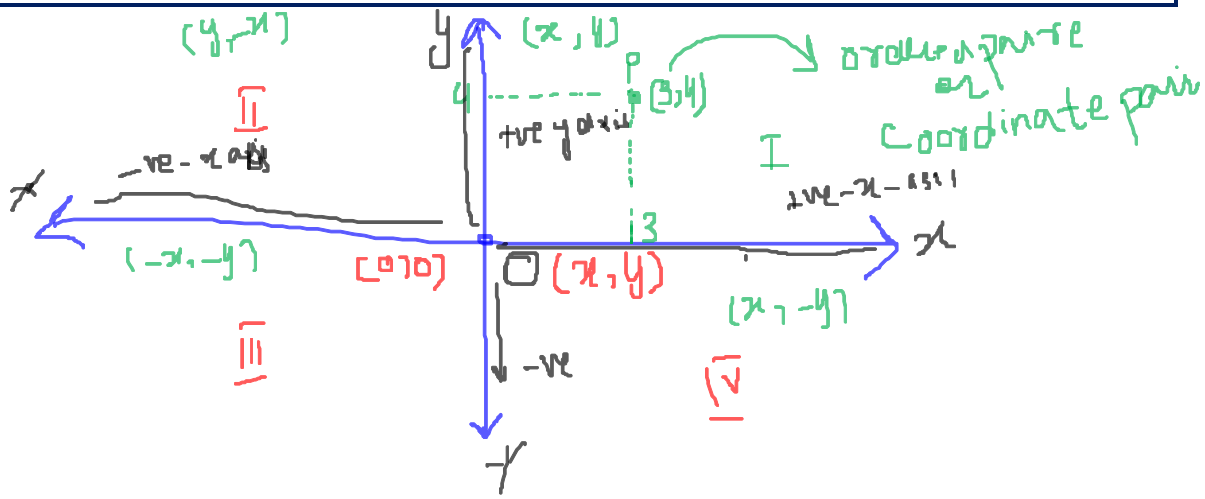
Coordinate axes

Two Perpendicular Coordinate lines that interest at the **O- point** these lines are called coordinate axes in the plane.



Origin

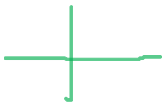
The coordinate system is the point in the plane where x and y are both zero

Coordinate pair

The ordered pair (a,b) is assigned to the point P

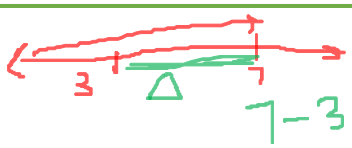
Quadrant

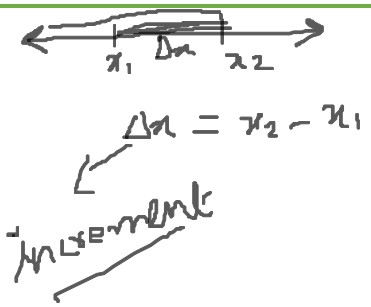
Coordinate axes divide into four regions is called quadrant



Increment and straight lines

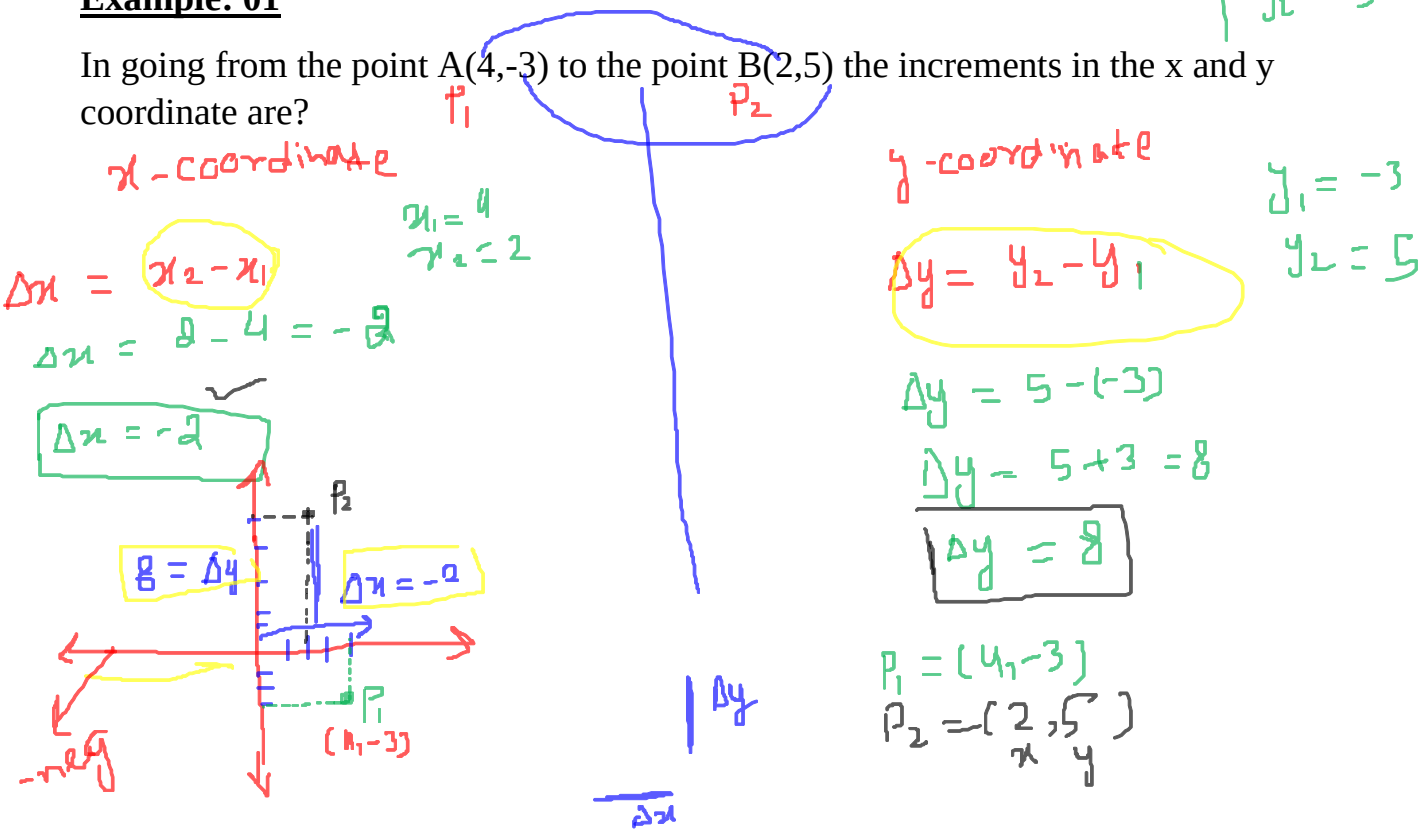
When particles move from one point to another point, the net changes is called increment





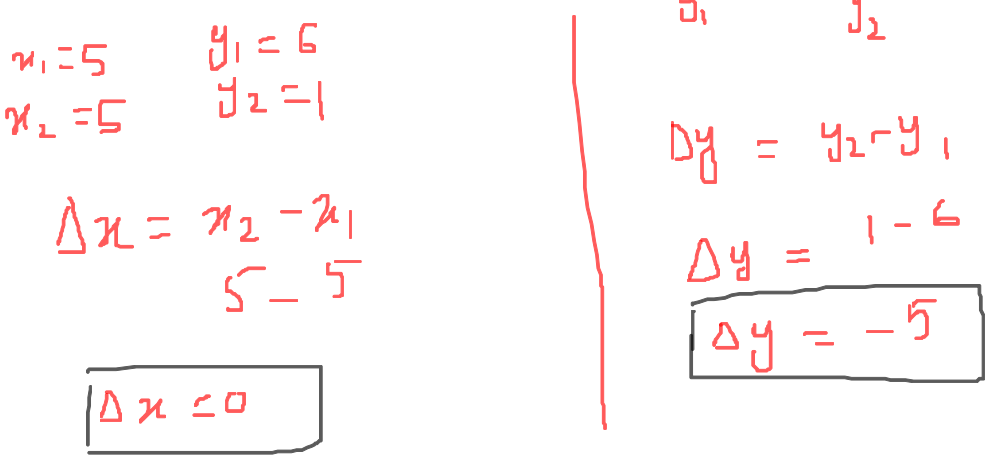
Example: 01

In going from the point A(4,-3) to the point B(2,5) the increments in the x and y coordinate are?



Example: 02

The coordinate increments from C (5,6) to D (5,1) ?

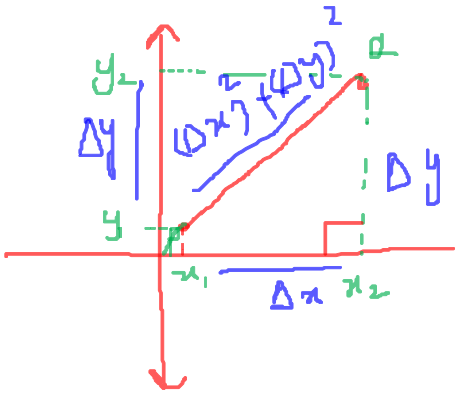


Distance formula for a point in the plane

The distance between the points P(x_1, y_1) and Q(x_2, y_2)

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

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



$$H^2 = B^2 + P^2$$

$$d^2 = (\Delta x)^2 + (\Delta y)^2$$

$$d = H = \sqrt{(\Delta x)^2 + (\Delta y)^2}$$

Example: 03

The distance between P (-1 , 2) (x_1, y_1) and Q (3, 4) (x_2, y_2) is

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

Example: 04

The distance from origin to P (x , y) is

O(0,0) (x_1, y_1) to P(x, y) (x_2, y_2)

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

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

$$d = \sqrt{x^2 + y^2}$$

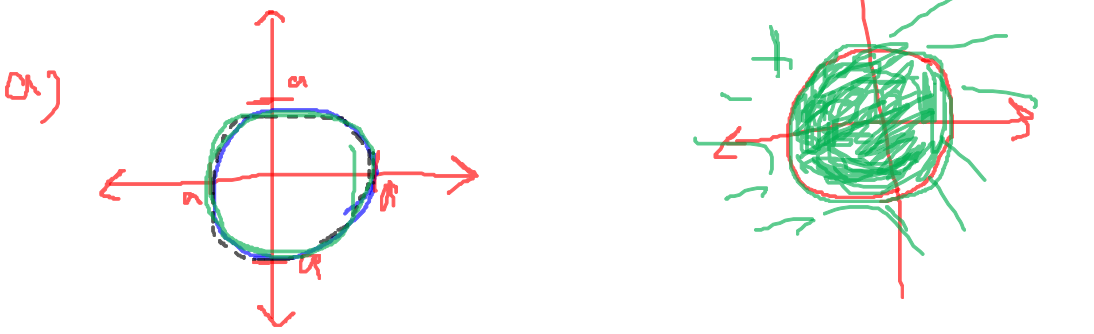
Graph

Involving the variable x and y is the set of the all point P(x,y) whose coordinate satisfy the equation and inequality.

Example: 05

a) $x^2 + y^2 = a^2$

b) $x^2 + y^2 \leq a^2$



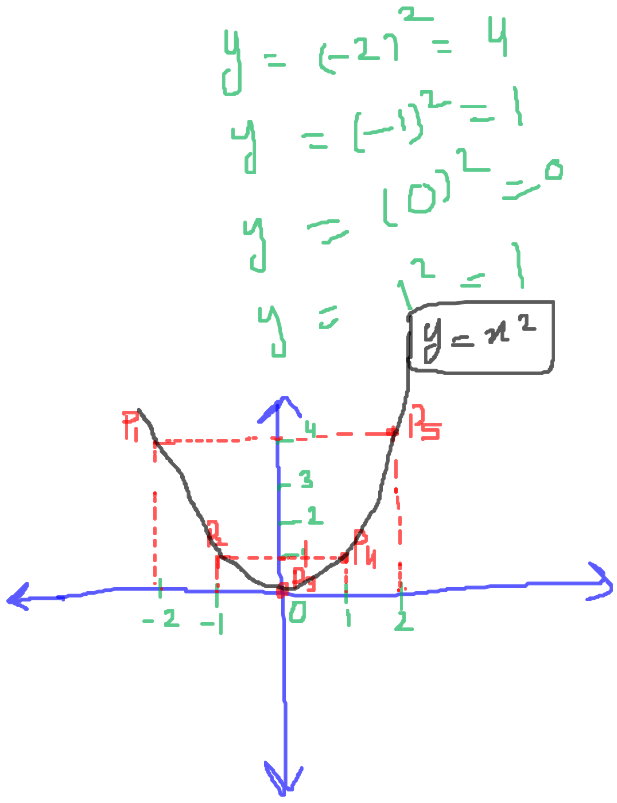
Example: 06

The equation $y = x^2$

x	$y = x^2$
x_1 -2	4 y_1
x_2 -1	1 y_2
x_3 0	0 y_3
x_4 1	1 x_4
x_5 2	4 x_5

$P_1(-2,4)$, $P_2(-1,1)$, $P_3(0,0)$

$P_4(1,1)$ $P_5(2,4)$

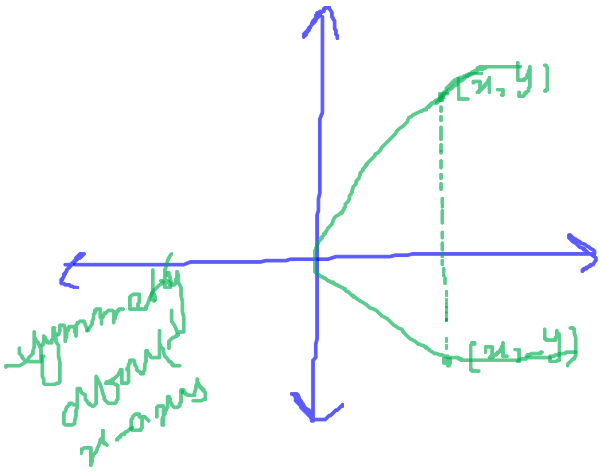


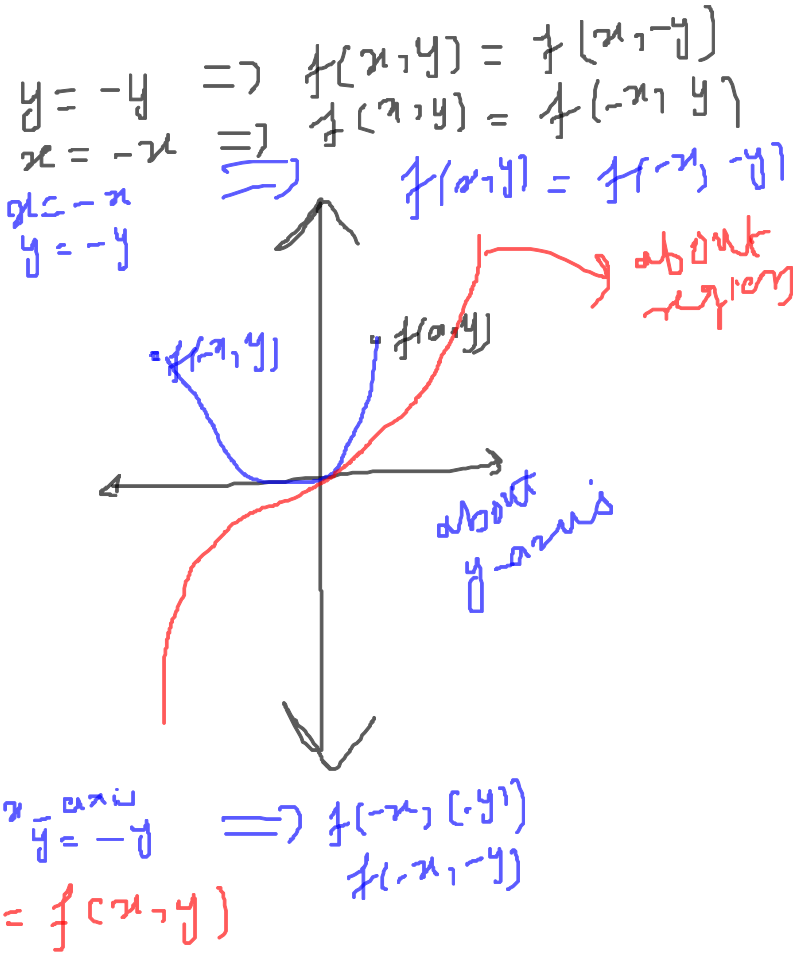
Properties:

SYMMETRY

There are three type of symmetry

- Symmetry about x – axis
- Symmetry about y - axis
- Symmetry about origin





f(-x,y)
y-axis
x = -x
f(-(-x),y) = f(x,y)

x-axis
y = -y
⇒ f(-x,(-y))
f(-x,-y)

Even and odd function:

y = f(x)

f(-x) = f(x) = even
f(-x) = -f(x) = odd