Rectangular coordinates

Vocabulary

Rectangular coordinate system (Cartesian plane)

x-axis

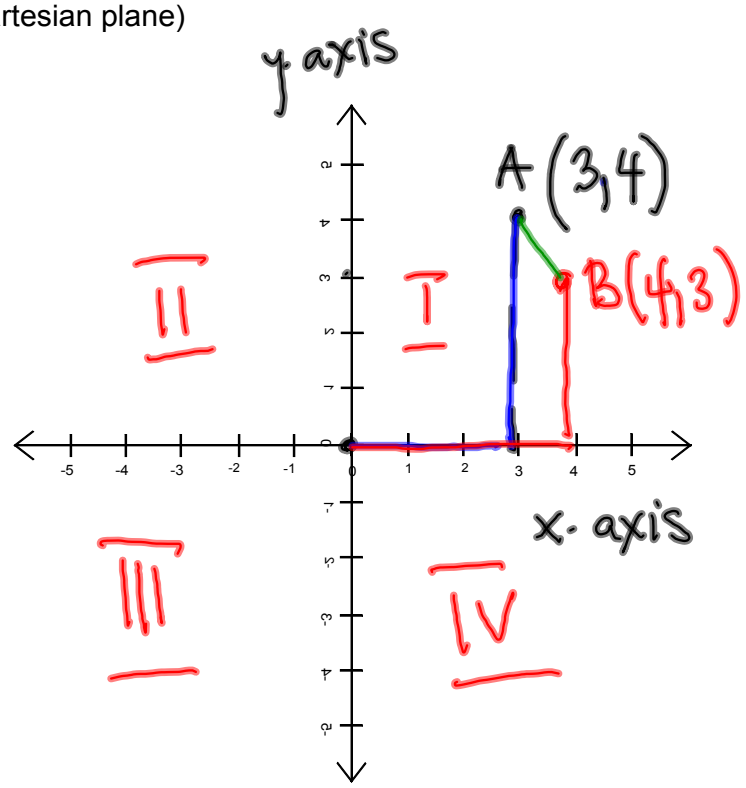
y-axis

origin (0,0)

Quadrants

Ordered pair (x,y)

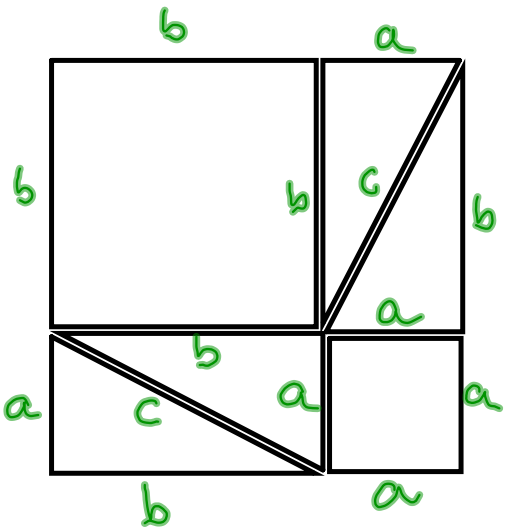
(4,3)

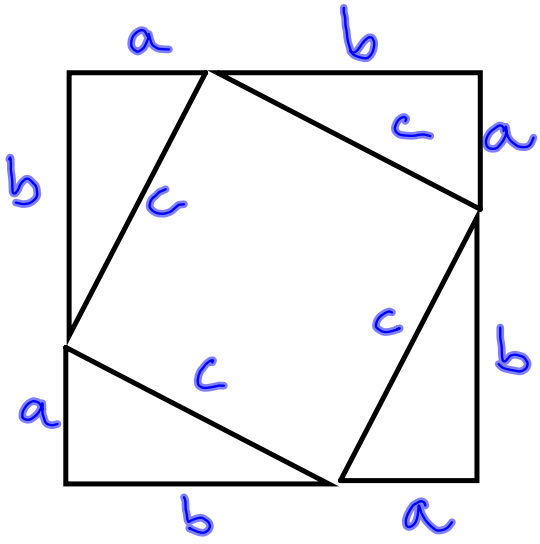


Pythagorean Theorem

$a^2+b^2=c^2$

Only true for right triangles!





$(a+b)^2 =$

$(a+b)(a+b) =$

$a^2+2ab+b^2$

$4 \cdot \frac{1}{2}ab + c^2 =$

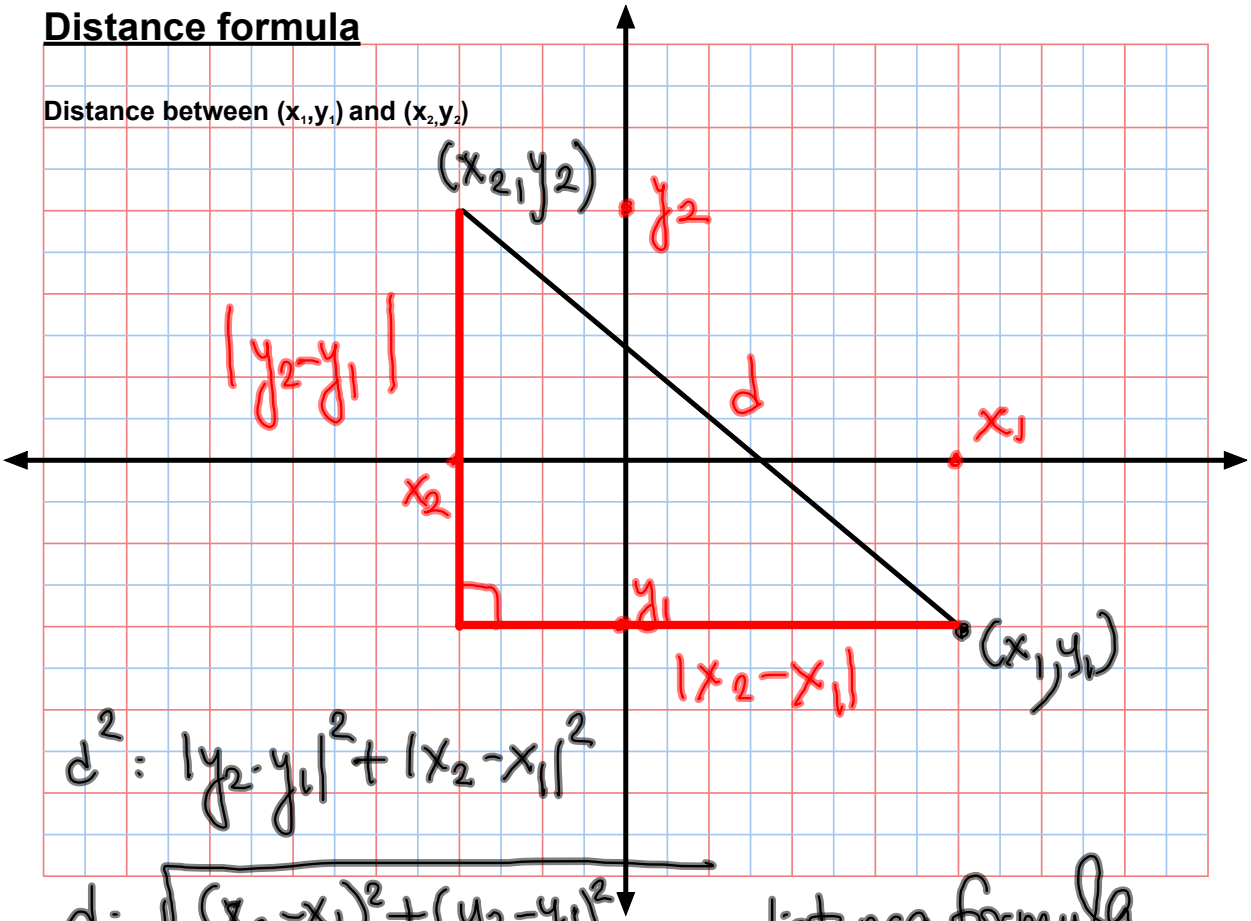
$= 2ab + c^2$

$a^2+2ab+b^2 = 2ab+c^2 \quad / -2ab$

$a^2+b^2 = c^2$

Distance formula

Distance between (x_1,y_1) and (x_2,y_2)

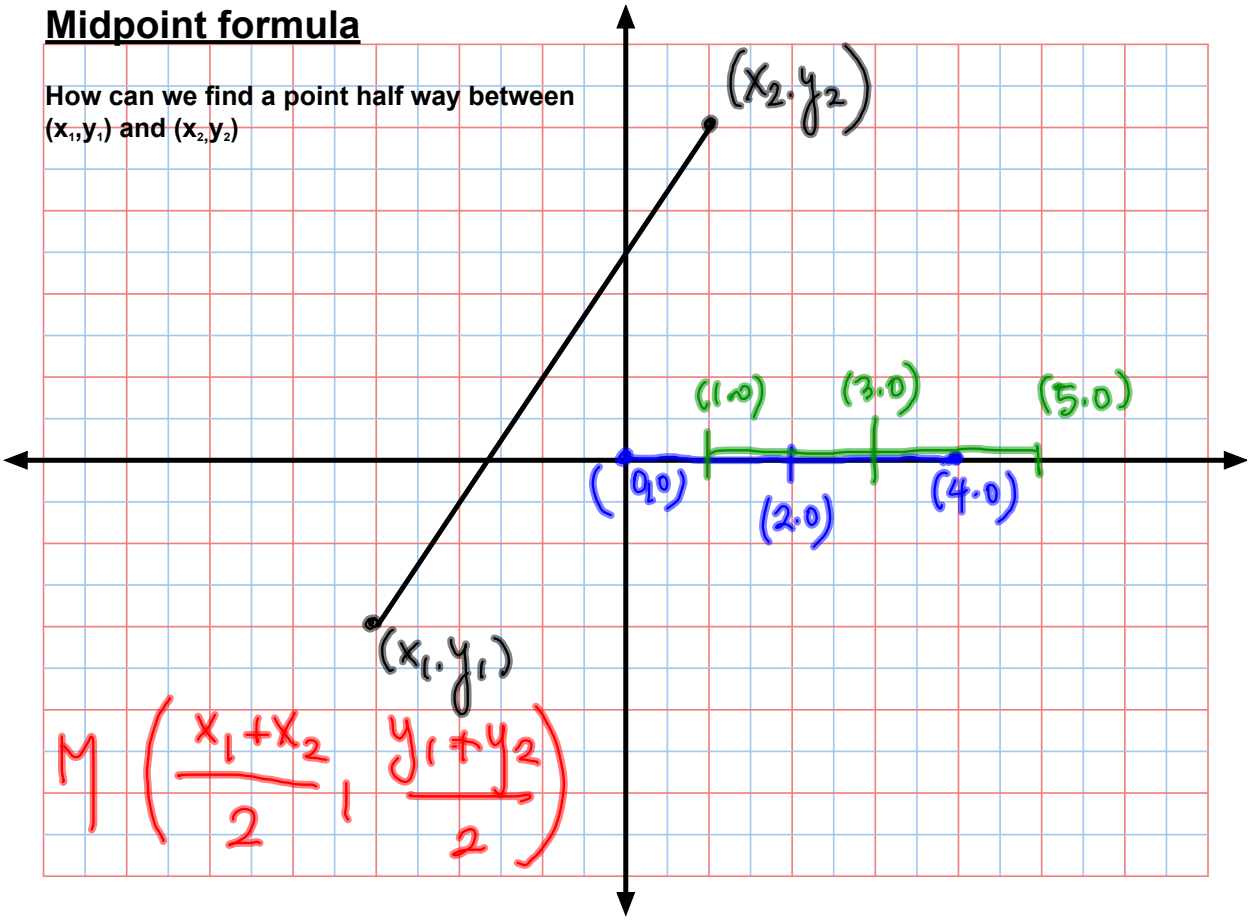


$$d^2 = |y_2 - y_1|^2 + |x_2 - x_1|^2$$

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

Midpoint formula

How can we find a point half way between (x_1,y_1) and (x_2,y_2)



1) Find the coordinates of a point ten units to the left of the y-axis and 3 units up from the x-axis.

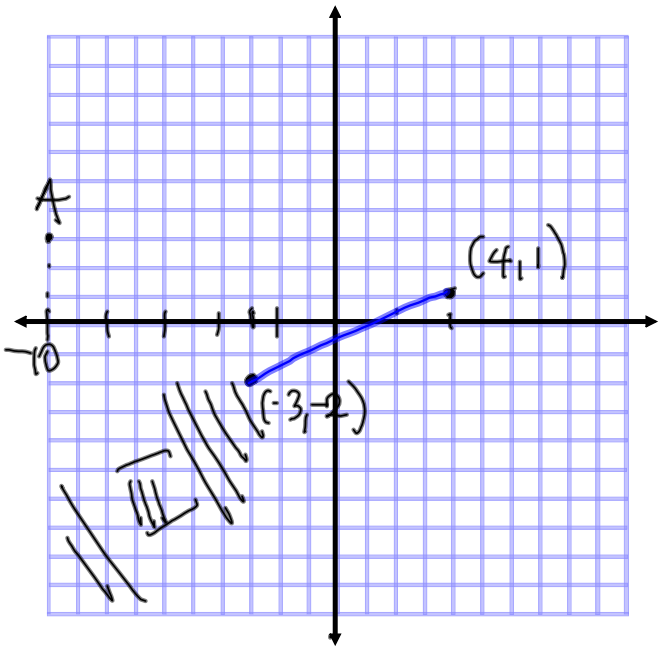
$(-10, 3)$ A

II quadrant.

2) If $-x > 0$ and $y < 0$, what quadrant is (x,y) in?

$-x > 0$

$x < 0 \quad . \; y < 0$ III



3) Find the distance between (-3,-2) and (4,1)

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

$= \sqrt{7^2 + 3^2}$

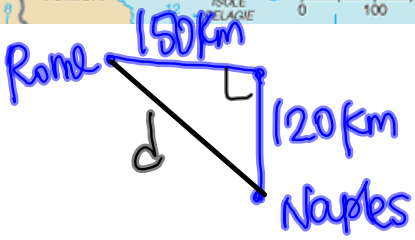
$= \sqrt{49+9} \therefore \sqrt{58}$

4) Find the midpoint of the segment in part 3.

$M\left(\frac{-3+4}{2}, \frac{-2+1}{2}\right) = \left(\frac{1}{2}, -\frac{1}{2}\right)$

4) An airplane flies from Naples, Italy in a straight line to Rome, Italy which is 120 km north and 150 km west of Naples.

How far does the plane fly?



$$d^2 = (120\text{km})^2 + (150\text{km})^2$$

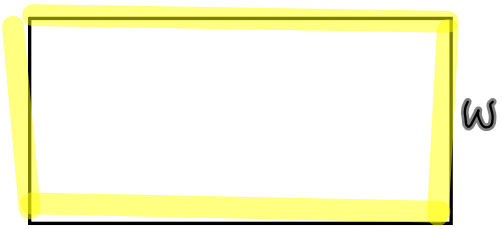
$$= 14400\,\text{km}^2 + 22500\,\text{km}^2$$

$$= 36900\,\text{km}^2$$

$$d = \sqrt{36900\,\text{km}^2}$$

$$= 192\,\text{km}$$

5) A room is 1.5 times as long as it is wide and the perimeter is 25 meters. Find the dimensions of the room.



$P = 25m$

$P = 2(l + w)$

$25m = 2(1.5w + w) =$

$= 2 \cdot 2.5w =$

$= 5w$

$25m = 5 \cdot w$

$5m = w$

$l = 1.5 \cdot 5m = 7.5m$