Coordinate Geometry :

1) i) (2,3), (4,1)

Ans: Let point A be (2,3) and point B be (4,1).

$x_1 = 2, y_1 = 3, x_2 = 4, y_2 = 1.$

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

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

→ $AB = \sqrt{(4-2)^2 + (1-3)^2}$

→ $AB = \sqrt{(2)^2 + (-2)^2}$

→ $AB = \sqrt{4+4}$

→ $AB = \sqrt{8}$

→ $AB = 2\sqrt{2}$

ii) (-5,7), (-1,3)

Let point A be (-5,7) and point B be (-1,3).

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

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

→ $AB = \sqrt{(-1-(-5))^2 + (3-7)^2}$

→ $AB = \sqrt{16 + 16}$

→ $AB = \sqrt{32}$

→ $AB = 4\sqrt{2}.$

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

Let point A be (a,b) and point B be (-a,-b).

$x_1 = a, y_1 = b, x_2 = -a, y_2 = -b.$

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

→ $AB = \sqrt{(-a-a)^2 + (-b-b)^2}$

→ $AB = \sqrt{(-2a)^2 + (-2b)^2}$

→ $AB = \sqrt{4a^2 + 4b^2}.$

→ $AB = 2\sqrt{a^2 + \cancel{2}b^2}.$

2) $(0,0), (36,15)$

→ $\sqrt{(36-0)^2+(15-0)^2}$

→ $\sqrt{1296+225}$

→ $\sqrt{1521}$

→ 39

(3) Let $A(1,5)$, $B(2,3)$, and $C(-2,-11)$ be the given points.

→ $AB = \sqrt{(2-1)^2+(3-5)^2}$

→ $AB = \sqrt{(1)^2+(-2)^2}$

$AB = \sqrt{1+4}$

$AB = \sqrt{5}$

→ $BC = \sqrt{(\cancel{-2}-2)^2+(-11-3)^2}$

→ $BC = \sqrt{(-4)^2+(-14)^2}$

→ $BC = \sqrt{16+196}$

→ $BC = \sqrt{212}$

→ $AC = \sqrt{(1-2)^2+(5+11)^2}$

$AC = \sqrt{(3)^2+(16)^2}$

$AC = \sqrt{9+256}$

$AC = \sqrt{265}$

$AB + BC = AC$

$\sqrt{5}+\sqrt{212} \neq \sqrt{265}$

∴ Therefore, they are not collinear.

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

→ $AB = \sqrt{(6-5)^2+(4-(-2))^2}$

→ $\sqrt{(1)^2+(6)^2}$

→ $\sqrt{1+36}$

→ $\sqrt{37}$

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

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

$\sqrt{1+36}$

$\sqrt{37}$

~~$AC = \sqrt{(-2-(-2))^2+($~~

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

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

$= \sqrt{4}$

$= 2$.

∴ Yes.

(6) Let point $A = (3, 4)$
$B = (6, 7)$
$C = (9, 4)$
$D = (6, 1)$

$AB = \sqrt{(6-3)^2 + (7-4)^2}$	$BC = \sqrt{(9-6)^2 + (4-7)^2}$	$CD = \sqrt{(6-9)^2 + (1-4)^2}$	$DA = \sqrt{(6-3)^2 + (1-4)^2}$
$AB = \sqrt{(3)^2 + (3)^2}$	$BC = \sqrt{(3)^2 + (-3)^2}$	$CD = \sqrt{(-3)^2 + (-3)^2}$	$DA = \sqrt{(3)^2 + (-3)^2}$
$AB = \sqrt{9+9}$	$BC = \sqrt{9+9}$	$CD = \sqrt{9+9}$	$DA = \sqrt{9+9}$
$AB = \sqrt{18}$	$BC = \sqrt{18}$	$CD = \sqrt{18}$	$DA = \sqrt{18}$
$AB = 3\sqrt{2}$	$BC = 3\sqrt{2}$	$CD = 3\sqrt{2}$	$DA = 3\sqrt{2}$.

$\because$ 4 sides are equal

$AC = \sqrt{(9-3)^2 + (4-4)^2}$	$BD = \sqrt{(6-6)^2 + (1-7)^2}$
$AC = \sqrt{(6)^2 + (0)^2}$	$BD = \sqrt{(0)^2 + (-6)^2}$
$AC = \sqrt{36}$	$BD = \sqrt{0+36}$
$AC = 6$	$BD = \sqrt{36} = 6$

$\because$ diagonals are also equals.

$\therefore$ Therefore, Champa is correct

(8) A B C D

(i) $(-1, -2), (1, 0), (-1, 2), (-3, 0)$.

Ans:

$AB = \sqrt{(1-(-1))^2 + (0-(-2))^2}$	$BC = \sqrt{(-1)-1)^2 + (2-0)^2}$	$CD = \sqrt{(-3-(-1))^2 + (0-2)^2}$
$= \sqrt{(2)^2 + (2)^2}$	$= \sqrt{(-2)^2 + (2)^2}$	$CD = \sqrt{(-3+1)^2 + (-2)^2}$
$= \sqrt{4+4}$	$= \sqrt{4+4}$	$CD = \sqrt{4+4}$
$= \sqrt{8}$	$= \sqrt{8}$	$CD = \sqrt{8}$
$= 4\sqrt{2}$	$= 4\sqrt{2}$	$CD = 4\sqrt{2}$.

$DA = \sqrt{-1-(-3))^2 + (-2-0)^2}$	$AC = \sqrt{(-1-(-1))^2 + (2-(-2))^2}$	$BD = \sqrt{(-3-1)^2 + (0-0)}$
$DA = \sqrt{(-1+3)^2 + (-2)^2}$	$= \sqrt{(-1+1)^2 + (4)^2}$	$BD = \sqrt{(-4)^2 + 0}$
$DA = \sqrt{8}$	$= \sqrt{16}$	$BD = \sqrt{16}$
$DA = 4\sqrt{2}$	$= 4$	$BD = 4$

$\therefore$ It is a ~~rhombus~~ square as the 4 sides are equal and the diagonals are also equal.

(ii) $A = (-3,5)$, $B = (3,1)$, $C = (0,3)$, $D = (-1,-4)$

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

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

$\sqrt{36+16}$

$\sqrt{52}$

$BC = \sqrt{(0-3)^2+(3-1)^2}$

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

$\sqrt{9+4}$

$\sqrt{13}$

$CD = \sqrt{(-1-0)^2+(-4-3)^2}$

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

$CD = \sqrt{(1)+49}$

$CD = \sqrt{50}$

$DA = \sqrt{(-3+1)^2+(5+4)^2}$

$= \sqrt{(-2)^2+(9)^2}$

$= \sqrt{4+81}$

$= \sqrt{85}$

$\therefore$ No quadrilateral figure

(iii) $\overset{A}{(4,5)}, \overset{B}{(7,6)}, \overset{C}{(4,3)}, \overset{D}{(1,2)}$

$\Rightarrow$ $AB = \sqrt{(7-4)^2+(6-5)^2}$

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

$= \sqrt{9+1}$

$= \sqrt{10}$

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

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

$= \sqrt{9+9}$

$= \sqrt{18} = 3\sqrt{2}$.

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

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

$CD = \sqrt{9+1}$

$CD = \sqrt{10}$

$DA = \sqrt{(4-1)^2+(5-2)^2}$

$DA = \sqrt{(3)^2+(3)^2}$

$DA = \sqrt{9+9}$

$DA = \sqrt{18} = 3\sqrt{2}$.

$\therefore$ It is a rectangle.

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(7) Let point A (2,-5), and B(-2,9) and ~~point~~ P(x,0)

$(2-x)^2+(-5-0)^2=(-2-x)^2+(-9-0)^2$

$\cancel{4}+\cancel{x^2}-4x+25=\cancel{4}+\cancel{x^2}+4x+81$

$-8x=81-25$

$-8x=56$

$-x=\frac{56}{8}$

$\boxed{x=-7}$

$\therefore$ $(-7,0)$

(8) $x_1=2, y_1=-3$

$x_2=10, y_2=y$

distance $=10$

Squa

$PQ = \sqrt{(10-2)^2 + (y-(-3))^2}$

$PQ = \sqrt{(8)^2 + (y+3)^2}$

Squaring both sides,

$PQ^2 = \sqrt{((8)^2)^2 + ((y+3)^2)^2}$

$\cancel{PQ}\ 100 = \cancel{\sqrt{}}(8)^2 + (y+3)^2$

$100 = 64 + y^2 + 9 + 6y$

$y^2 = 100 - 64 - 9 - 6y$

$\cancel{90} = y^2 \cancel{+} 100 + 64 + 9 + 6y$

$y^2 + 9y - 3y - 27$

$y(y+9) - 3(y+9) = 0$

$(y-3)(y+9) = 0$ | Hence, $y = 3$ or $y = -9$

(9) $P(5,-3)$ and $Q(x,6)$.
and $(0,1)$ is equidistant from P and R

$x_1 = 5$, $y_1 = -3$
$x_2 = x$, $y_2 = 6$

$$(5-0)^2 + (-3-1)^2 = (x-0)^2 + (6-1)^2$$
$$(5)^2 + (-4)^2 = (x)^2 + (5)^2$$
$$\cancel{25} + 16 = x^2 + \cancel{25}$$
$$x^2 = 16$$
$$\boxed{x = \pm 4}$$
$$\boxed{Q = \pm 4}$$

(10) $\sqrt{(3-x)^2+(6-y)^2} = \sqrt{(-3-x)^2+(4-y)^2}$

Squaring both sides

$\Rightarrow$

$= \left(\sqrt{(3-x)^2+(6-y)^2}\right)^2 = \left(\sqrt{(-3-x)^2+(4-y)^2}\right)^2$

$= (3-x)^2+(6-y)^2 = (-3-x)^2+(4-y)^2$

$\Rightarrow$ $\cancel{9}+\cancel{x^2}-6x+36+\cancel{y^2}-12y = \cancel{9}+\cancel{x^2}+6x+16+\cancel{y^2}-8y$

$= -6x-6x-12y+8y+36-16=0$

$= -12x-4y+20$

$= -4(3x+y-20)$

$= 3x+y = \frac{20}{-4}$

$= 3x+y-5=0$