(5) Using distance formula,

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

$= \sqrt{(3)^2 + (3)^2} = \sqrt{9+9} = \sqrt{18}$

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

$= \sqrt{(3)^2 + (-3)^2} = \sqrt{9+9} = \sqrt{18}$

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

$= \sqrt{(-3)^2 + (-3)^2} = \sqrt{9+9} = \sqrt{18}$

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

$= \sqrt{(-3)^2 + (-3)^2} = \sqrt{9+9} = \sqrt{18}$

The diagonals,

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

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

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

$= \sqrt{36} = 6.$

We can observe that, ABCD forms a squere as the sides and diagonals of the quadrilateral ABCD are equal.

Hence, champas statement is correct.

(6) 1) By distance formula in this fig.

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

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

$AD = \sqrt{(-3+1)^2 + (0-2)^2} = \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$

Diagonals, AC and BD

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

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

We can observe that the diagonals and the quadrilateral ABCD are equal.

Hence, the fig. is a square.

(ii) By distance formula,

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

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

$= \sqrt{(3)^2 + (1)^2} = \sqrt{9+1} = \sqrt{10}$

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

$= \sqrt{(-3)^2 + (-3)^2} = \sqrt{9+9} = \sqrt{18}$

$CD = \sqrt{(1-4)^2 + (2-3)^2} = \sqrt{(-3)^2 + (-1)^2}$
$= \sqrt{9+1} = \sqrt{10}$

$AD = \sqrt{(1-4)^2 + (2-5)^2}$
$= \sqrt{(-3)^2 + (-3)^2} = \sqrt{9+9} = \sqrt{18}$

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

$= \sqrt{(0)^2 + (2)^2} = \sqrt{4} = 2$

Diagonal $CD = \sqrt{(7-1)^2 + (6-2)^2}$
$= \sqrt{(6)^2 + (4)^2}$
$= \sqrt{36+16} = \sqrt{52}$
$= 13\sqrt{2}$

We can observe that, the opposite sides of the quadrilateral are of the same length.

However, the diagonals are of different lengths. ~~Hence~~ Therefore, the given points are the vertices of a parallelogram.

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(7) $AC = BC$

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

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

$\Rightarrow 4 + x^2 - 4x + 81 = 4 + x^2 + 4x + 25$

$\Rightarrow \cancel{4} - \cancel{4} + \cancel{x^2} - \cancel{x^2} - 4x - 4x + 81 - 25 = 0$

$\Rightarrow -8x + 54 \quad \Rightarrow x = \frac{-54}{-8} = 7$

Therefore, the point is $(-7, 0)$

(8) The dist. betwn the points are $P(-2, -3)$ and $Q(10, y)$ is 10 units.

Distance formula $= 10$

$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = 10$

$\Rightarrow (2-10)^2 + (-3-y)^2 = 10$

$\Rightarrow \sqrt{(-8)^2 + (3+y)^2} = 100$

$\Rightarrow (y+3)^2 = 100 - 64$

$(y+3)^2 = 36$

$y + 3 = \sqrt{36}; \quad y + 3 = 6$

$y = (3, -9)$

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(9) $PQ = QR$

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

$$\Rightarrow \sqrt{(5-0)^2+(-3-1)^2} = \sqrt{(0-x)^2+(1-6)^2}$$

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

$$\Rightarrow \sqrt{25+16} = \sqrt{x^2+25}$$

$$\Rightarrow 41 = x^2+25$$

$$\Rightarrow 16 = x^2$$

$$\Rightarrow x = \sqrt{16} = 4$$

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

$$= \sqrt{(5-4)^2+(-3-6)^2}$$

$$= \sqrt{(1)^2+(-9)^2} = \sqrt{1+81} = \sqrt{82}$$

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

$$= \sqrt{(4-0)^2+(6-1)^2}$$

$$= \sqrt{(4)^2+(5)^2} = \sqrt{16+25} = \sqrt{41}$$

As, $PQ = PR$

Therefore, $QR = PQ = \sqrt{41}$, & $PR = \sqrt{82}$.

(10) $P(x,y)$, $Q(3,6)$ and $R(-3,4)$

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

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

$$\Rightarrow 9+x^2+36+y^2+(-2\cdot3\cdot-x)+-2\cdot6\cdot y =$$

$$9+x^2-2\cdot(-3)\cdot(-x)+16+y^2 = 2$$

$$\Rightarrow 45-35+6x+12y-8y=0$$

$$\Rightarrow 12x+4y-20=0, \Rightarrow 4(3x+y-5)=0$$

Therefore, the relation betw^n $(3,6)$, $(-3,4)$ and, x,y is - $3x+y-5=0$.