

Math 1

Take out packet
from yesterday.

laptops
for thursday.

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Math I - Notes --- Midpoint, Distance and Pythagoras

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

1. Plot the points $A(-6, -5)$ and $B(6, 4)$
 - a. Find the midpoint of \overline{AB} . Call that point C.
↳ middle or halfway.
 - b. What are the coordinates of C?

$$(0, -5)$$

- c. Find the distance between points AB and AC.

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

$$12^2 + 9^2 = c^2$$

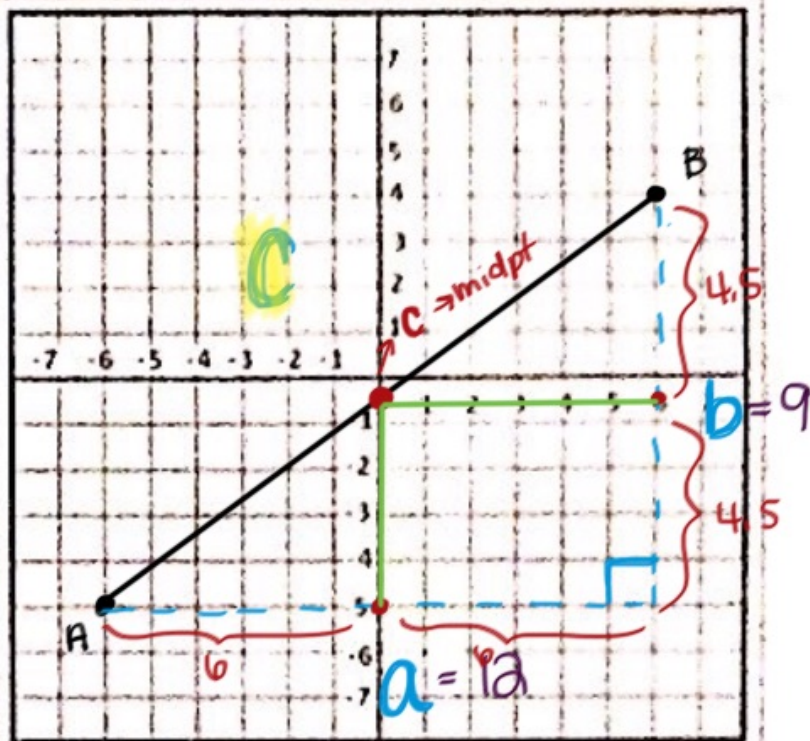
$$144 + 81 = c^2$$

$$\sqrt{225} = \sqrt{c^2}$$

$$15 = c$$

$$\overline{AB} = 15$$

$$\overline{AC} \text{ or } \overline{BC} = 7.5$$



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2. Plot the points: $A(1, 7)$ and $C(3.5, 1)$

d. C is the midpoint of AB . Find the other endpoint, B .

e. What are the coordinates of B ?

$$(6, -5)$$

f. Find the distance between points AB and AC .

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

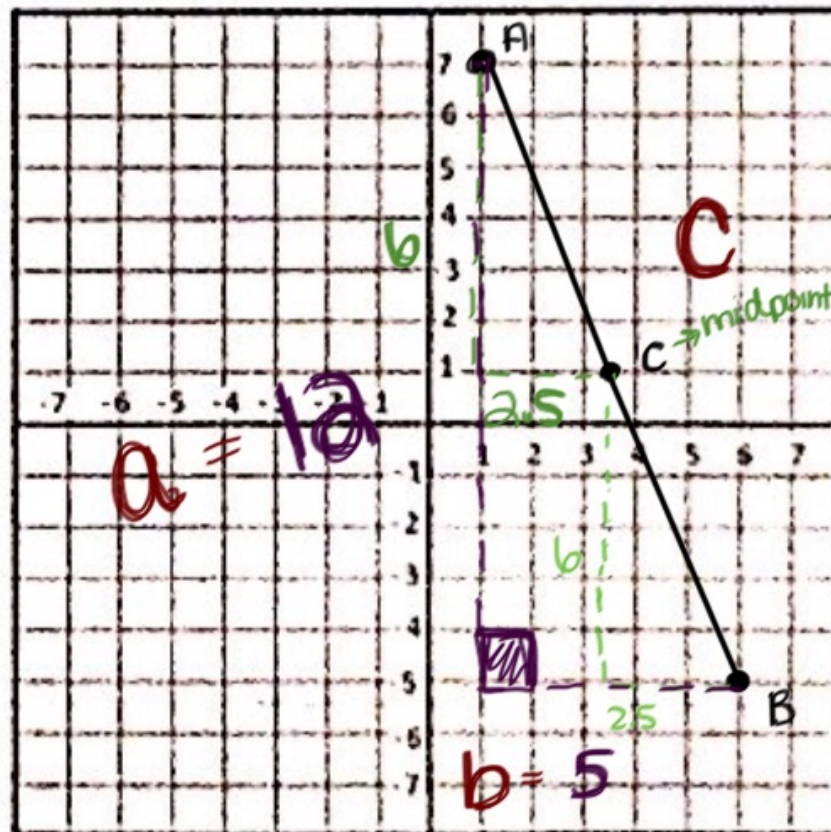
$$12^2 + 5^2 = c^2$$

$$144 + 25 = c^2$$

$$\sqrt{169} = \sqrt{c^2}$$

$$c = 13$$

$$\overline{AB} = 13 \quad \overline{AC} = \overline{BC} = 6.5$$



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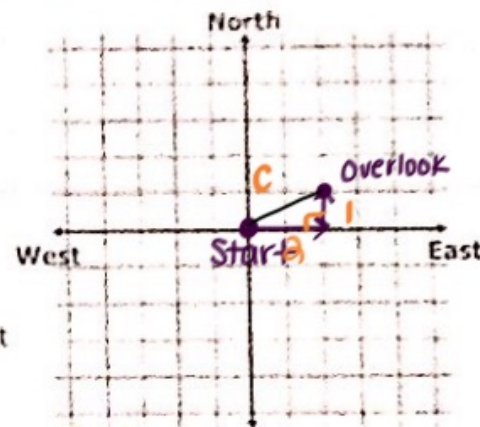
Investigation: Distance and Midpoint Formulas

Many hikers rely on Global Positioning Systems (GPS) to determine location and distances; however, there are other methods for determining how far you are from a set point. As you work on the following problems, look for answers to this question:

What information and calculations are needed to determine distance and location?

1. A coordinate grid can be used to determine how far the visitors are from where they started.

- a. Represent the distance and direction (2 miles east and 1 mile north) by drawing line segments onto a coordinate grid with the starting point at the origin. Label the coordinate point of the overlook where the visitors stopped.
- b. Draw a line segment from the starting point to the overlook. Identify the plane shape that is formed by the line segments drawn on the coordinate grid.
- c. Find the distance between the starting point and the overlook.
- d. Show or explain your work.



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

$$2^2 + 1^2 = c^2$$

$$4 + 1 = c^2$$

$$\sqrt{5} = \sqrt{c^2} \rightarrow \boxed{c = 2.2}$$

Need to have
 horizontal Distance \rightarrow x-axis
 vertical Distance \rightarrow y-axis

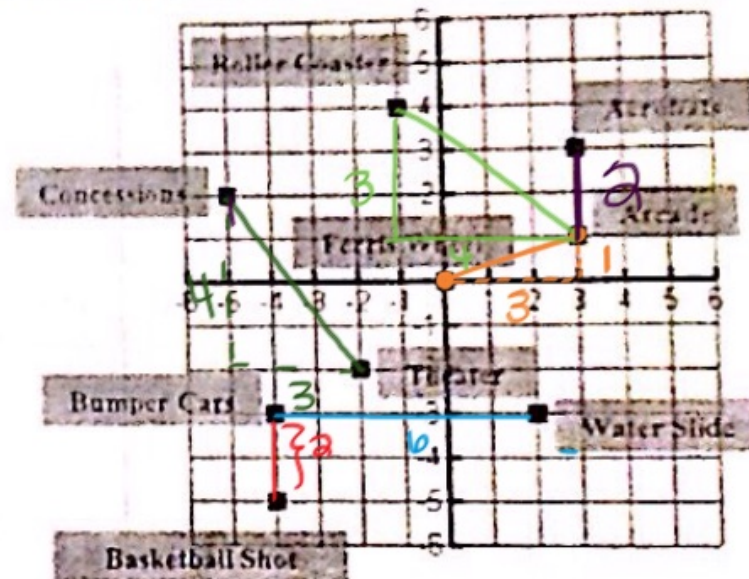
Start: (0,0) \rightarrow y-coord
 Overlook: (2,1) \rightarrow x-coord.
 vertical Dist.
 horizontal Dist.

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3. The FunFilled Amusement Park is creating a new brochure. They want to include in the brochure distances between some of the most frequently visited attractions. Use the copy of the map and the method from #1 and #2 to find the distances between each pair of attractions.

- a. Ferris Wheel and Arcade
 $3^2 + 1^2 = 9 + 1 = \sqrt{10} = \boxed{3.2}$
- b. Basketball Shot and the Bumper Cars
 2
- c. Bumper Cars and Water Slide
 6
- d. Roller Coaster and Arcade
 $3^2 + 4^2 = 9 + 16 = \sqrt{25} = \boxed{5}$
- e. Concessions and Theater
 $3^2 + 4^2 = 9 + 16 = \sqrt{25} = \boxed{5}$
- f. Acrobats and Arcade
 2



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c. Use the expression to find the distances between each pair of points.

horizontal → x-axis
vertical → y-axis

i. $(\underline{3}, \underline{-2})$ and $(\underline{5}, \underline{-1})$

$$3 \rightarrow 5 = a \quad 1^2 + 2^2$$

$$-2 \rightarrow -1 = 1 \quad 1 + 4 = 5 \rightarrow \sqrt{5} = \boxed{2.2}$$

ii. $(\underline{2}, \underline{-1})$ and $(\underline{-4}, \underline{3})$

$$2 \rightarrow -4 = b \quad 4^2 + b^2 = c^2$$

$$-1 \rightarrow 3 = 4 \quad 16 + 3b = 5a \rightarrow \sqrt{5a} = \boxed{7.2}$$

iii. $(\underline{-1}, \underline{-3})$ and $(\underline{4}, \underline{1})$

$$-1 \rightarrow 4 = 5 \quad 4^2 + 5^2$$

$$-3 \rightarrow 1 = 4 \quad 16 + 25 = 41 \rightarrow \sqrt{41} = \boxed{6.4}$$

iv. $(\underline{0.5}, \underline{2.1})$ and $(\underline{4}, \underline{2.1})$

$$.5 \rightarrow 4 = \boxed{3.5} \quad 3.5^2 + 0^2 = c^2$$

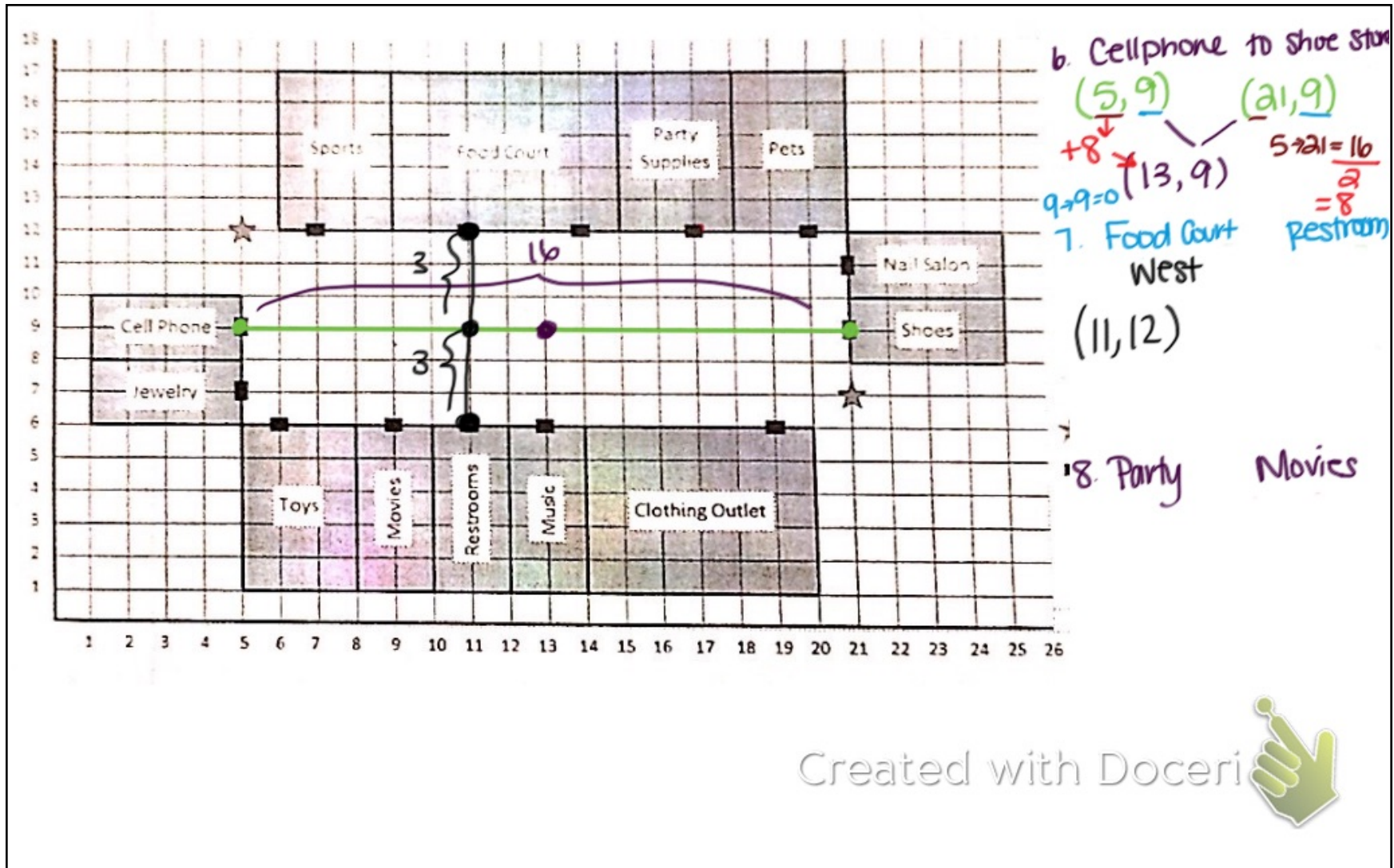
$$2.1 \rightarrow 2.1 = 0 \quad 12.25 + 0 = c^2$$

$$\sqrt{12.25} = \sqrt{c^2}$$

$$\boxed{c = 3.5}$$

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Endpoint 1	Endpoint 2	Midpoint
$(-3, 2)$	$(1, 2)$	$(-1, 2)$
$(-4, 1)$	$(-2, 1)$	$(-3, 1)$
$(3, 3)$	$(3, -2)$	$(3, 0.5)$
$(1, -3)$	$(1, 2)$	$(1, -0.5)$
$(3, 2)$	$(1, 1)$	$(1.5, 2)$
$(-3, -1)$	$(2, 3)$	$(-0.5, 1)$
$(4, -2)$	$(-3, 3)$	$(0.5, 0.5)$

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