Horizontal and Vertical Distance Study Guide

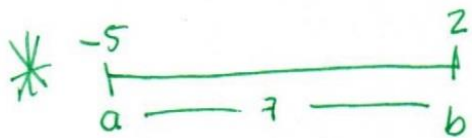**Distance**

length
measure
how far apart
how long

AB
Space between

$m\overline{AB}$

$C = (2, -3)$

$D = (8, -3)$

$CD = 6$

$A = (-6, 5)$

$B = (-6, 1)$

$AB = 4$

vertical lines

Since the points have the same x-coordinate, ask yourself how far apart the y-coordinates are – that is your distance

horizontal lines

Since the points have the same y-coordinates, ask yourself how far apart the x-coordinates are – That is your distance

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  -5                2
  ├──────────────┤
  a ──── 7 ──── b
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→ On a number line, distance is found by subtracting the numbers and making your answer positive
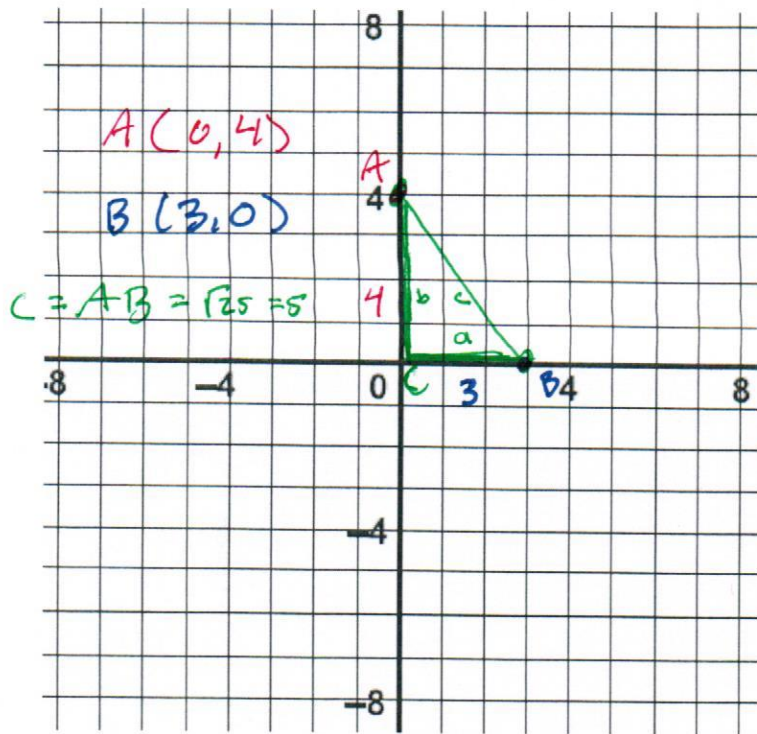
→ this is taking the absolute value of the difference

→ in symbols $|a - b|$

Distance is never negative!!!
When counting, make sure you count "jumps"
If you count lines, make sure to start at 0
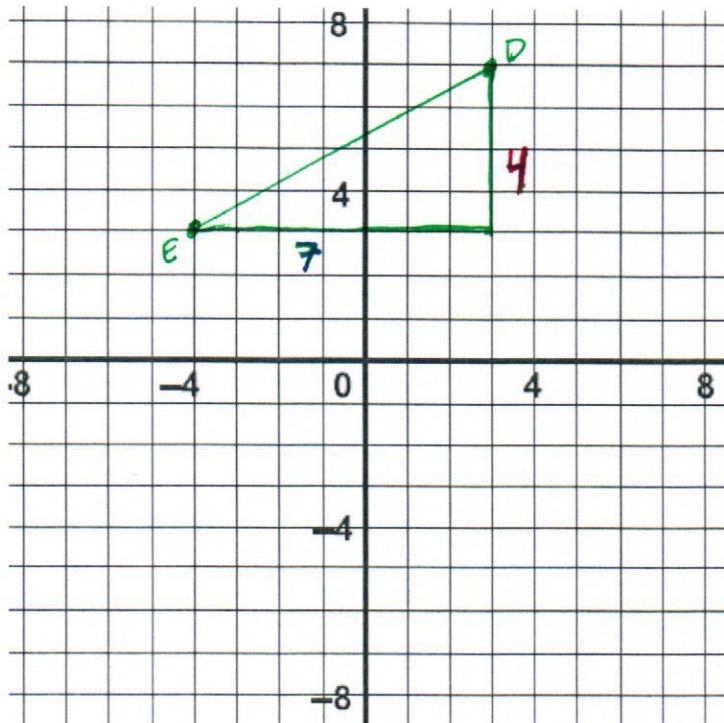*Answer is a number (including square roots)*

Other Distances

$A(0,4)$

$B(3,0)$

$C = AB = \sqrt{25} = 5$

use right triangles
and the Pythagorean thm
to find diagonal distances

a = how far apart the xs are
b = how far apart the ys are
c = the distance you are
finding

$$a^2 + b^2 = c^2$$
$$3^2 + 4^2 = c^2$$
$$9 + 16 = c^2$$
$$25 = c^2$$
$$\sqrt{25} = 5 = c$$

$D (3,7)$
$E (-4,3)$

$$7^2 + 4^2 = c^2$$
$$49 + 16 = c^2$$
$$65 = c^2$$
$$\sqrt{65} = c$$

* The distance formula can also be used
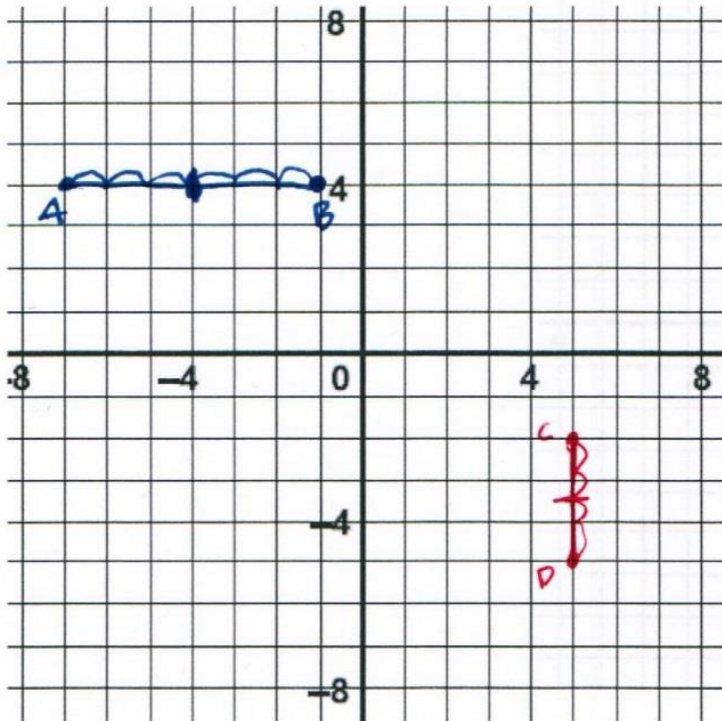$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

* you can also think of distance^2 as $\sqrt{run^2 + rise^2}$
(if you don't reduce slope)

Horizontal and Vertical Midpoints

midpoint

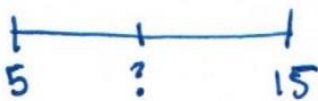middle
center
median
half way
average

$A(-7,4)$ $B(-1,4)$

midpoint $(-4,4)$

$C(5,-2)$ $D(5,-5)$

midpoint $= (5,-3.5)$

Instead of "counting in" to the middle,
mathematically you can _average_ the endpoints

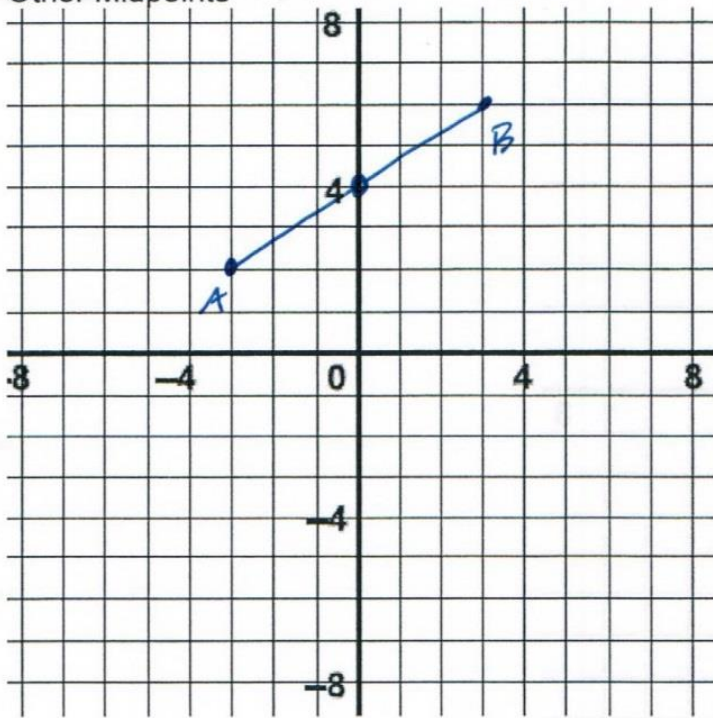$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

* on a number line

5   ?   15

$$\frac{5+15}{2} = 10$$

midpoint $= \frac{a+b}{2}$

Answer is a coordinate (x,y)
Your answer can be a decimal

Other Midpoints

Midpoint = (average x, average y)
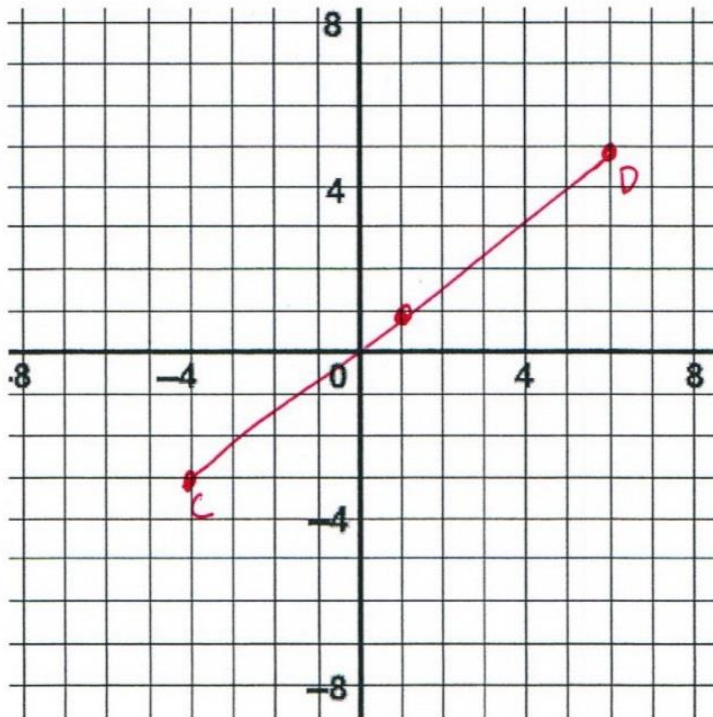
$$A\ (-3, 2)$$
$$B\ (3, 6)$$

$$Mdpt = \left(\frac{-3+3}{2}, \frac{2+6}{2} \right)$$

$$\left(\frac{0}{2}, \frac{8}{2} \right)$$

$$(0, 4)$$

$$C\ (-4, -3)$$
$$D\ (6, 5)$$

$$Mdpt = \left(\frac{-4+6}{2}, \frac{-3+5}{2} \right)$$

$$\left(\frac{2}{2}, \frac{2}{2} \right)$$

$$(1, 1)$$

Missing Endpoints

B = Beginning
M = mdpt
E = missing endpoint

$$B\ (-2, 4)$$
$$\qquad {}^{+3}\ {}^{-4}$$
$$M\ (1, 0)$$
$$\qquad {}^{+3}\ {}^{-4}$$
$$E\ (\ 4, -4)$$

Determine how you
moved from B to M,
Then repeat from M to E
(look at x and y separtly)

Slope Study Guide

Name **Answer Key**

Slope	$m = \dfrac{rise}{run} = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{\Delta y}{\Delta x}$ $\Delta = $ delta $= $ change
Slope Intercept	$y = mx + b$ $m = $ slope $b = y$-intercept
Standard Form	$Ax + By = C$ A, B + C are numbers
Point Slope	$y - y_1 = m(x - x_1)$ $(x_1, y_1) = $ point $m = $ slope
Parallel Lines Symbol : $\parallel$	$a \parallel b$ — have the same slope
Perpendicular Lines Symbol : $\perp$	$c \perp d$ — Intersecting lines that have opposite (negative) reciprocal slopes — product of slopes is -1
Intersecting Lines	do not have the same slope

Given points ($\overset{x}{-2}$, $\overset{y}{3}$) and (4,-3), fill in the following information:

$\frac{Y_2-Y_1}{X_2-X_1}$	Slope m	$\frac{-3-3}{4--2} = \frac{-6}{6} = 1$ $\boxed{m=-1}$
use a point and m to solve for b	y-intercept b	$y=mx+b$ $3=(-1)(-2)+b$ $3=2+b$ $\frac{-2\quad-2}{}$ $\boxed{1=b}$
plug in m+b	Slope Intercept $Y=mx+b$	$y=-1x+1$
solve Y=mx+b for "b"	Standard Form $Ax+By=C$	$\begin{matrix}y=-1x+1\\ +1x\quad+1x\end{matrix}$ $y+x=1$ $1=x+y$
	Point Slope $Y-Y_1=m(x-x_1)$	point (-2,3) slope = -1 $y-3=-1(x+2)$

Write the equation of a line that is parallel to
y = -3/4x + 3 and passes through the points ($\overset{x}{4}$,$\overset{y}{-3}$).

Parallel slope = -3/4 $-3=(-3/4)(4)+b$

$-3=-3+b$ $y=-3/4x+0$

$+3\quad+3$

$0=b$ $\boxed{y=-3/4x}$

Write the equation of a line that is perpendicular to
y = 3x – 6 and passes through the point ($\overset{x}{-9}$,$\overset{y}{2}$).

perpendicular slope = $-\frac{1}{3}$ $2=(-\frac{1}{3})(-9)+b$

$2=3+b$

$-3\quad-3$

$-1=b$