Pakistan School
Kingdom of Bahrain

Welcome Class 10th (arts)

Introduction to coordinate geometry

Objectives

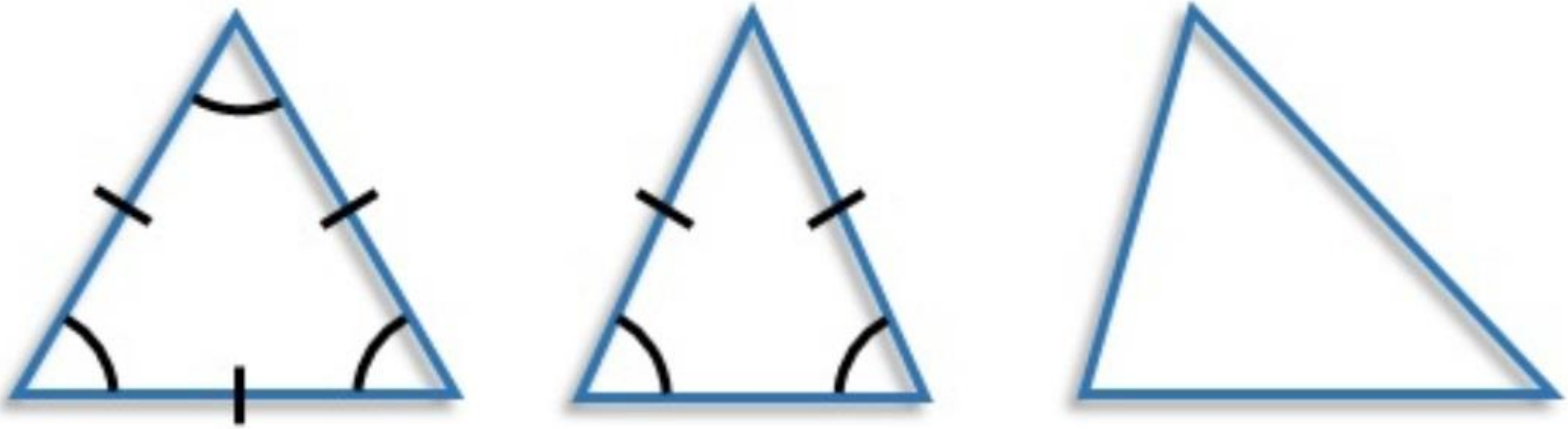
Students will be able to:

Use distance formula to solve triangles

Equilateral
(3 sides, 3 angles equal)

Isosceles
(2 sides, 2 angles equal)

Scalene
(0 sides, 0 angles equal)



Show that the points $A(3,1)$ $B(-2,-3)$ and $C(2,2)$ are vertices of an Isosceles triangle.

SOLUTION: Given $A(3,1)$, $B(-2,-3)$ and $C(2,2)$.

Let $\overline{AB}=c$, $\overline{BC}=a$ and $\overline{CA}=b$ be the lengths of the sides of a $\Delta\, ABC$.

Using distance formula, we have

$$a=\left|\overline{BC}\right|=\sqrt{(2-(-2))^2+(2+3)^2}=\sqrt{4^2+5^2}=\sqrt{41}$$

$$b=\left|\overline{CA}\right|=\sqrt{(3-2)^2+(1-2)^2}=\sqrt{1^2+1^2}=\sqrt{2}$$

$$c=\left|\overline{AB}\right|=\sqrt{(-2-3)^2+(-3-1)^2}=\sqrt{5^2+4^2}=\sqrt{41}$$

$$\left|\overline{AB}\right|=\left|\overline{BC}\right|$$

Here $c=a=\sqrt{41}$

That is, the two sides are equal in length.

Thus, Δ ABC is an Isosceles triangle.

Show that the points $A(-3,0)$, $B(3,0)$ and $C(0,3\sqrt{3})$ are the vertices of an equilateral triangle.

SOLUTION: Given $A(-3,0)$, $B(3,0)$ and $C(0,3\sqrt{3})$.

Using distance formula, we have,

$$\left|\overline{AB}\right| = \sqrt{(-3-3)^2+(0-0)^2} = \sqrt{(-6)^2} = \sqrt{36} = 6$$

$$\left|\overline{BC}\right| = \sqrt{(3-0)^2+(0-3\sqrt{3})^2} = \sqrt{9+27} = \sqrt{36} = 6$$

$$\left|\overline{AC}\right| = \sqrt{(-3-0)^2+(0-3\sqrt{3})^2} = \sqrt{9+27} = \sqrt{36} = 6$$

Here $\left|\overline{AB}\right| = \left|\overline{BC}\right| = \left|\overline{AC}\right| = 6$

That is, three sides of ΔABC are equal in length.

Thus, ΔABC is an equilateral triangle.

Show that the points $A(5,3)$ $B(-2,2)$ and $C(4,2)$ are vertices of a scalene triangle.

SOLUTION: Given $A(5,3)$ $B(-2,2)$ and $C(4,2)$.

Let $\overline{BC} = a$, $\overline{CA} = b$, $\overline{AB} = c$ be the lengths of the sides of a ΔABC.

Using distance formula, we have

$$|\overline{BC}| = a = \sqrt{(4+2)^2 + (2-2)^2} = \sqrt{6^2} = 6$$

$$|\overline{CA}| = b = \sqrt{(5-4)^2 + (3-2)^2} = \sqrt{1^2 + 1^2} = \sqrt{2}$$

$$|\overline{AB}| = c = \sqrt{(-2-5)^2 + (2-3)^2} = \sqrt{7^2 + 1^2} = \sqrt{50} = 5\sqrt{2}$$

As, $|\overline{AB}| = c$, $|\overline{BC}| = a$, $|\overline{CA}| = b$ are all different in length.

Thus ΔABC is a scalene triangle.

Activity

Show that the points A (4, –2), B(–2, 4) and C(5, 5)are vertices of an isosceles triangle.

Solution: Here A (4, -2), B(-2, 4) and C(5, 5)

$$|\overline{AB}| = \sqrt{(-2-4)^2 + [4-(-2)]^2}$$
$$= \sqrt{(-2-4)^2 + (4+2)^2}$$
$$= \sqrt{(-6)^2 + (6)^2}$$
$$= \sqrt{36+36}$$
$$= \sqrt{72}$$
$$= \sqrt{2\times2\times3\times3\times2} = 2\times3\sqrt{2} = 6\sqrt{2}$$

$$|\overline{BC}| = \sqrt{[-5(-2)]^2 + (5-4)^2}$$
$$= \sqrt{(5+2)^2 + (5-4)^2}$$
$$= \sqrt{(7)^2 + (1)^2}$$
$$= \sqrt{49+1}$$
$$= \sqrt{50}$$
$$= \sqrt{5\times5\times2}$$
$$= 5\sqrt{2}$$

$$|\overline{AC}| = \sqrt{(5-4)^2 + [5-(-2)]^2}$$
$$= \sqrt{(5-4)^2 + [5+2]^2}$$
$$= \sqrt{(1)^2 + (7)^2}$$
$$= \sqrt{1+49}$$
$$= \sqrt{50}$$
$$= \sqrt{5\times5\times2}$$
$$= 5\sqrt{2}$$

Since $|\overline{BC}| = |\overline{AC}| = 5\sqrt{2}$

Thus, triangle is an isosceles.

Homework

Ex 10.1 Q 11, 12, 13