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Co-ordinate Geometry

Q) Find the distance between i) (2, 3) and (4, -5)
$x_1\ y_1$ $x_2\ y_2$

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

$$= \sqrt{(-5-3)^2 + (4-2)^2}$$

$$= \sqrt{(-8)^2 + (2)^2}$$

$$= \sqrt{64+4} = \sqrt{68} = \sqrt{2 \times 2 \times 17} = 2\sqrt{17}$$

ii) (-2, -4) (4, -5)

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

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

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

iii) (a, b), (-a, -b)

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

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

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

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

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

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

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Q) Prove that (3,1), (6,4) and (8,6) collinear.

Ans) Let the points be A(3,1), B(6,4) and C(8,6)

A B C

(3,1) (6,4) (8,6)

$x_1 y_1$ $x_2 y_2$ $x_3 y_3$

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

$= \sqrt{(4-1)^2 + (6-3)^2}$

$= \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

$BC = \sqrt{(x_3-x_2)^2 + (y_3-y_2)^2}$

$= \sqrt{(8-6)^2 + (6-4)^2}$

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

$= \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$

$CA = \sqrt{(x_3-x_1)^2 + (y_3-y_1)^2}$

$= \sqrt{(8-3)^2 + (6-1)^2}$

$= \sqrt{(5)^2 + (5)^2} = \sqrt{25+25}$

$= \sqrt{50} = 5\sqrt{2}$

Yes it is collinear.

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Q2) Find the distance between the points (0,0) and (36, 15).

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

The distance between two points is

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

$= \sqrt{(36-0)^2 + (15-0)^2}$

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

Q3) Determine if the points (1,5), (2,3) and (-2,-11) are collinear.

Ans) 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 $AB + BC \neq AC$

Hence, the given points are not collinear.

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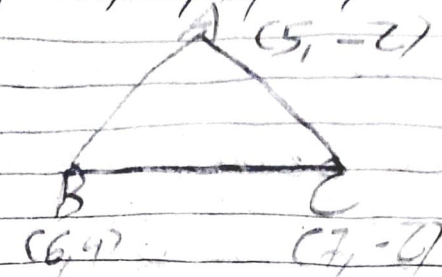
(Ex) (5, −2), (6, 4), (7, −2)



Let the point be

A(5, −2), B(6, 4), C(7, −2)

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

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

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

$AB = BC$

$\triangle ABC$ is an isosceles.

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Q5) In a classroom, 4 friends are seated in the points A, B, C and D as shown in Fig. Champa and Chameli walk into the class and after observing for a few minutes Champa and Chameli they decided whether it is a square or not?

Ans) Points A(3,4), B(6,7), C(9,4) and D(6,1)

$AB = \sqrt{(6-3)^2 + (7-4)^2}$

$= \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

$BC = \sqrt{(9-6)^2 + (4-7)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

$CD = \sqrt{(6-9)^2 + (1-4)^2} = \sqrt{9+9} = 3\sqrt{2}$

$AD = \sqrt{(6-3)^2 + (1-4)^2} = \sqrt{9+9} = 3\sqrt{2}$

$AC = \sqrt{(9-3)^2 + (4-4)^2} = \sqrt{36+0} = 6$

$BD = \sqrt{(6-6)^2 + (1-7)^2} = \sqrt{0+36} = 6$

Here $AB = BC = CD = DA$ and $AC = BD$

ABCD is a square. Hence Champa is correct.