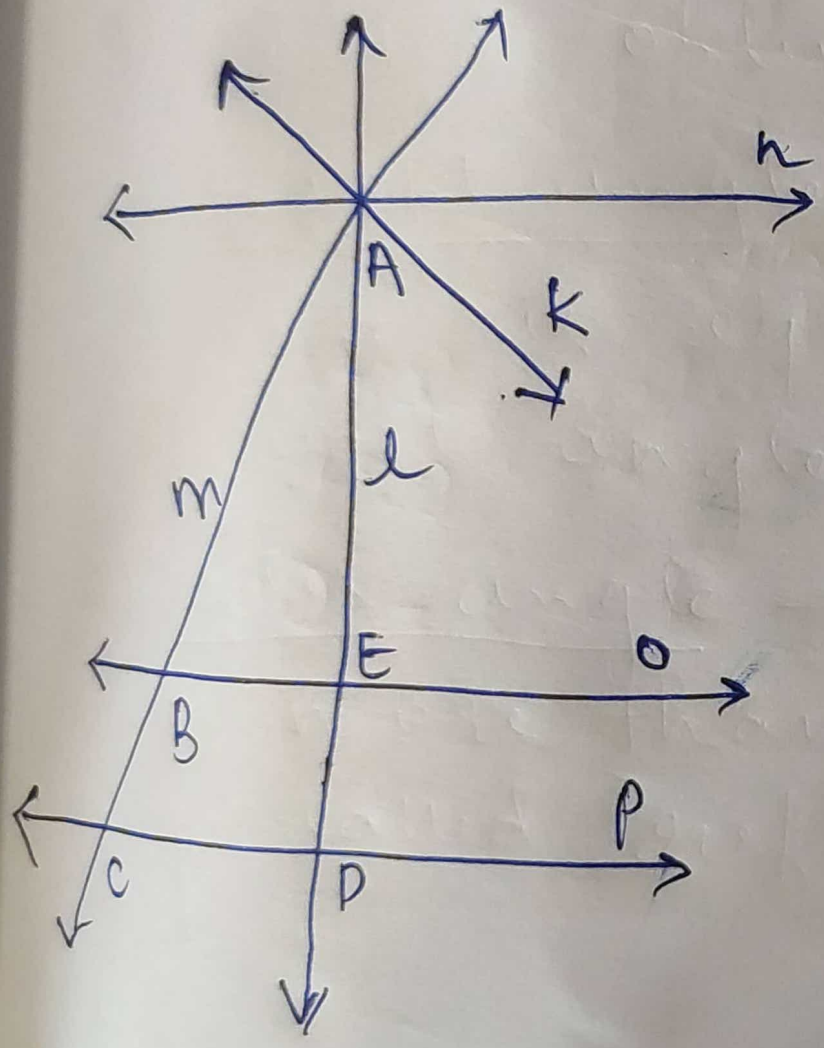
Ex 16.2

Q



(i) Pair of intersecting lines

K & L

K & m

K & n

l & n

m & n

~~o & K~~

o & l

o & m

~~P & K~~

P & l

P & m

l & m

(ii) Parallel lines

$o \parallel n$
$o \parallel p$
$n \parallel p$

(iii) Line Segments

$\overleftrightarrow{AE}$ $\overleftrightarrow{CD}$
$\overleftrightarrow{ED}$ $\overleftrightarrow{AB}$ $\overleftrightarrow{BC}$
$\overleftrightarrow{BE}$ $\overleftrightarrow{AC}$

(iv) Collinear points

A, B, C
A, E, D

(v) Concurrent lines

k, l, m & n

3) (i) obtuse angle
(ii) Reflex angle
(iii) zero angle
(iv) Reflex angle
(v) complete angle
(vi) Straight angle
(vii) Acute angle
(viii) Right angle
(ix) Acute angle

4) $120^\circ + 72^\circ + 65^\circ = 257^\circ$

$360^\circ - 257^\circ = 103^\circ$

6) (i) 45°
$90 - 45 = 45^\circ$

(ii) $90^\circ - 85^\circ = 5^\circ$

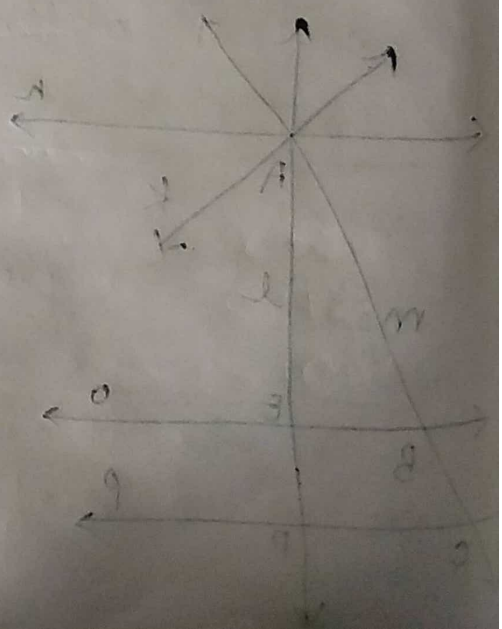
(iii) $90^\circ - 30^\circ = 60^\circ$

(iv) $90^\circ - 40^\circ = 50^\circ$

(v) $90^\circ - 10^\circ = 80^\circ$

(vi) $90^\circ - 54^\circ = 36^\circ$

(vii) $90^\circ - 61^\circ = 29^\circ$



7) (i) $180° - 61° = 119°$

(ii) $180° - 80° = 100°$

(iii) $180° - 90° = 90°$

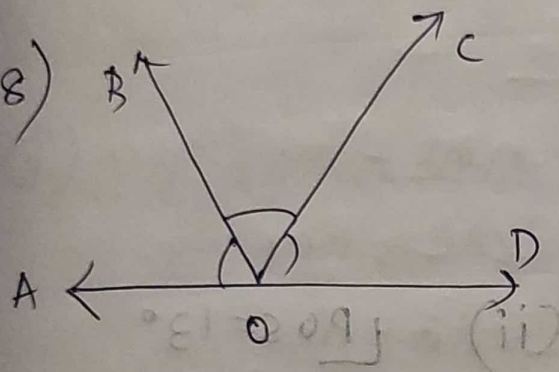
(iv) $180° - 10° = 170°$

(v) $180° - 125° = 55°$

(vi) $180° - 138° = 42°$

(vii) $180° - 38° = 142°$

8)



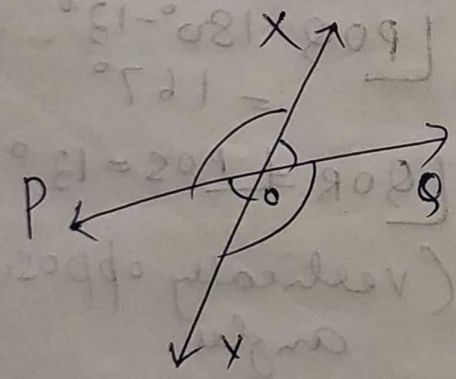
$\angle AOB$ & $\angle BOC$

$\angle BOC$ & $\angle COD$

$\angle AOC$ & $\angle COD$

$\angle AOB$ & $\angle BOD$

(ii)



$\angle POX$ & $\angle XOQ$

$\angle XOQ$ & $\angle QOY$

$\angle QOY$ & $\angle YOP$

$\angle POX$ & $\angle YOP$

$\angle POQ$ & $\angle QOP$

$\angle XOY$ & $\angle YOX$

9) $\angle POX$ & $\angle XOQ$

$\angle XOQ$ & $\angle QOY$

$\angle QOY$ & $\angle YOP$

$\angle YOP$ & $\angle POX$

10) $\angle POX$ & $\angle QOY$

$\angle QOX$ & $\angle YOP$

11) Angle covered by the minute hand of a clock in 60 min = 360°

∴ angle covered in 1 min = $\frac{360°}{60} = 6°$

(i) 45 min = 45 × 6° = 270°

(ii) 10 min = 10 × 6° = 60°

(iii) 25 min = 25 × 6° = 150°

(iv) 6 min = 6 × 6° = 36°

12) (i) $\angle AOB = 90°3$

$\angle AOD = 180° - 93° = 87°$

$\angle BOC = 180° - 93° = 87°$

$\angle COD = \angle AOB = 93°$

(vertically opposite angles are equal)

(ii) $\angle POS = 13°$

$\angle POQ = 180° - 13°$
$= 167°$

$\angle QOR = \angle POS = 13°$

(vertically opposite angles

$\angle ROS = \angle POQ = 167°$

13)

(ii) $x + 130° = 180°$ – Linear pair

$x = 180° - 130°$

$x = 50°$

(iv) $(x + 20) + x = 180°$ Linear pair

$2x + 20° = 180°$

$2x = 180° - 20° = 160°$

$x = \frac{160}{2} = 80°$

$x + 20°$
$80° + 20°$
$= 100°$.

iii) $x = 57°$ (Vertically opposite angle)

iv) $(x+18)+x = 180°$ → Linear pair

$2x+18 = 180°$

$2x = 180° - 18°$

$2x = 162$

$x = \frac{162}{2} = 81°$

(v) $x + 2x + 3x + 4x = 360°$

$10x = 360°$

$x = 36°$

(vi) $x + 2x = 180°$ ---Linear pair

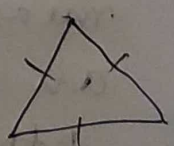
$3x = 180°$

$x = 60°$

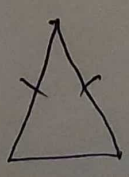
Types of Triangles

Based on length of sides →

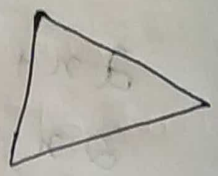
1) Equilateral triangle → A triangle in which all the three sides are equal to each other is known as equilateral triangle.
All the angles is equal to 60°.



2) Isosceles triangle → If two sides of a triangle are equal, it is known as isosceles triangle.

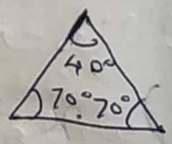


3) Scalene triangle → If no two sides of a triangle are equal, it is known as scalene triangle.

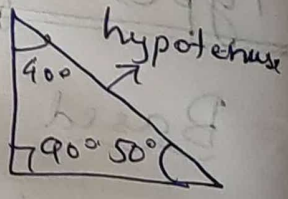


Based on magnitude of angles

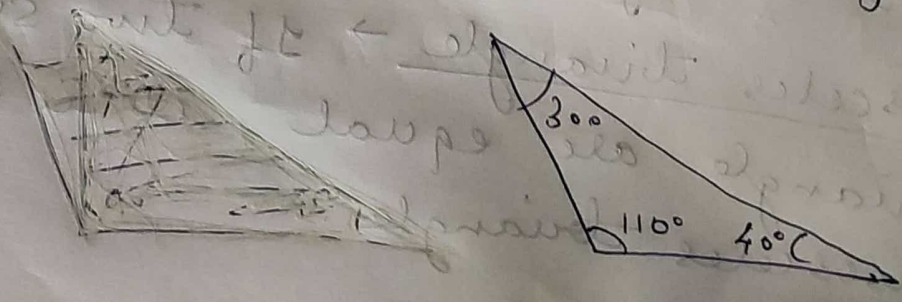
1) Acute Angled triangle →
A triangle in which all the three angles are acute angles is known as an acute angled triangle.



2) Right Angled Triangle →
A triangle in which one of the three angles is a right angle is known as a right angled triangle.
The side opposite to right angle is called the hypotenuse.



3) Obtuse Angled triangle →
A triangle with one of the angles measuring more than 90° is known as an obtuse angled triangle.
Other two angles are acute angles.



Important Properties of Triangles

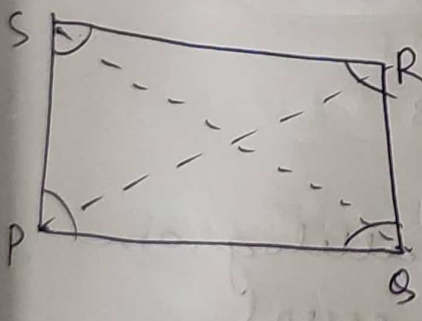
1) The sum of all interior angles of a triangle is 180°

2) An exterior angle is equal to the sum of its two opposite interior angles.

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

Quadrilateral

A quadrilateral is a closed figure bounded by four line segments.



The elements of quadrilateral PQRS are-

(i) 4 vertices = P, Q, R, S

(ii) 4 sides = PQ, QR, RS, SP

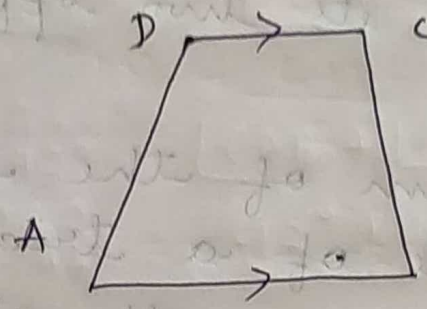
(iii) 4 angles = $\angle P$, $\angle Q$, $\angle R$, $\angle S$

(iv) 2 diagonals = PR & QS

The sum of the four angles of a quadrilateral equals 360°.

Types of Quadrilaterals

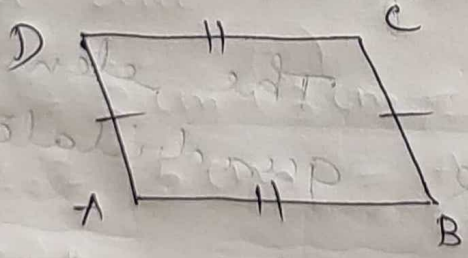
1) Trapezium → A trapezium is a quadrilateral in which one pair of opposite sides is parallel to each other.



2) Parallelogram

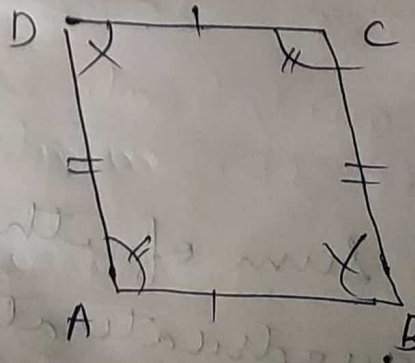
A quadrilateral in which both pairs of opposite sides are parallel to each other is known as a parallelogram.

Opposite sides & opposite angles are equal in parallelogram.

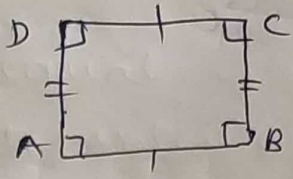


3) Rhombus →

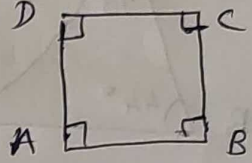
A rhombus is a parallelogram in which all sides are equal.



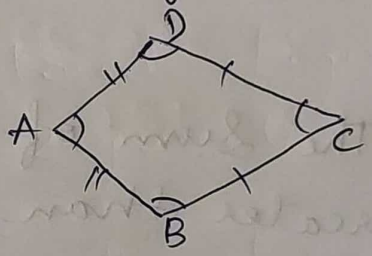
4) **Rectangle** → A rectangle is a parallelogram with all angles equal to 90°. Opposite sides are parallel & equal.



5) **Square** → A Square is a rhombus with all angles equal to 90° and also all 4 sides are equal and parallel To each other.

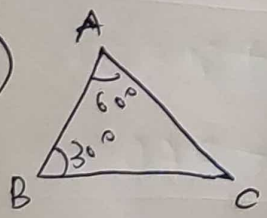


6) **Kite** → A Kite is a quadrilateral in which two pairs of adjacent sides are equal



Ex 16.3

3) (i)



$\angle ABC = 30°$

$\angle CAB = 60°$

$\angle ABC + \angle CAB + \angle BCA = 180°$

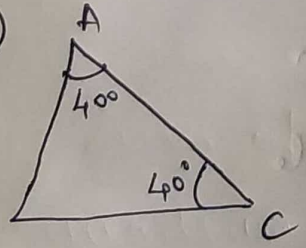
$30° + 60° + \angle BCA = 180°$

$90° + \angle BCA = 180°$

$\angle BCA = 180 - 90$

$\angle BCA = 90°$

(ii)



$\angle CAB = 40°$

$\angle BCA = 40°$

$\angle ABC + \angle CAB + \angle BCA = 180°$

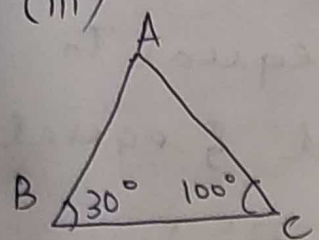
$\angle ABC + 40° + 40° = 180°$

$\angle ABC + 80° = 180°$

$\angle ABC = 180 - 80$

$\angle ABC = 100°$

(iii)



$\angle BCA = 100°$

$\angle ABC = 30°$

$\angle ABC + \angle CAB + \angle BCA = 180°$

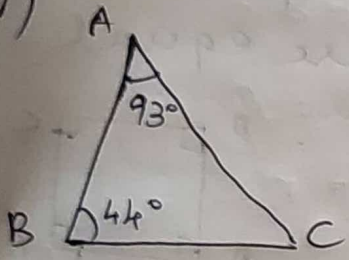
$30° + \angle CAB + 100° = 180°$

$\angle CAB + 130° = 180°$

$\angle CAB = 180° - 130°$

$\angle CAB = 50°$

(iv)



$\angle CAB = 93°$

$\angle ABC = 44°$

$\angle CAB + \angle ABC + \angle BCA = 180°$

$93° + 44° + \angle BCA = 180°$

$137° + \angle BCA = 180°$

$\angle BCA = 180 - 137$

$\angle BCA = 43°$

4) The sum of any two sides must be greater than the third side

(i) Since $BC + AC = 2\,cm + 3\,cm =$

$= 5\,cm = AB$

So $AB = AB$

$\therefore \Delta ABC$ is not possible.

(ii) $PQ = 10\,cm$, $QR = 5\,cm$, $PR = 4\,cm$.

$QR + PR = 5\,cm + 4\,cm.$

$= 9\,cm < PQ = 10\,cm$

$\therefore \Delta PQR$ is not possible.

(iv) DE = 12cm, EF = 8cm, FD = 14 cm.

$12+8 = 20\text{cm} > 14\text{ cm}$.

$8+14 = 22\text{cm} > 12\text{ cm}$.

ΔDEF is possible because sum of any two sides is greater than the third side.

Q5) (i) $x + 50 + 90 = 180°$

Sum of the angles of a triangle is 180°

$x + 140° = 180°$

$x = 180 - 140°$

$x = 40°$.

(ii) $x + 2x + 3x = 180°$

$6x = 180°$

$x = \frac{180°}{6}$

$x = 30°$

(iii) Exterior angle = Sum of two interior opposite angles

$x + 45° = 128°$

$x = 128° - 45°$

$x = 83°$

(iv) $x + 65 + 50°$

$x = 115°$.

v) $x + x = 140°$

$2x = 140°$

$x = \frac{140}{7}$ $x = 70°$

(vi) $x + 2x = 90°$

$3x = 90°$

$x = \frac{90}{3}$

$x = 30°$

7) (i) $105°$, $93°$ and $85°$

Sum of the 4 angles of a quadrilateral $= 360°$

Let 4th angle be $x°$

$105° + 93° + 85° + x = 360$

$283 + x = 360°$

$x = 360 - 283$

$x = 77°$

(ii) $45 + 121 + 68 + x = 360°$

~~264~~ $234 + x = 360$

$x = 360 - 234$

$x = 126°$

(iii) $72 + 84 + 111 + x = 360$

$267 + x = 360$

$x = 360 - 267$

$x = 93°$

(iv) $91 + 93 + 95 + x = 360°$

$279° + x = 360°$

$x = 360 - 279$

$x = 81°$

(v) $147 + 69 + 55 + x = 360°$

$271 + x = 360$

$x = 360° - 271°$

$x = 89°$

(vi) $103 + 67 + 82 + x = 360°$

$252 + x = 360°$

$x = 360° - 252°$

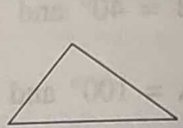
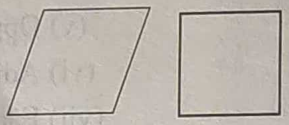
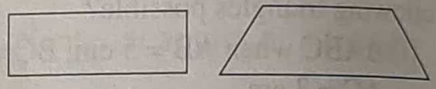
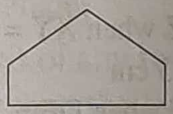
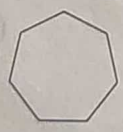
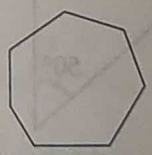
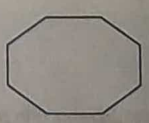
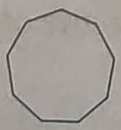
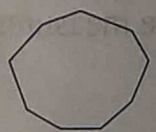
$x = 108°$

SIMPLE POLYGONS

We have already discussed figures with three sides, i.e. triangles and the ones with four sides, i.e. quadrilaterals in detail. As we know these are all *polygons*, which are many-sided closed figures. Polygons are also referred to as simple polygons. Polygons are classified on the basis of the number of sides. There are further two types of polygons:

1. Regular Polygons: These are polygons, whose sides are all of equal lengths.
2. Irregular Polygons: Polygons whose sides are not all of equal lengths are called irregular polygons.

In the table below, we can see the different polygons classified according to the number of sides. These are further divided according to regular and irregular polygons.

Sides	Name	Figure	
		Regular	Irregular
3	Triangle	 Equilateral Triangle	 Scalene Triangle  Isosceles Triangle
4	Quadrilateral	 Rhombus, Square	 Rectangle, trapezium, etc
5	Pentagon	 Regular Pentagon	 Irregular Pentagon
6	Hexagon	 Regular Hexagon	 Irregular Hexagon
7	Heptagon	 Regular Heptagon	 Irregular Heptagon
8	Octagon	 Regular Octagon	 Irregular Octagon
9	Nonagon	 Regular Nonagon	 Irregular Nonagon