ODM EDUCATIONAL GROUP
Changing your Tomorrow

COORDINATE GEOMETRY

INTRODUCTION

SUBJECT : MATHEMATICS
CHAPTER NUMBER: 07
CHAPTER NAME : COORDINATE GEOMETRY

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LEARNING OUTCOME

1. Students will be able to plot points in coordinate plane.

2.Students will be able to apply distance formula to find the distance between two points.

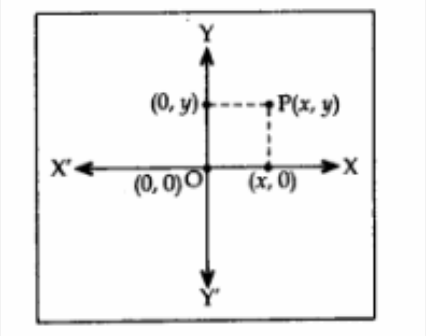
3.. Students will be able to apply distance formula to know whether three points are collinear or not.

4.Students will be able to apply distance formula to solve on problems based on geometrical figure.

Why coordinate geometry
https://youtu.be/QYAnXiZC5kQ (5.45))

Position of a point P in the Cartesian plane with respect to co-ordinate axesis represented by the ordered pair

(x, y).



1.The line X'OX is called the X-axis and YOY' is called the Y-axis.

2.The part of intersection of the X-axis and Y-axis is called the origin O andthe co-ordinates of O are (0, 0).

3.The perpendicular distance of a point P from the Y-axis is the 'x' co-ordinate and is called the abscissa.

4.The perpendicular distance of a point P from the X-axis is the 'y' co-ordinate and is called the ordinate.

5. Any point on the X-axis is of the form (x, 0).

6 .Any point on the Y-axis is of the form (0, y)

Distance formula ;
https://youtu.be/yLlXOSAwpDw (5.45).

Distance between Two Points Using Pythagoras Theorem

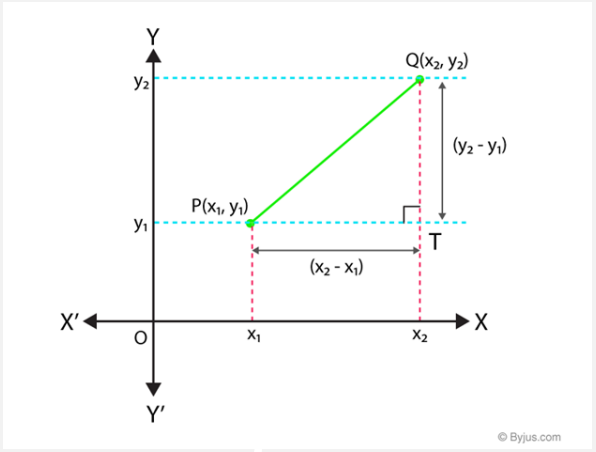
Let P(x_1, y_1) and Q(x_2, y_2)) be any two points on the cartesian plane. Draw lines parallel to the axes through P and Q to meet at T.

ΔPTQ is right-angled at T.

By Pythagoras Theorem, $PQ^2 = PT^2 + QT^2$

$= (X_2 - X_1)^2 + (Y_2 - Y_1)^2$

$PQ = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$



The distance between two points P(x_1, y_1) and Q(x_2, y_2)) is given by

$PQ = \sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$

Note. If O is the origin, the distance of a point P(x, y) from the origin O(0, 0) is given by

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

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1. Find the distance between the following pairs of points : (i) (2, 3), (4, 1)

(ii) (– 5, 7), (– 1, 3) (iii) (a, b), (– a, – b)

(i) Let the given points be P(2, 3) and Q(4, 1).

Then $x_1 = 2, y_1 = 3, x_2 = 4$ and $y_2 = 1$

$$\therefore \text{Distance PQ} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(4-2)^2 + (1-3)^2}$$

$$= \sqrt{(2)^2 + (-2)^2} = \sqrt{4+4}$$

$$= \sqrt{8} = \mathbf{2\sqrt{2}}\ \mathbf{units}.$$

(ii) Let the given points be P(−5, 7) and Q(−1, 3).

Then $x_1 = -5, y_1 = 7, x_2 = -1$ and $y_2 = 3$

$$\therefore \text{Distance PQ} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-1+5)^2 + (3-7)^2}$$

$$= \sqrt{(4)^2 + (-4)^2} = \sqrt{16+16}$$

$$= \sqrt{32} = \mathbf{4\sqrt{2}}\ \mathbf{units}.$$

(iii) Let the given points be $P(a, b)$ and $Q(-a, -b)$.

Then $x_1 = a, y_1 = b, x_2 = -a$ and $y_2 = -b$

$$\therefore \text{Distance PQ} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$= \sqrt{(-a - a)^2 + (-b - b)^2}$$

$$= \sqrt{(-2a)^2 + (-2b)^2}$$

$$= \sqrt{4a^2 + 4b^2}$$

$$= \mathbf{2\sqrt{a^2 + b^2}\ units.}$$

2. Find the distance between the points (0, 0) and (36, 15))

2. Find the distance between the points (0, 0) and (36, 15))

Let points be A (0, 0) and B (36, 15)

The distance between two points is

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(36 - 0)^2 + (15 - 0)^2}$$

$$= \sqrt{1296 + 225} = \sqrt{1521} = 39 \text{ units}$$

3.Determine if the points (1, 5), (2, 3) and (– 2, – 11) are collinear

3.Determine if the points (1, 5), (2, 3) and (– 2, – 11) are collinear

Let the given points are A (1, 5), B (2, 3) and C (-2, -11). Then:

$$AB = \sqrt{(2-1)^2 + (3-5)^2} = \sqrt{(1)^2 + (-2)^2}$$

$$= \sqrt{1+4} = \sqrt{5}.$$

$$BC = \sqrt{(-2-2)^2 + (-11-3)^2} = \sqrt{(-4)^2 + (-14)^2}$$

$$= \sqrt{16+196} = \sqrt{212} = 2\sqrt{53}.$$

$$AC = \sqrt{(-2-1)^2 + (-11-5)^2} = \sqrt{(-3)^2 + (-16)^2}$$

$$= \sqrt{9+256} = \sqrt{265}.$$

Since AB + BC ≠ AC

Hence, the given points are not collinear.

4. Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an isosceles triangle

4. Check whether (5, – 2), (6, 4) and (7, – 2) are the vertices of an isosceles triangle

Let points be A(5, -2), B (6, 4) and C (7, -2)

$$AB = \sqrt{(6-5)^2+(4+2)^2} = \sqrt{1+36} = \sqrt{37}$$

$$BC = \sqrt{(7-6)^2+(-2-4)^2} = \sqrt{1+36} = \sqrt{37}$$

$$AC = \sqrt{(7-5)^2+(-2+2)^2} = \sqrt{4+0} = 2$$

Here, AB = BC

ΔABC is an isosceles triangle.

HOME ASSIGNMENT Ex. 7.1 Q. No 1 to Q 5

AHA

1.Find a relation between x and y such that the point (x , y) is equidistant from the points (7, 1) and (3, 5).

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THANKING YOU

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