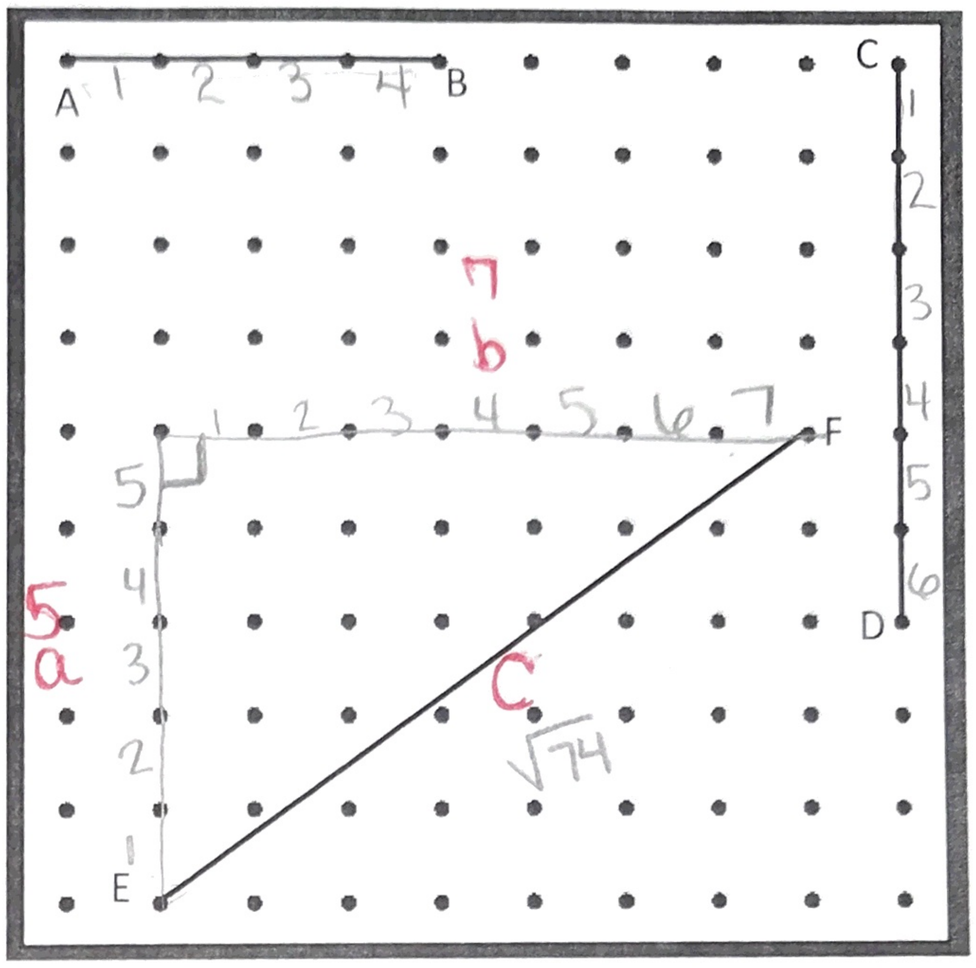
Name: _____ Date: Jan 21 Hour: __Alg 1___

**Unit 5a Day 7: Finding Distance on the Coordinate Plane**

*Focus Question: How do I find the length of a slanted segment?*




A. Vertical and Horizontal lines

1. What type of line is segment AB? Horizontal
2. What is the slope of segment AB? $m = 0$
3. What is the length of segment AB? $d = 4$ units
   distance
4. What type of line is segment CD? vertical
5. What is the slope of segment CD? $m = \emptyset$
6. What is the length of segment CD? $d = 6$ units
7. Is length the same thing as slope? No!

B. Slanted lines

1. Can you count to find the length of segment EF? Explain. No
   its not vertical or horizontal
2. What is the slope of segment EF? $m = \frac{5}{7}$
3. When you drew your stair, what type of triangle was created?
   right $\triangle$
4. What did we learn about the length of the sides of right triangles?
   $a^2 + b^2 = c^2$

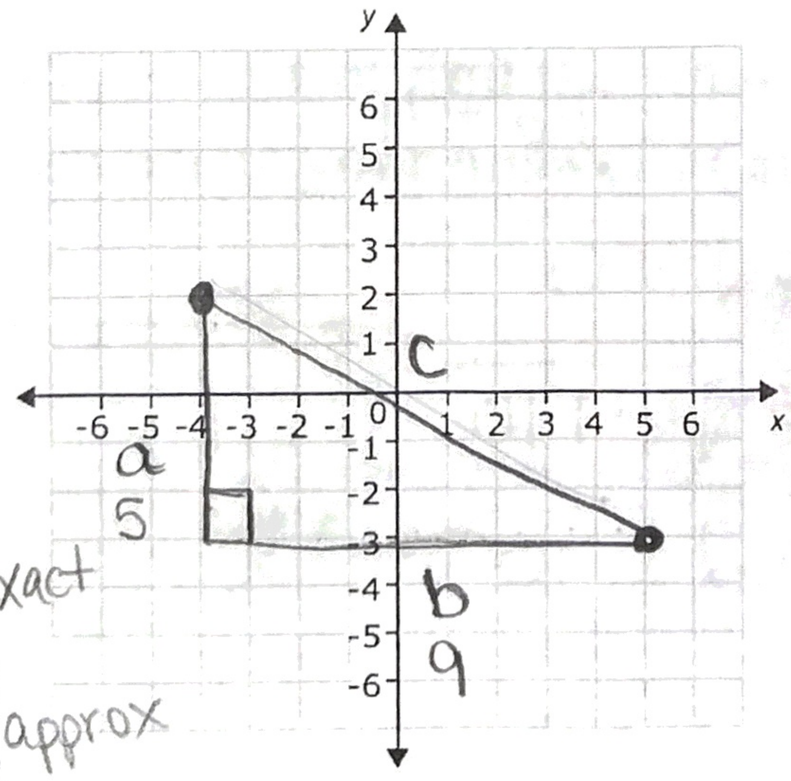
1. Label the triangle with *a*, *b*, and *c*. Then, find the length of segment EF.

$5^2 + 7^2 = c^2$
$25 + 49 = c^2$
$\sqrt{74} = \sqrt{c^2}$

$c = \sqrt{74}$
$EF = \sqrt{74}$ exact
$EF \approx 8.60$ approx.

C. Distance on the coordinate plane.
Plot the two given points, then find the distance between them. Give an exact and approximate answer.

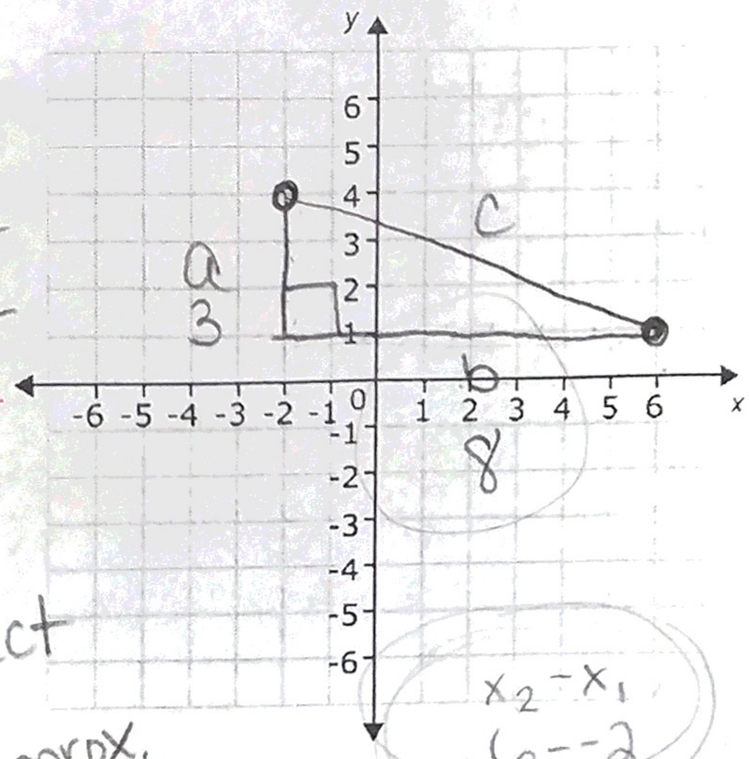
(-4, 2) and (5, -3)




$a^2 + b^2 = c^2$
$5^2 + 9^2 = c^2$
$25 + 81 = c^2$
$\sqrt{106} = \sqrt{c^2}$

$c = \sqrt{106}$ exact
$c \approx 10.30$ approx

(-2, 4) and (6, 1)

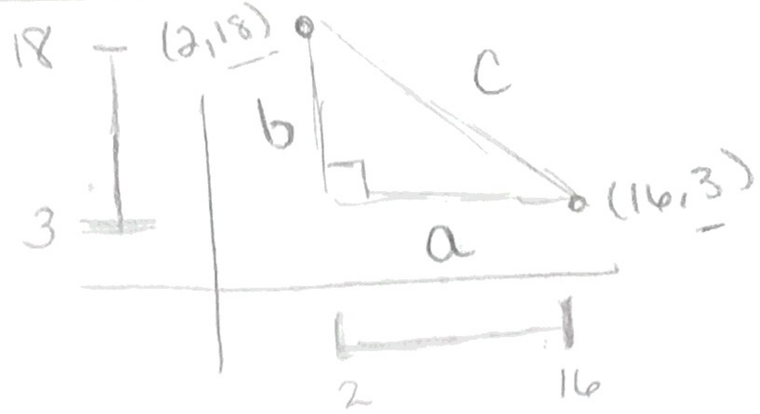



$a^2 + b^2 = c^2$
$3^2 + 8^2 = c^2$
$9 + 64 = c^2$
$\sqrt{73} = \sqrt{c^2}$

$c = \sqrt{73}$ exact
$c \approx 8.54$ approx.

$x_2 - x_1$
$6 - -2$

Plotting and counting is okay if your graph is large enough. But what if you were asked to find the distance between (16, 3) and (2, 18)? What strategy could you use that would use the Pythagorean Theorem as its basis?




| With Numbers (16, 3) and (2, 18) | Symbolically |
|---|---|
| $a^2 + b^2 = c^2$ | $a^2 + b^2 = c^2$ |
| $(16-2)^2 + (18-3)^2 = c^2$ | $(\Delta x)^2 + (\Delta y)^2 = d^2$ (distance) |
| $14^2 + 15^2 = c^2$ | $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} = \sqrt{d^2}$ |
| $196 + 225 = c^2$ | $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$ |
| $\sqrt{421} = \sqrt{c^2}$ | |
| $c = \sqrt{421}$ | |

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

Without graphing, find the distance between each pair of points.

(4, 0) and (-2, 5)

$d = \sqrt{(4--2)^2 + (0-5)^2}$

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

$d = \sqrt{36+25}$

$d = \sqrt{61}$ units

$d \approx 7.81$

(-5, -3) and (5, 5)

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

$d = \sqrt{(-10)^2 + (-8)^2}$

$d = \sqrt{100+64}$

$d = \sqrt{164}$

$d = \sqrt{4 \cdot 41}$

$d = 2\sqrt{41}$ units

$d \approx 12.81$

(7, -2) and (-1, -5)

$d = \sqrt{(7--1)^2 + (-2--5)^2}$

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

$d = \sqrt{64+9}$

$d = \sqrt{73}$ units

$d \approx 8.54$

(-12, -3) and (14, -1)

$d = \sqrt{(-12-14)^2 + (-3--1)^2}$

$d = \sqrt{(-26)^2 + (-2)^2}$

$d = \sqrt{676+4}$

$d = \sqrt{680}$

$d = \sqrt{4 \cdot 170}$

$d = 2\sqrt{170}$ units

$d \approx 26.08$