Wednesday, September 3

Objective

SWBAT-

- Develop and apply the formula for distance.

DO NOW

Find the coordinates of the midpoint of the segment with the given endpoints:

① $S(4, -1)$ and $T(6, 0)$

② $L(4, 2)$ and $P(0, 2)$

Use the given endpoint R and the midpoint M of RS to find the coordinates of the other endpoint:

③ $R(6, 0), M(0, 2)$

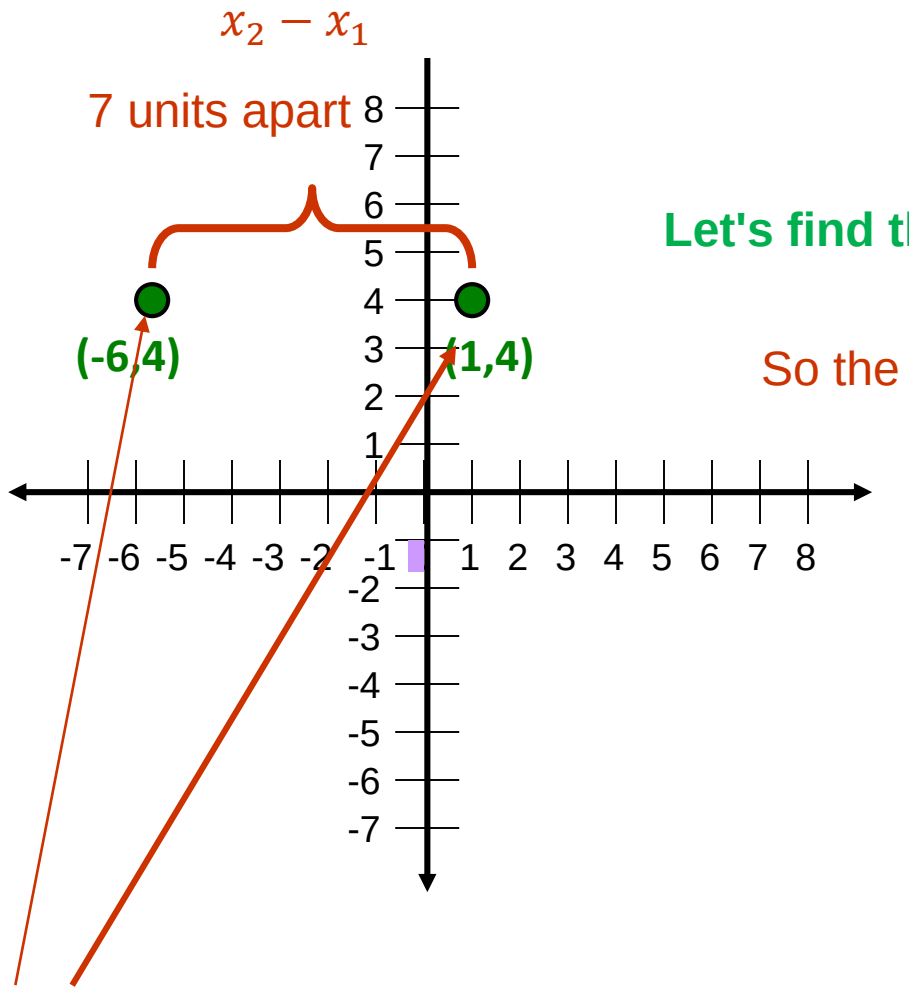
HW: study for quiz! Sections 1.1-1.3

1.3 Midpoint and Distance Formulas

Agenda:

- **Do Now** (7 min)
  - ✓Work and Solve
- **Introduction to New Material** (10 min)
  - ✓Formulating the Distance Formula
- **Guided Practice** (12 min)
  - ✓Pythagoras and the Distance Formula
- **Independent Practice** (12 min)
  - ✓The dang distance formula!
- **Exit Ticket** (5 min)
  - ✓Top Ten Results

HW: study for quiz! Sections 1.1-1.3

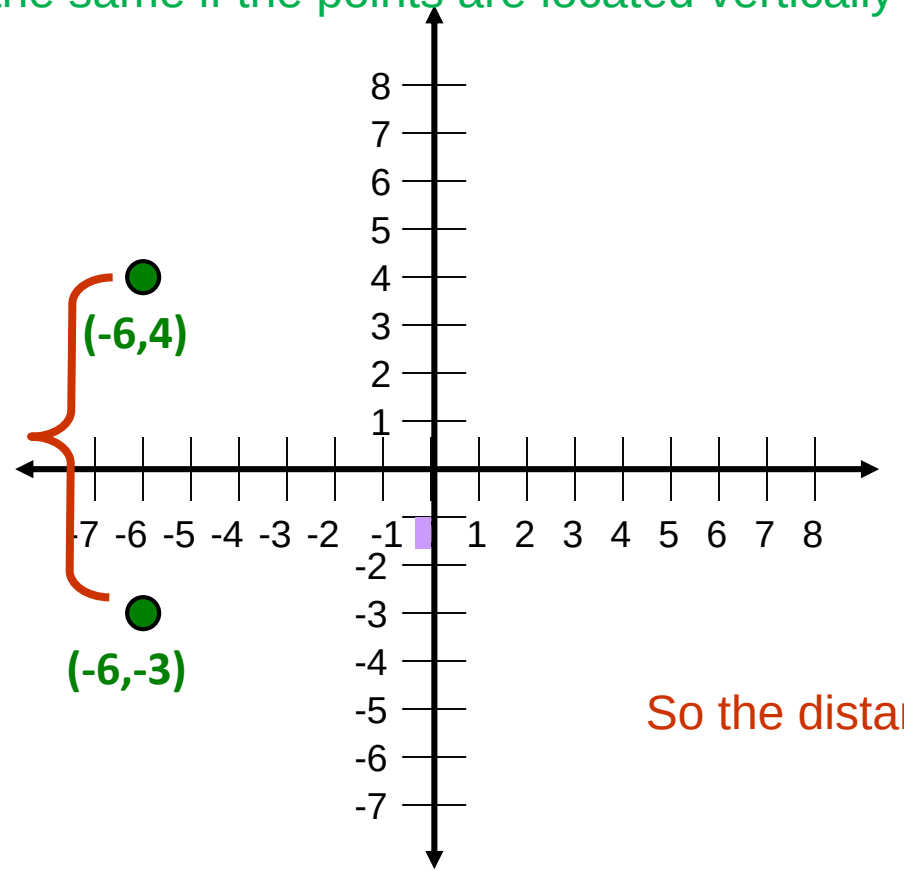


Let's find the distance between two points.

So the distance from (-6,4) to (1,4) is 7.

If the points are located horizontally from each other, the *y* coordinates will be the same. You can look to see how far apart the *x* coordinates are.

What coordinate will be the same if the points are located vertically from each other?



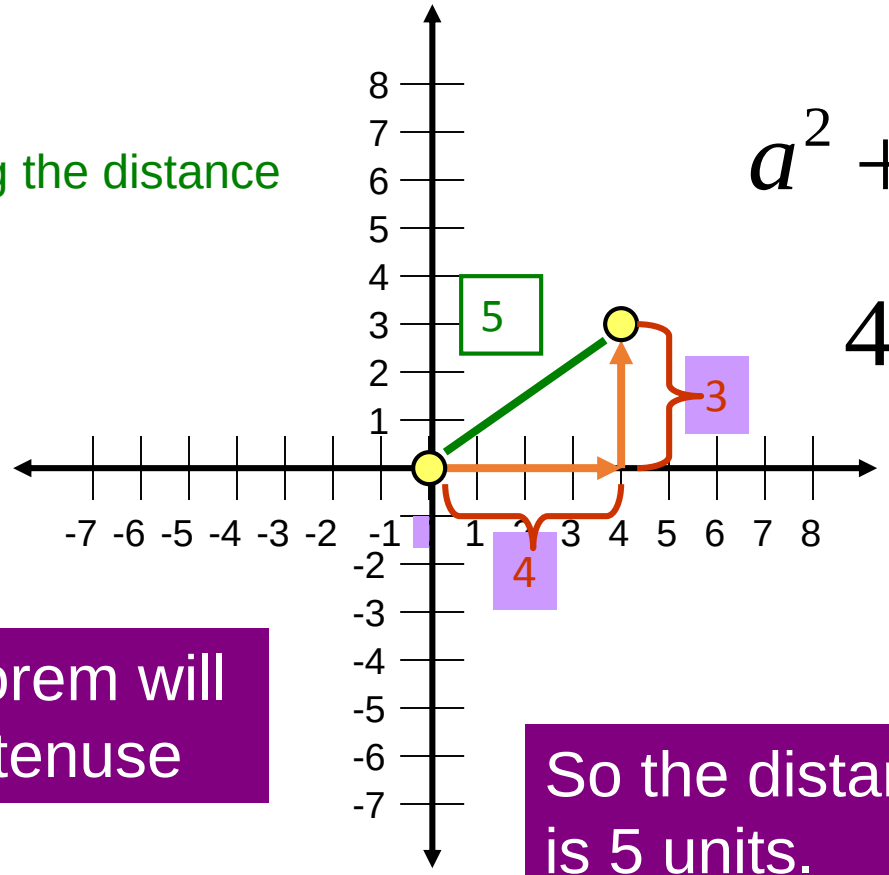
7 units apart

$y_2 - y_1$

So the distance from (-6,-3) to (-6,4) is 7.

If the points are located vertically from each other, the *x* coordinates will be the same. You can look to see how far apart the *y* coordinates are.

Let's start by finding the distance from (0,0) to (4,3)



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

$$4^2 + 3^2 = c^2$$

$$16 + 9 = c^2$$

$$c = 5$$

The Pythagorean Theorem will help us find the hypotenuse

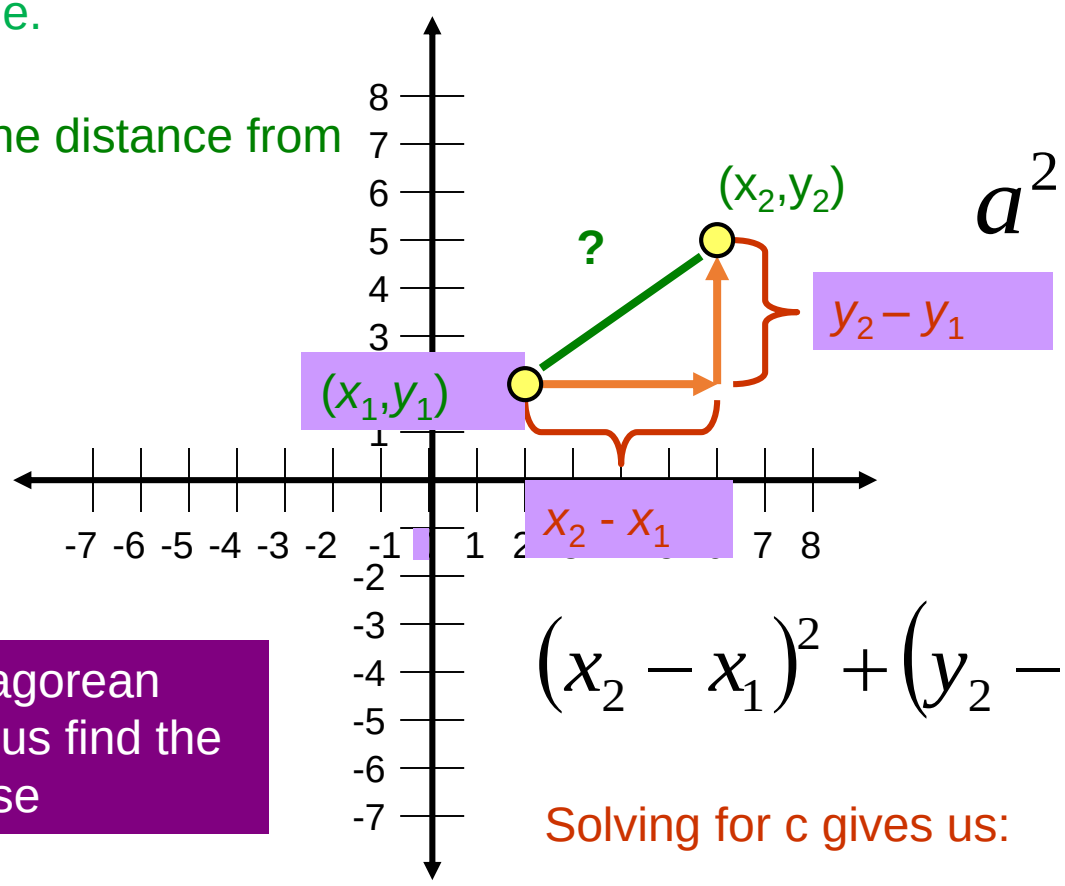
So the distance between (0,0) and (4,3) is 5 units.

Let's add some lines and make a right triangle.

This triangle measures 4 units by 3 units on the sides. If we find the hypotenuse, we'll have the distance from (0,0) to (4,3)

Now let's generalize this method to come up with a formula so we don't have to make a graph and triangle every time.

Let's start by finding the distance from (x_1,y_1) to (x_2,y_2)



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

Again the Pythagorean Theorem will help us find the hypotenuse

$$(x_2 - x_1)^2 + (y_2 - y_1)^2 = c^2$$

Solving for c gives us:

Let's add some lines and make a right triangle.

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

This is called the distance formula

HW: study for quiz! Sections 1.1-1.3

Let's use it to find the distance between (3, -5) and (-1, 4)

(x_1, y_1) (x_2, y_2)

Plug these values in the distance formula

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

means approximately equal to

$$c = \sqrt{(-4)^2 + (9)^2} = \sqrt{16 + 81} = \sqrt{97} \approx 9.8$$

found with a calculator

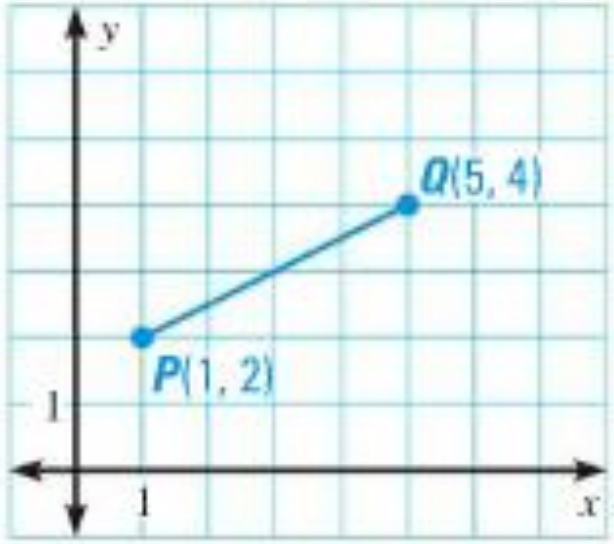
Don't forget the order of operations!

You must do the parenthesis first then powers (square the numbers) and then add together BEFORE you can square root

1.3 Midpoint and Distance Formulas

DISTANCE FORMULA **Find the length of the segment. Round to the nearest tenth of a unit.**

31.



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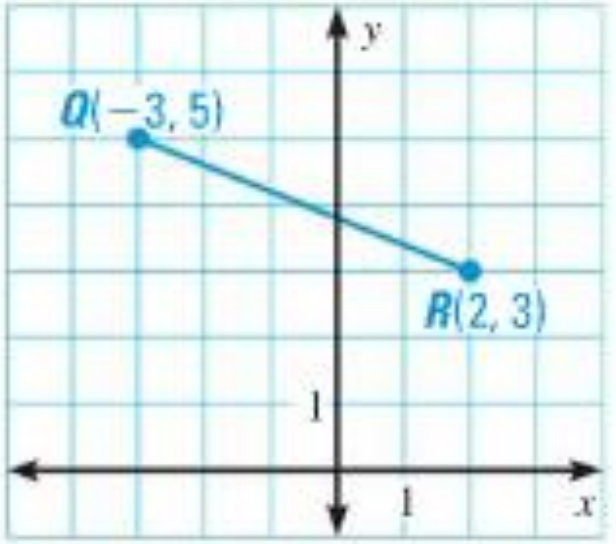

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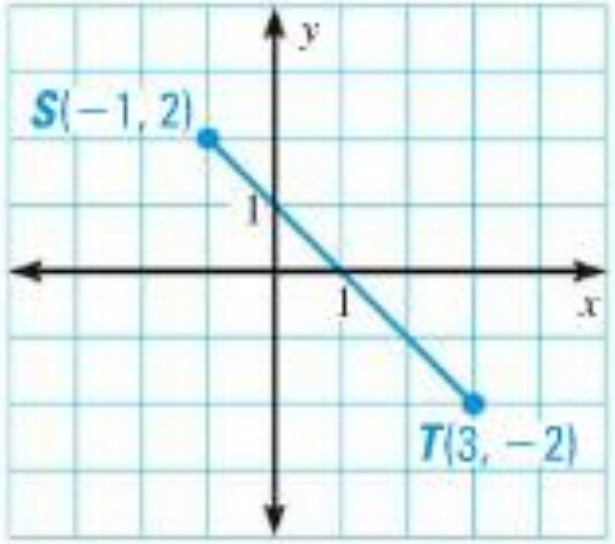

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1.3 Midpoint and Distance Formulas

The diagram shows the position of three soccer players. Player A kicks the ball to Player B, who then kicks it to Player C. How far did Player A kick the ball? How far did Player B kick the ball? How far would Player A have kicked the ball if she had kicked it directly to Player C? Round all answers to the nearest tenth of a yard.