

Jakarta International School

8th Grade – AG1

Practice Test - Black

Unit 2: Graphing

Name: SOLUTIONS

Date: _____

Score: $\frac{58}{100}$

Goal 4: Students convert graphical, symbolic, and numerical representations of data

1. The points $(-1, -4)$, $(2, -6)$, and $(6, 0)$ are three vertices of a rectangle.

- a. What are the coordinates of the fourth vertex? $(3, 2)$

(1 pt)

- b. Find the length of the rectangle's longest side? Express your answer in simplest radical form.

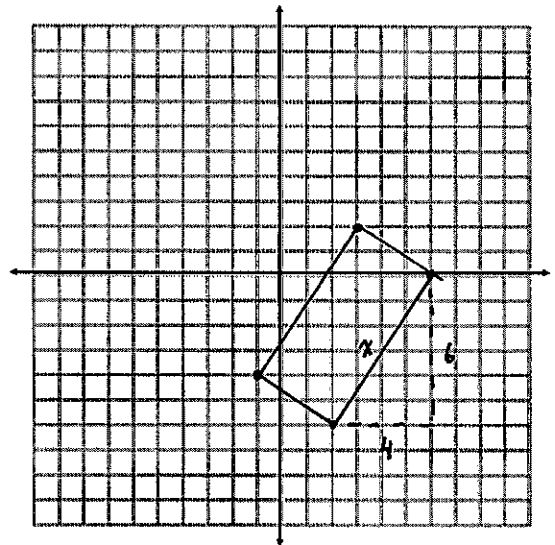
$$4^2 + 6^2 = x^2$$

$$16 + 36 = x^2$$

$$52 = x^2$$

$$x = \sqrt{52} = 2\sqrt{13}$$

(1 pt)



2. What can be determined about the signs of x and y if (x, y) lies...

- a) in the second quadrant? (1 pt) $x < 0$ and $y > 0$

- b) below the origin on the y -axis? (1 pt) $x = 0$ $y < 0$

3. Weight varies directly with gravity. A person who weighs 150 pounds on Earth weighs 57 pounds on Mars.

$$E = mK \quad \text{So} \quad K = \frac{150}{57}$$

- a. Write an equation that relates a person's weight, E , on Earth to that person's weight, M , on Mars. (1 pt)

$$E = \frac{150}{57} M$$

- b. A person weighs 210 pounds on Earth. Estimate that person's weight on Mars. (1 pt)

$$210 = \frac{150}{57} M$$

$$\frac{210 \cdot 57}{150} = M$$

$$79.8 = M$$

$$M \approx 80 \text{ pounds}$$

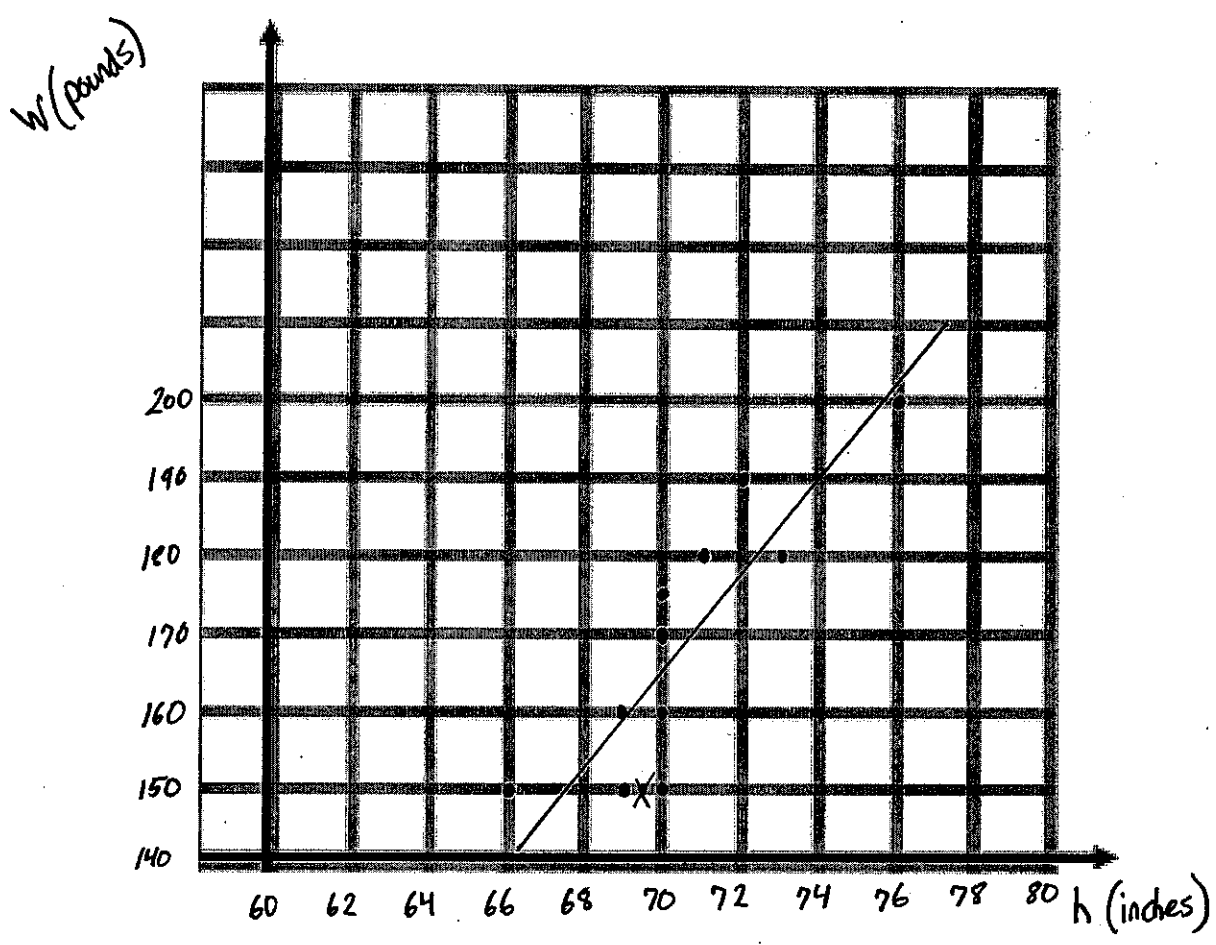
4.

You are the student manager of your high school soccer team. You are working on the team's program guide and have recorded the height and weight of the team's eleven players.

* Identify the minimum and maximum of each data set to help scale your axes.

Height (in.)	72	70	71	70	69	70	69	73	66	70	76	Min = 66 Max = 76
Weight (pounds)	190	170	180	175	160	160	150	180	150	150	200	Min = 150 Max = 200

a. Make a scatter plot of the data. Put height h on the horizontal axis and weight w on the vertical axis. (2 pts)



b. Use a line of best fit to estimate the weight of a player who is 74 inches tall. (1 pt)

190 pounds

c. Describe the relationship between the heights and weights of the team's members? (1 pt)

As the players heights increase, their weights generally increase as well.

5. Use a table of values to graph the equations mentioned in the following problem. Then, answer the question.

What is the number of square units in the area of the region bounded by the graphs of $y=2|x|$ and $y=-2|x|+4$ (3)

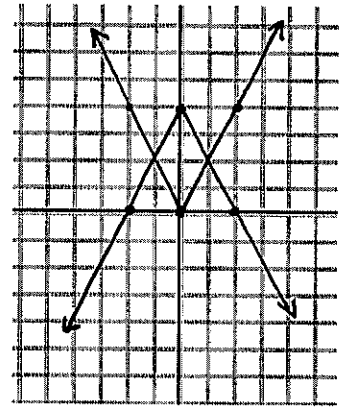
$$y=2|x|$$

$$y=-2|x|+4$$

x	y
-2	4
0	0
2	4

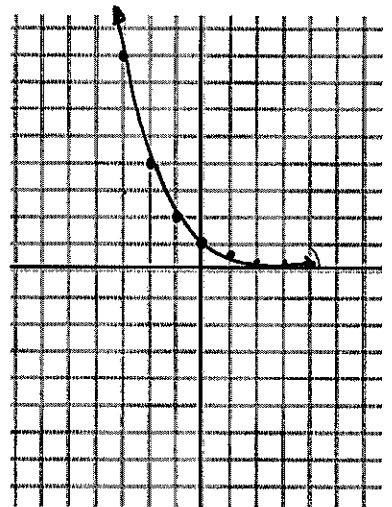
x	y
-2	0
2	0
0	4

$$\text{AREA} = 4 \text{ units}^2$$



6. Use a table of values to graph the following function: $y = \frac{1}{2}^x$ (2 pts)

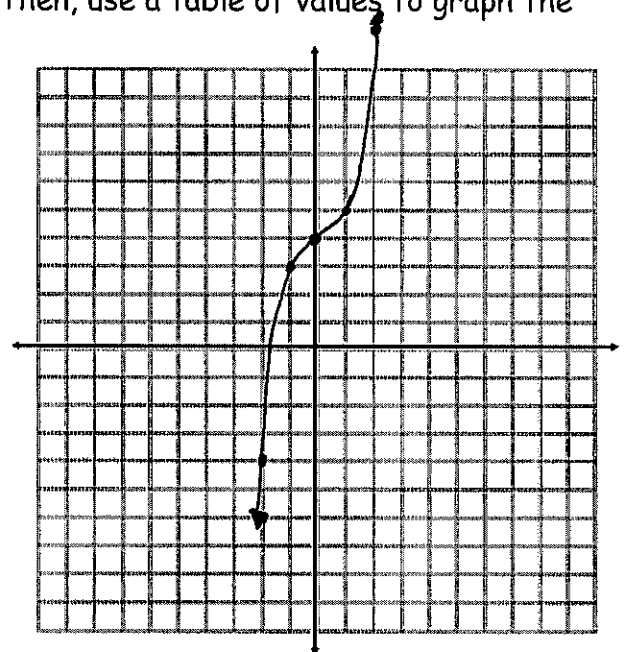
x	y
-3	8
-2	4
-1	2
0	1
1	1/2
2	1/4
3	1/8



7. Re-write the following equation in function form. Then, use a table of values to graph the function: $\frac{1}{2}y = \frac{1}{2}x^3 + 2$ (3 pts)

$$y = x^3 + 4$$

x	y
-2	-4
-1	3
0	4
1	5
2	12



8.

On the planet of Creon, every creature is exactly the same height (80 cm), but no creature is the same weight, though the heaviest creature is 100 kg.

a. Graph the relationship between x , the height of each creature, and y , each creature's weight. (1 pt)

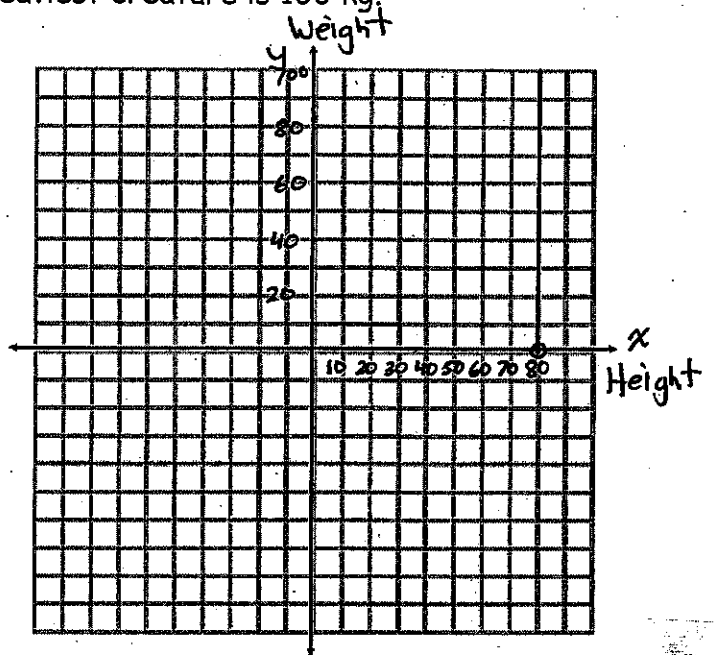
b. Write an equation for this graph? (1 pt)

$x = 80$

c. What is the Domain of this graph? Range? (2 pts)

Domain: $x = 80$
 Range: $0 < y \leq 100$

d. slope is undefined



9. Two vertices of a triangle are located $(-4, -2)$ and $(2, -2)$.

A. If the area of the triangle is 9 square units, what are all the possible positions for the third vertex? (2 pts)

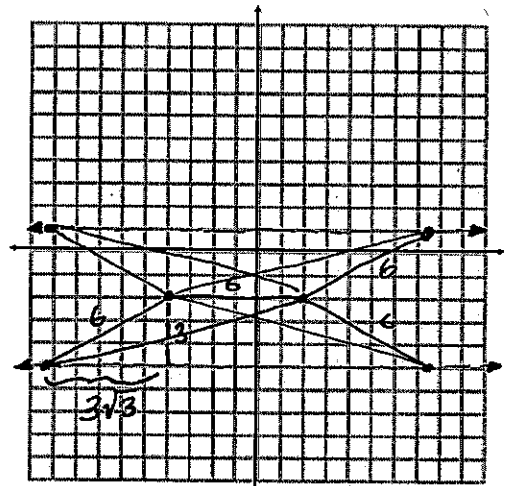
Anywhere along the lines $y = 1$ or $y = -5$

B. What if the triangle is isosceles? (2 pts)

* If 6 is the hypotenuse, the 3rd vertex could be at $(-1, 1)$ or $(-1, -5)$.

* There are 4 possibilities if the 2 equal sides of the isosceles triangle have lengths of 6 units. These possibilities are

$(-4-3\sqrt{3}, -5)$ $(2+3\sqrt{3}, -5)$
 $(-4-3\sqrt{3}, 1)$ $(2+3\sqrt{3}, 1)$.

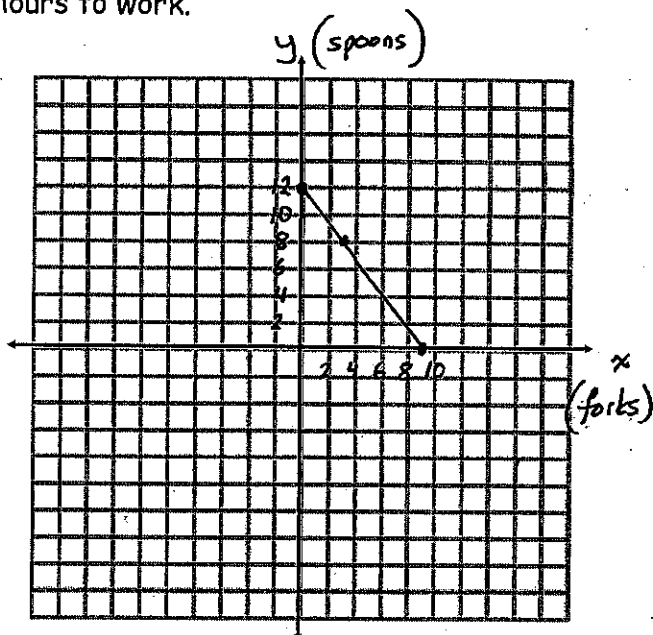


$6^2 = 3^2 + x^2$
 $36 = 9 + x^2$
 $27 = x^2$
 $3\sqrt{3} = x$

- Steve is making crafts to sell at a fair. It takes him $\frac{2}{3}$ of an hour to make a wooden fork and $\frac{1}{2}$ hour to make a wooden spoon. He has 6 hours to work.

- A. Write an equation to show the relationship between how many forks and spoons Steve can make in three hours. Let x = the number of forks and y = the number of spoons. (1)

$$\frac{2}{3}x + \frac{1}{2}y = 6$$



- B. Graph your equation from Part A. (1)
when $x=0$ $y=12$; when $y=0$, $x=9$ →

- C. What is the x -intercept? What does it represent in this situation? (2)

$(9, 0)$: If he makes 0 spoons, he can make 9 forks

- D. What is the y -intercept? What does it represent in this situation? (2)

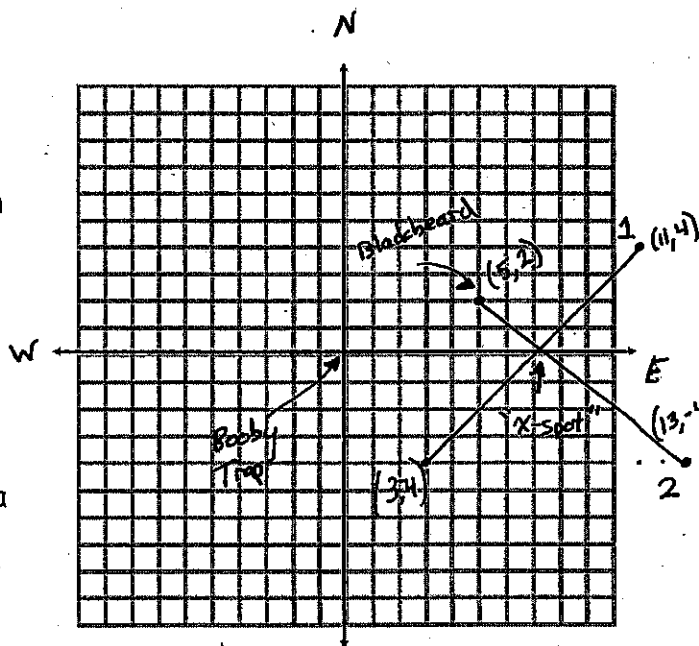
$(0, 12)$ If he makes 0 forks, he can make 12 spoons

- E. If Steve works the entire 6 hours while making 8 spoons, how many forks did he make? (1)

$$y=8 \text{ so } \frac{2}{3}x + \frac{1}{2} \cdot 8 = 6 \rightarrow \frac{2}{3}x + 4 = 6 \rightarrow \frac{2}{3}x = 2 \rightarrow x = 3 \quad \boxed{3 \text{ forks}}$$

11.

- Blackbeard was standing at a point 5 steps East and 2 steps North of a booby trap, with a long rope in his hand. Holding one end in his hand, he gave the other end to one of his men and directed him to walk 6 steps south and 8 steps east. He gave another rope to each of two other men, instructing one to walk to a spot 6 steps due east and 2 steps due north of his position. He told the third man to walk to a spot that was 6 steps due south and 2 steps due west. Blackbeard decided to bury a treasure at the point where the two ropes crossed. Determine the exact coordinates of that "x" spot using algebra. (3 pts)



Find an equation for both lines. The "x-spot" is an ordered pair that is a solution to both equations.

Line 1

$$\text{slope} = \frac{4-2}{11-5} = \frac{2}{6} = \frac{1}{3}$$

$$\text{Equation: } y-2 = \frac{1}{3}(x-5)$$

$$y = \frac{1}{3}x - \frac{5}{3} + 2$$

$$y = \frac{1}{3}x + \frac{1}{3}$$

Line 2

$$\text{slope} = \frac{-4-2}{13-5} = \frac{-6}{8} = -\frac{3}{4}$$

$$\text{Equation: } y-2 = -\frac{3}{4}(x-5)$$

$$y = -\frac{3}{4}x + \frac{15}{4} + 2$$

$$y = -\frac{3}{4}x + \frac{23}{4}$$

At the x-spot, $y_{\text{line 1}} = y_{\text{line 2}}$

$$\text{So, } x-7 = -\frac{3}{4}x + \frac{23}{4}$$

$$\frac{7}{4}x = \frac{51}{4}$$

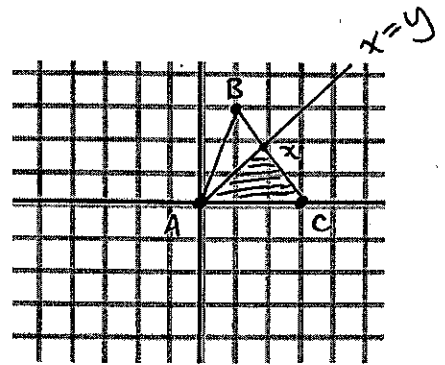
$$x = \frac{51}{4} \cdot \frac{4}{7}$$

$$x = \frac{51}{7} = 7\frac{2}{7}$$

$$\text{and } y = x-7 = 7\frac{2}{7}-7 = \frac{2}{7}$$

So, the ordered pair is $(7\frac{2}{7}, \frac{2}{7})$ for the "x-spot."

12. A point is randomly selected from within the triangle having vertices $(0,0)$, $(1,3)$ and $(3,0)$. What's the probability that the x-coordinate will be greater than the y-coordinate? (3 pts)



① Find x .

Find equation of \overleftrightarrow{BC}

$$\text{slope} = -\frac{3}{2}$$

$$y - 3 = -\frac{3}{2}(x - 1)$$

$$y = -\frac{3}{2}x + \frac{9}{2}$$

② the ordered pair for x is a solution to both equations, so

$$x = -\frac{3}{2}x + \frac{9}{2}$$

$$\frac{5}{2}x = \frac{9}{2}$$

$$x = \frac{9}{5}$$

$$y = \frac{9}{5}$$

$$\left(\frac{9}{5}, \frac{9}{5}\right)$$

③ Area $\Delta ACX =$

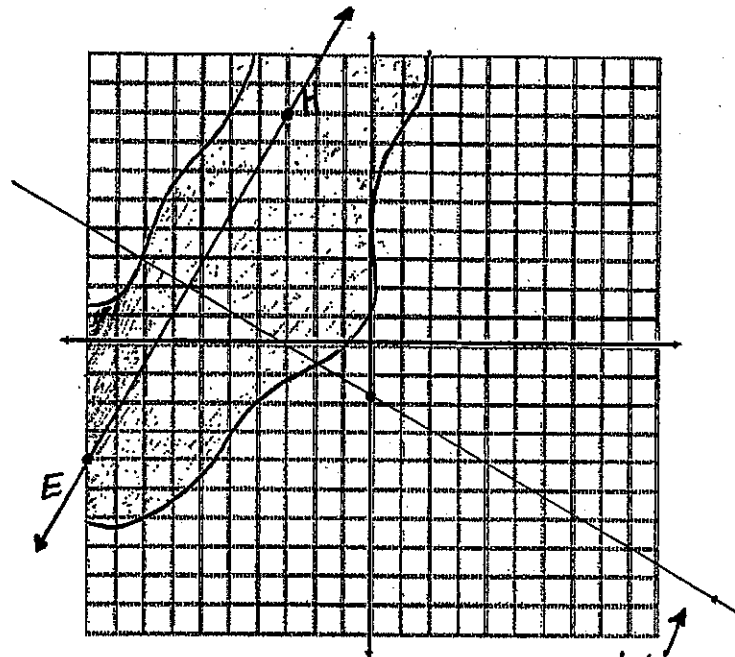
$$\frac{1}{2} \cdot 3 \cdot \frac{9}{5} = \frac{27}{10}$$

$$\text{TOTAL AREA} = \frac{9}{2}$$

$$\textcircled{4} P(x > y) = \frac{\frac{27}{10}}{\frac{9}{2}} = \frac{27}{10} \cdot \frac{2}{9} = \boxed{\frac{3}{5}}$$

13.

Capture the Flag! The English and History classes at Mathland High School are planning to play a game of Capture the Flag in the woods behind the school. They've been discussing how to fairly divide the woods into two territories, as the game requires. To help, they've drawn a map of the woods on a coordinate plane. The English class wants to claim the southwest territory of the woods and puts their base at $(-10, -4)$. The History class wants to claim the northeast territory, and plans to put their base at $(-3, 8)$. Both classes agree that the perpendicular bisector of the segment joining their bases would be a fair divider between the two territories. What is the equation of that line in slope-intercept form? (3 pts)



① Slope of Line EH is $\frac{8 - (-4)}{-3 - (-10)} = \frac{12}{7}$

② Midpoint of EH is $\left(\frac{-3 + (-10)}{2}, \frac{-4 + 8}{2}\right)$
 $(-6.5, 2)$

③ So, the perpendicular bisector must pass through $(-6.5, 2)$ with a slope of $-\frac{7}{12}$

④ Point-Slope Form:

$$y - 2 = -\frac{7}{12}(x + 6.5)$$

$$y - 2 = -\frac{7}{12}x + \frac{-7 \cdot 13}{12 \cdot 2}$$

$$y - 2 = -\frac{7}{12}x + \frac{-91}{24}$$

⑤ slope intercept form

$$y = -\frac{7}{12}x + \frac{-91}{24} + \frac{48}{24}$$

$$y = -\frac{7}{12}x - \frac{43}{24}$$

sketch to check

sketch to check

14. **Temperature Affects Running Speed:** The optimal running speed at 60°F is 17.6 feet per second. A person would slow down by about .3 foot per second for every 5° increase in temperature above 60°F .

* A. Write an equation that represents this situation in point-slope form. (1 pt)

Since "Temperature affects Speed,"
Speed is the dependent variable.

* the slope would be how much
the speed change per degree,
so slope = $\frac{-.3}{5} = -.06$

$$S - 17.6 = -.06(T - 60)$$

T	Speed
60	17.6

← An ordered pair we know

B. Now, write the equation in slope-intercept form. (1 pt)

$$S - 17.6 = -.06T + 3.6$$

$$S = -.06T + 21.2$$

C. What is the optimal running speed if the outside temperature is 80°F ? (1 pt)

if $T = 80$

$$S = -.06(80) + 21.2$$

$$S = -4.8 + 21.2 = 16.4 \text{ feet per second}$$

15. In point-slope form, write an equation of the line that passes through the given points:

$(2w, -z)$ and $(w, w-z)$ (1 pt)

$$\textcircled{1} \text{ Slope} = \frac{w - z - (-z)}{w - 2w}$$

$$= \frac{w}{-w}$$

$$= -1$$

$\textcircled{2}$ Point-Slope Form

$$y - (-z) = -1(x - 2w)$$

$$y + z = -1(x - 2w)$$

B. Now, write the equation in slope intercept form. (1 pt)

$$y + z = -1(x - 2w)$$

$$y + z = -1x + 2w$$

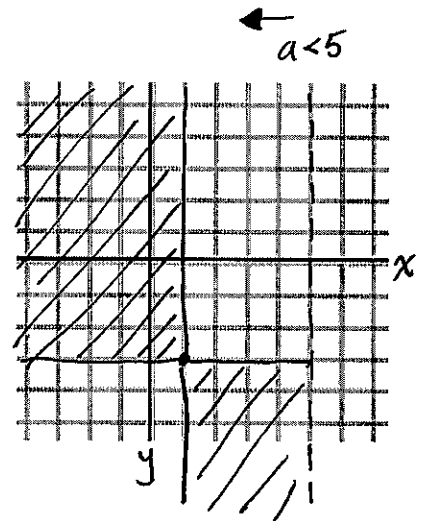
$$y = -1x + (2w - z)$$

16. If $a < 5$, what must be true about b so that the line passing through the points (a, b) and $(1, -3)$ has a negative slope? (2 pts)

(a, b) can be in either shaded area.

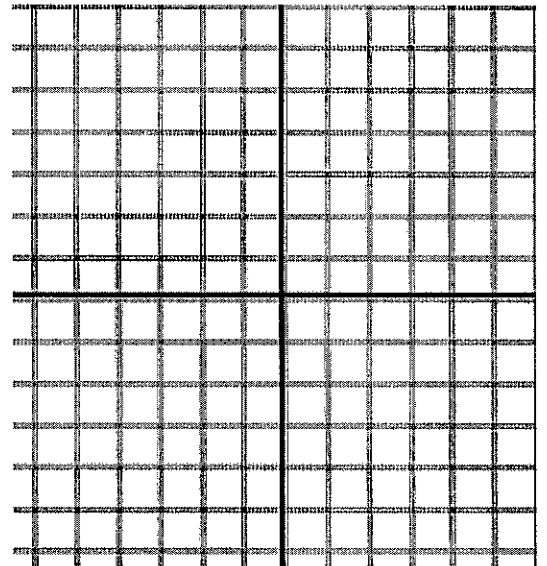
So, if $1 < a < 5$, then $b < -3$.

if $a < 1$, $b > -3$.



17. You have \$12 to spend on fruit for a meeting. Grapes cost \$1 per pound and peaches cost \$1.50 per pound. Let x represent the number of pounds of grapes you can buy. Let y represent the number of pounds of peaches you can buy. Write and graph an inequality to model the amounts of grapes and peaches you can buy. (2 pts)

Blue #24



18. Write an inequality that satisfies the following criteria. The points $(-3, 5)$ and $(7, 9)$ are on the boundary of the graph of the inequality and are solutions of the inequality. The origin is a solution of the inequality. (1 pt)

The information in the problem gives the solution shown in the graph.

- ① Find the equation of the line.

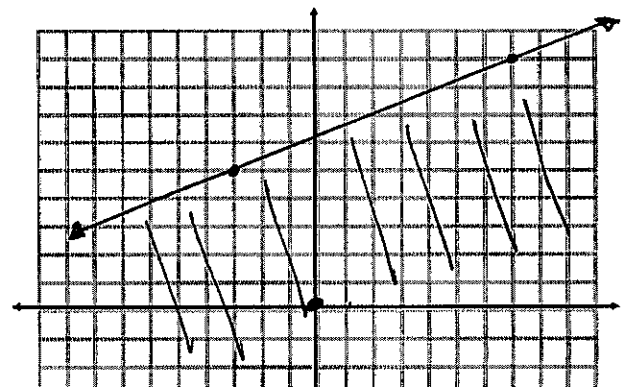
$$\text{slope} = \frac{9-5}{7-(-3)} = \frac{4}{10} = \frac{2}{5}$$

$$y - 9 = \frac{2}{5}(x - 7)$$

$$y = \frac{2}{5}x - \frac{14}{5} + 9$$

$$\rightarrow y = \frac{2}{5}x + 6\frac{1}{5}$$

substitute $(0, 0)$ to

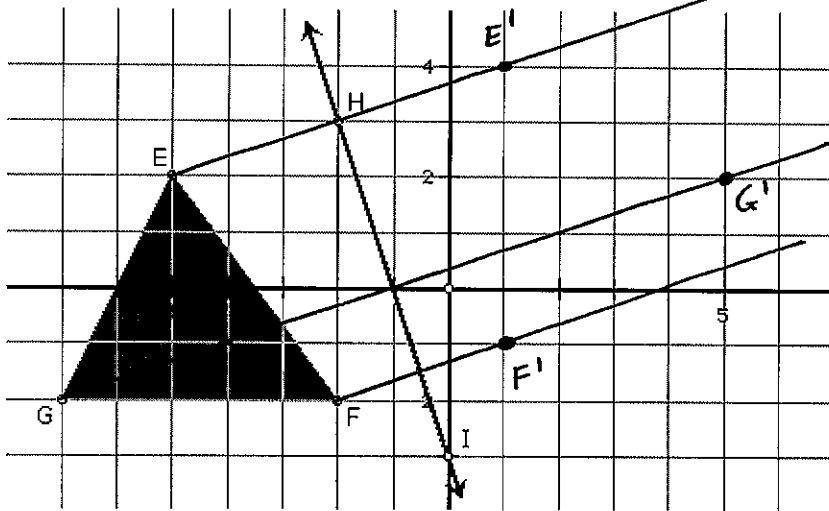


determine the sign.

$$0 < 0 + 6\frac{1}{5} \therefore$$

$$y \leq \frac{2}{5}x + 6\frac{1}{5}$$

19. Find the coordinates of the vertices of the triangle that is a reflection of the shown triangle through the line HI in the picture below. (2 pts)



- ① A line segment connecting a point to its reflection point must be perpendicular to \overleftrightarrow{HI} .
 Slope of $\overleftrightarrow{HI} = -\frac{3}{1}$, so all line segments connecting points to their reflection points must have a slope of $\frac{1}{3}$.
- ② Points and reflection points must be the same distance from \overleftrightarrow{HI} .

$$\begin{matrix} E' (1, 4) & G' (2, 5) \\ F' (1, -1) & \end{matrix}$$

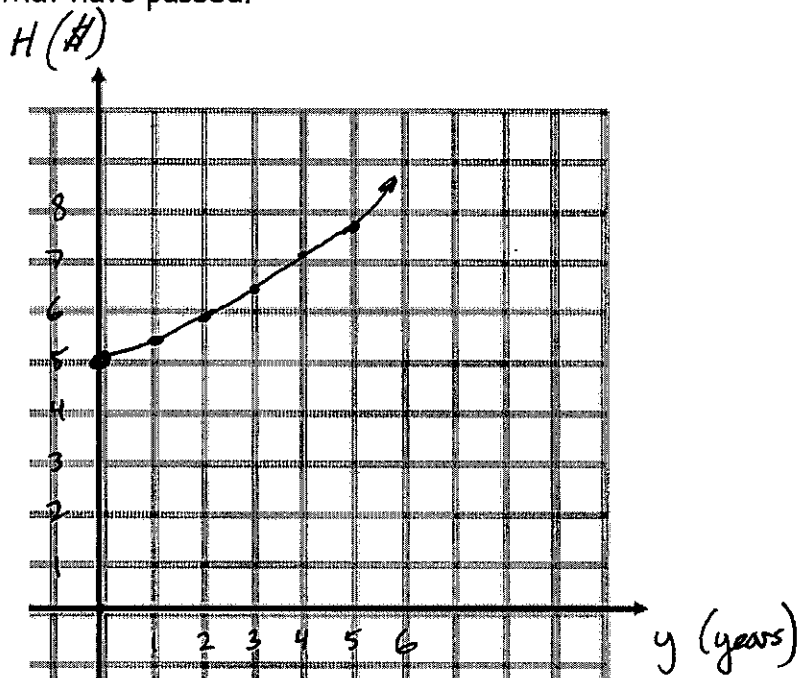
20. The hourly rate of your new job is \$5 per hour. You expect a raise of 9% at the end of each year. (3 pts total: 1 pt each)

A. Write an equation for your hourly rate, H , in terms of the number of years, y , that have passed.

$$H = 5(1.09)^y$$

B. Graph your equation

y	H
0	5
1	5.45
2	5.94
3	6.48
4	7.06
5	7.69



C. At the end of your first year, you receive your first raise. What will your hourly rate be at the end of your fifth year?

→ \$7.69