GRADE 5 – MODULE 6: PARENT GUIDE

Problem Solving with the Coordinate Plane

- Each day in class, we do practice sets. Attached are the answer keys to the Practice Sets from this module. These answer keys can be used to refresh your child's memory of work we did together in class and help you support your child with the math homework. There is a footer at the end of each answer key that tells you the lesson number. This lesson number corresponds with the lesson number on the homework sheets.

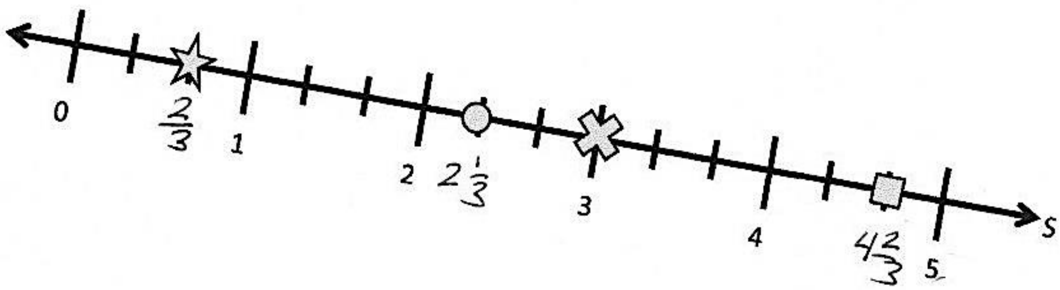
Module 6 Contents:

Name John　　　　Date ______

1. Each shape was placed at a point on the number line S. Give the coordinate of each point below.

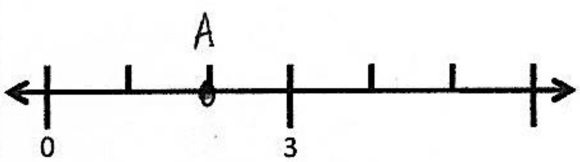
a. ✖ 3　　　　b. ☆ $\frac{2}{3}$

c. ○ $2\frac{1}{3}$　　　　d. □ $4\frac{2}{3}$



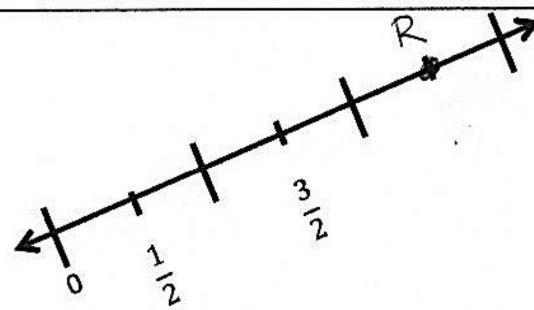
2. Plot the points on the number lines.

a.



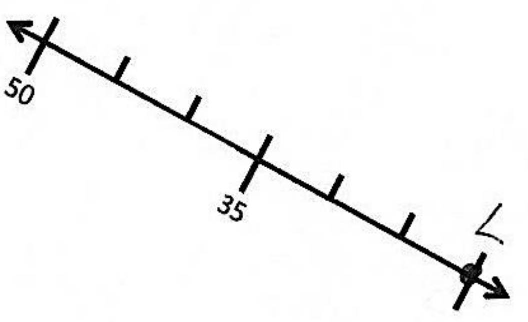
Plot A so its distance from the origin is 2.

b.



Plot R so that its distance from the origin is $\frac{5}{2}$.

c.

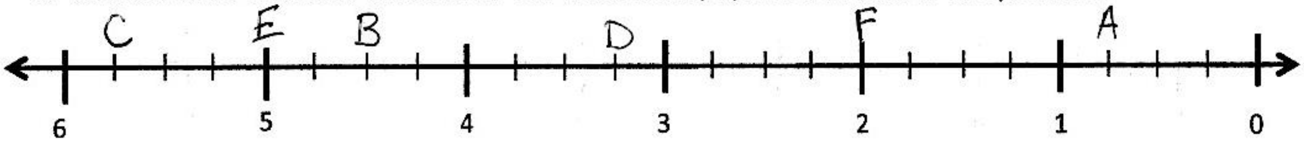


Plot L so its distance from the origin is 20

d.

Plot a point T so that its distance from the origin is $\frac{2}{3}$ more than that of S

3. Number line G is labeled from 0 to 6. Use number line, $\boldsymbol{G}$, below to answer the questions.



a. Plot the point A at $\frac{3}{4}$.

b. Label a point that lies at $4\frac{1}{2}$ as B.

c. Label a point, C, whose distance from zero is 5 more than that of A.

The coordinate of C is $5\frac{3}{4}$.

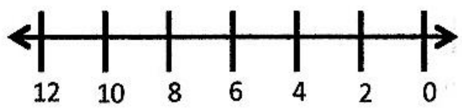
d. Plot a point, D, whose distance from zero is $1\frac{1}{4}$ less than that of B.

The coordinate of D is $3\frac{1}{4}$.

e. The distance of E from zero is $1\frac{3}{4}$ more than that of D. Plot the point E.

f. What is the coordinate of the point that lies halfway between A and D? 2
Label this point F.

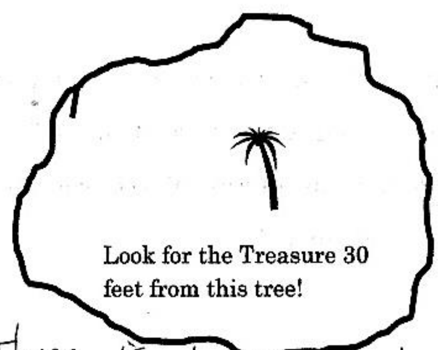
4. Mrs. Fan asked her 5th grade class to create a number line. Lenox created the number line below:



Parks said Lenox's number line is wrong because numbers should always increase from left to right. Who is correct? Explain your thinking.

Lenox is right because her number line starts at zero and uses equal intervals to increase. It doesn't matter what direction it goes.

5. A pirate marked the palm tree on his treasure map and buried his treasure 30 feet away. Do you think he'll be able to easily find his treasure when he returns? Why or why not? What might he do to make it easier to find?

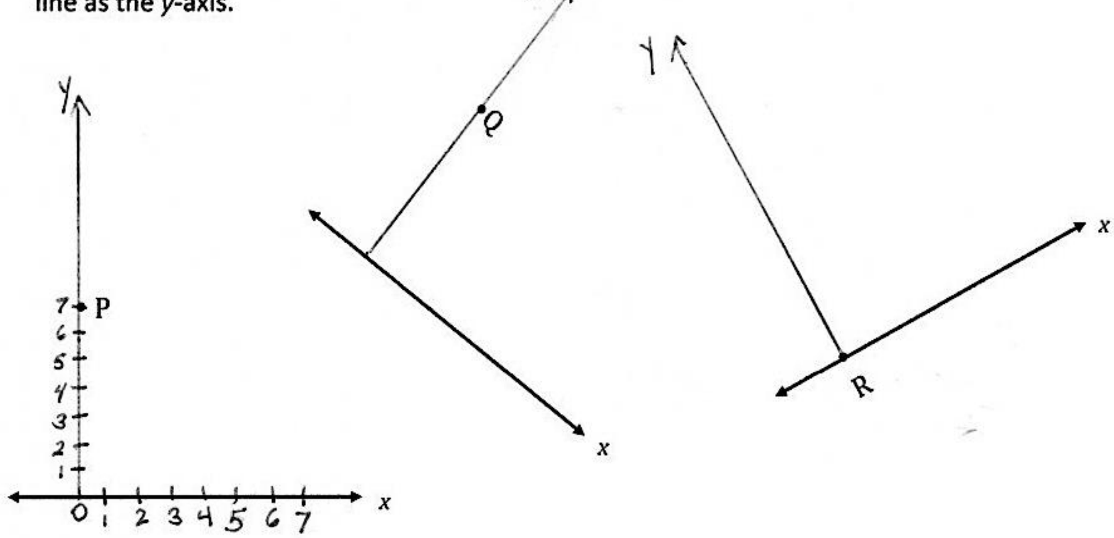


No, because he doesn't say in what direction the 30 feet is, so it could be anywhere in the circle. There is also no scale on the map. If he adds a scale and gives a direction, it will be easier to find.

Name Brianna Date ____________________

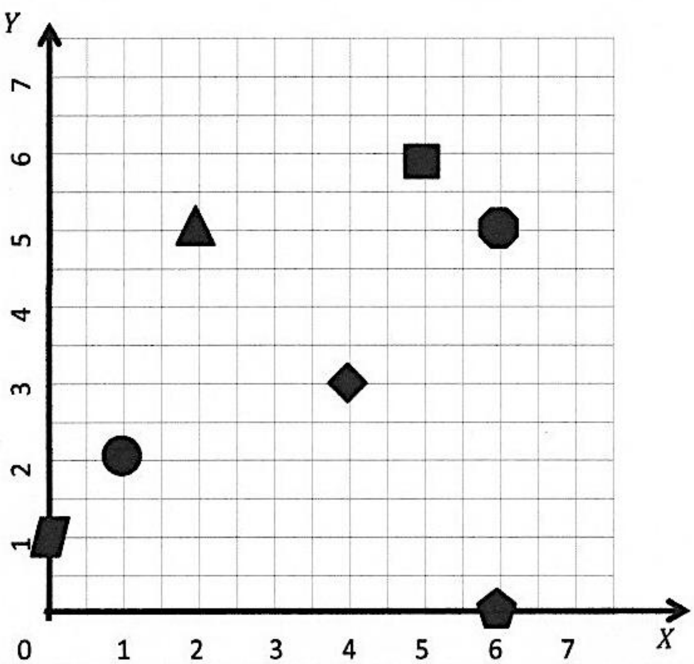
1.

a. Use a set-square to draw a line perpendicular to the x-axes through points P, Q, and R. Label the new line as the y-axis.



b. Choose one of the sets of perpendicular lines above and create a coordinate plane. Mark 7 units on each axis and label as whole numbers.

2. Use the coordinate plane to answer



a. Tell the shape at each location

x-coordinate	y-coordinate	Shape
2	5	triangle
1	2	circle
5	6	square
6	5	octagon

b. Which shape is 2 units from the y-axis?

triangle

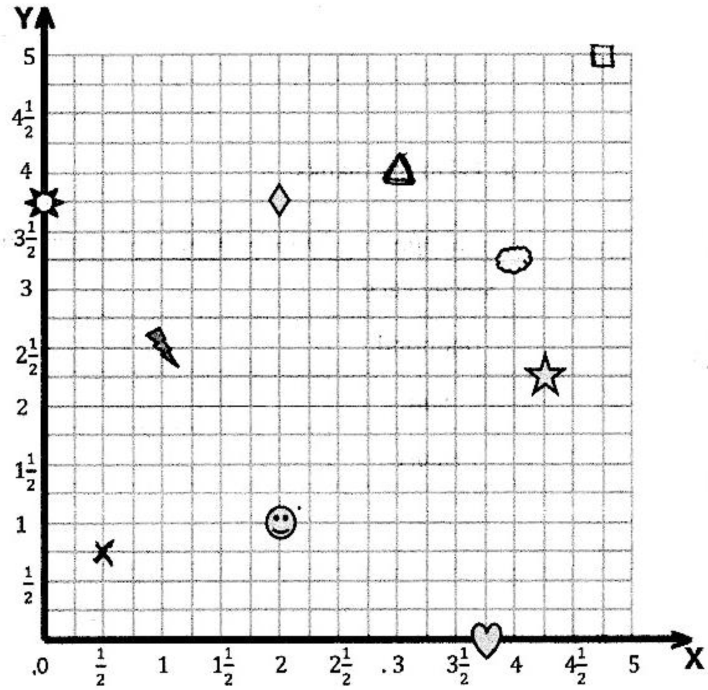
c. Which shape has an x-coordinate of 0?

parallelogram

d. Which shape is 4 units from the y-axis and 3 units from the x-axis?

square (diamond)

3. Use the coordinate plane to answer.



a. Fill in the blanks.

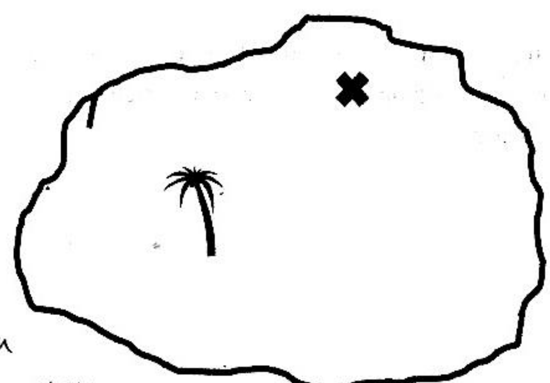
Shape	x-coordinate	y-coordinate
Smiley Face	2	1
Diamond	2	$3\frac{3}{4}$
Sun	0	$3\frac{3}{4}$
Heart	$3\frac{3}{4}$	0

b. Name the shape whose x-coordinate is $\frac{1}{2}$ unit more than the heart's x-coordinate.

The cloud.

c. Plot a triangle at (3,4). d. Plot a square at $(4\frac{3}{4}, 5)$ e. Plot an "X" at $(\frac{1}{2}, \frac{3}{4})$

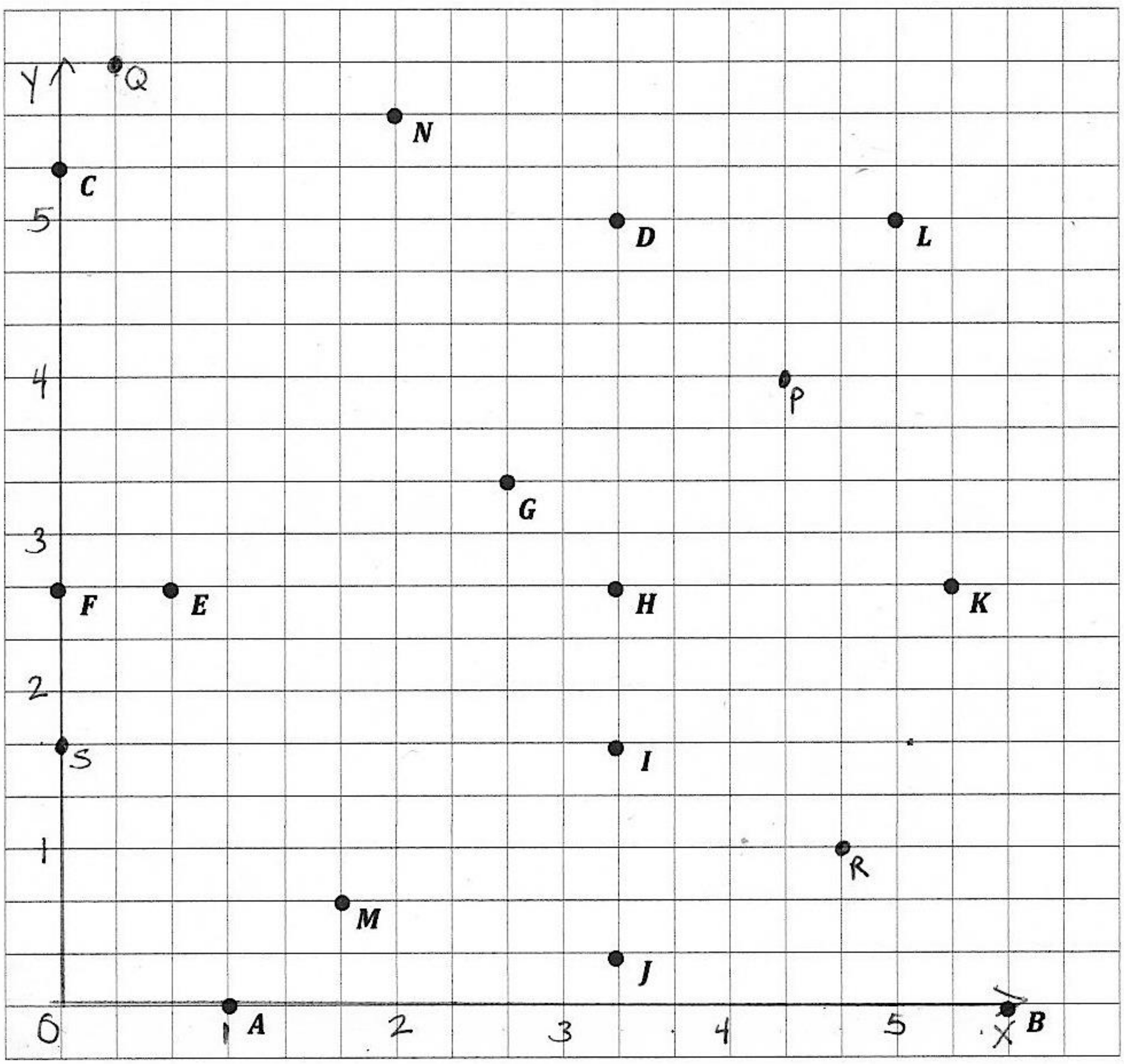
4. The pirate's treasure is buried at the "x" on the map. How could a coordinate plane make describing its location easier?



It would give an exact location for the X. If you drew an X-axis along the bottom of the island and a Y-axis along the left side, you could make a scale and describe the position of the X very clearly.

Name Jarvis Date ____________

1. Use the grid below, to complete the following tasks.
   a. Construct an x-axis that passes through points A and B.
   b. Construct a perpendicular y-axis that passes through points C and F.
   c. Label the origin as 0.
   d. The x-coordinate of B is $5\frac{2}{3}$. Label the whole numbers along the x-axis.
   e. The y-coordinate of C is $5\frac{1}{3}$. Label the whole numbers.



2. For all of the following problems consider the points A through N on the previous page.

   a. Identify all of the points that have an x-coordinate of $3\frac{1}{3}$. D, H, I, J

   b. Identify all of the points that have a y-coordinate of $2\frac{2}{3}$. F, E, H, K

   c. Which point is $3\frac{1}{3}$ units above the x-axis ***and*** $2\frac{2}{3}$ units to the right of the y-axis? Name the point and give its coordinate pair. G $(2\frac{2}{3}, 3\frac{1}{3})$

   d. Which point is located $5\frac{1}{3}$ units from the y-axis? K

   e. Which point is located $1\frac{2}{3}$ units down the x-axis? M

   f. Give the coordinate pair for each of the following points.

   K: $(5\frac{1}{3}, 2\frac{2}{3})$ I: $(3\frac{1}{3}, 1\frac{2}{3})$ B: $(5\frac{2}{3}, 0)$ C: $(0, 5\frac{1}{3})$

   g. Name the points located at the following coordinates.

   $(1\frac{2}{3}, \frac{2}{3})$ M $(0, 2\frac{2}{3})$ F $(1, 0)$ A $(2, 5\frac{2}{3})$ N

   h. Which point has an equal x- and y-coordinate? L

   i. Give the coordinates for the intersection of the two axes. 0, 0 Another name for this point on the plane is the origin.

   j. Plot the following points.

   P: $(4\frac{1}{3}, 4)$ Q: $(\frac{1}{3}, 6)$ R: $(4\frac{2}{3}, 1)$ S: $(0, 1\frac{2}{3})$

   k. What is distance between E and H, or EH? $2\frac{2}{3}$

   l. What is the length, HD? $2\frac{1}{3}$

   m. Would the length ED be greater or less than $EH + HD$? Less

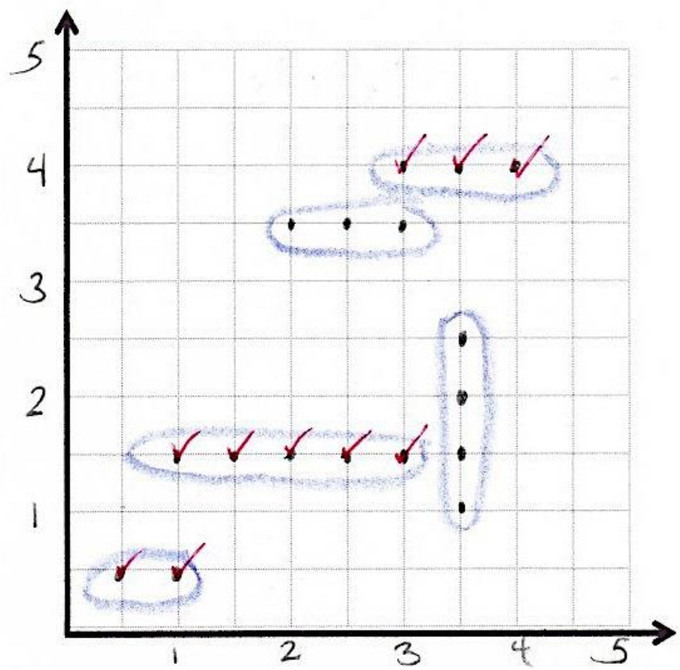
   n. Jack was absent when the teacher explained how to describe the location of a point on the coordinate plane. Explain it to him using point J.

   The x coordinate is the number of units to the right. J is $3\frac{1}{3}$. The y coordinate is the number of units up. J is $\frac{1}{3}$. You name the point by (x, y). So J is $(3\frac{1}{3}, \frac{1}{3})$.

My Ships

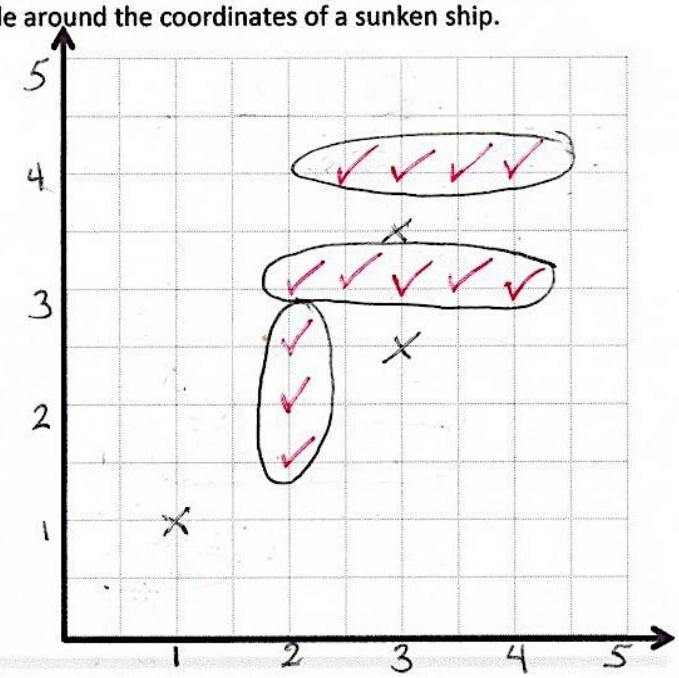
- Draw a red ✓over any coordinate your opponent "hits".
- Once all of the coordinates of any ship have been "hit" say, "You've sunk my (name of ship)".

aircraft carrier – 5 points
battleship – 4 points
cruiser – 3 points
submarine – 3 points
patrol boat – 2 points



Enemy Ships

- Draw a black ✖ on the coordinate if your opponent says, "miss".
- Draw a red ✓ on the coordinate if your opponent says, "hit".
- Draw a circle around the coordinates of a sunken ship.



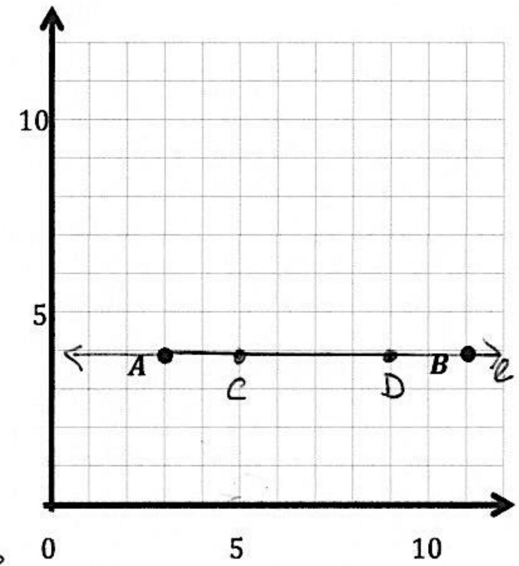
Attack Shots

- Record the coordinates of each shot below and whether it was a ✓(hit) or a ✖ (miss).

1, 1 x	$3\frac{1}{2}$, 3 ✓
2, 2 ✓	4, 3 ✓
2, $2\frac{1}{2}$ ✓	$4\frac{1}{2}$, 3 x
2, $1\frac{1}{2}$ ✓	2, 3 ✓
3, 3 ✓	4, 4 ✓
3, $2\frac{1}{2}$ x	$3\frac{1}{2}$, 4 ✓
3, $3\frac{1}{2}$ x	3, 4 ✓
$2\frac{1}{2}$, 3 ✓	$2\frac{1}{2}$, 4 ✓

Name John Date ____________

1. Use the coordinate plane below to answer the following questions.



   a. Use a straight edge to construct a line that goes through points A and B. Label the line e.
   b. Line e is parallel to the X-axis and is perpendicular to the y-axis.
   c. Plot two more points on line e. Name them C and D.
   d. Give the coordinates of each point below.

      A: (3, 4) B: (11, 4)

      C: (5, 4) D: (9, 4)

   e. What do all of the points of line e have in common?

      They all have a y-coordinate of 4.

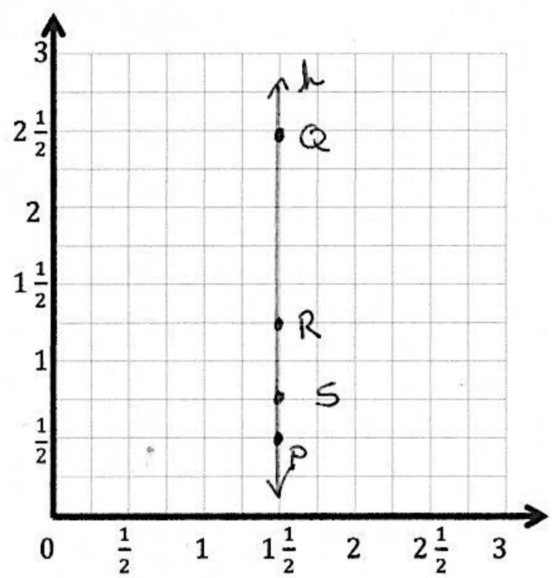
   f. Give the coordinates of another point that would fall on line e with an x-coordinate greater than 15.

      (16, 4)

2. Plot the following points on the coordinate plane to the right.

   P: $(1\frac{1}{2}, \frac{1}{2})$ Q: $(1\frac{1}{2}, 2\frac{1}{2})$

   R: $(1\frac{1}{2}, 1\frac{1}{4})$ S: $(1\frac{1}{2}, \frac{3}{4})$



   a. Use a straight edge to draw a line to connect these points. Label the line h.
   b. In line h x = $1\frac{1}{2}$ for all values of y.
   c. Circle the correct word.

      Line h is *parallel* *perpendicular* to the x-axis.

      Line h is *parallel* *perpendicular* to the y-axis.

   d. What pattern occurs in the coordinate pairs that let you know that line h is vertical?

      All of the x values are the same, but the y values are different.

3. For each pair of points below, think about the line that joins them. For which pairs is the line parallel to the *x*-axis? Circle your answer(s). Without plotting them, explain how you know.

   a. (1.4, 2.2) & (4.1, 2.4) b. (3, 9) & (8, 9) c. $(1\frac{1}{4}, 2)$ & $(1\frac{1}{4}, 8)$

   If the y values are the same, the line is parallel to the x-axis. Answer b was the only choice like that.

4. For each pair of points below, think about the line that joins them. For which pairs is the line parallel to the *y*-axis? Circle your answer(s). Then, give 2 other coordinate pairs that would also fall on this line.

   a. (4, 12) & (6, 12) b. $(\frac{3}{5}, 2\frac{3}{5})$ & $(\frac{1}{5}, 3\frac{1}{5})$ c. (0.8, 1.9) & (0.8, 2.3)

   (0.8, 2.9) and (0.8, 5)

5. Write the coordinate pairs of 3 points that can be connected to construct a line that is $5\frac{1}{2}$ units to the right of and parallel to the *y*-axis.

   a. $(5\frac{1}{2}, 1)$ b. $(5\frac{1}{2}, 3)$ c. $(5\frac{1}{2}, 5\frac{1}{2})$

6. Write the coordinate pairs of 3 points that lie on the *x*-axis.

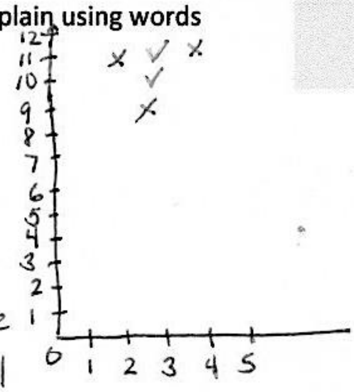
   a. (1, 0) b. (3, 0) c. (19, 0)

7. Adam and Janice are playing Battleship. Here is a record of Adam's guesses so far:

(3, 11)	hit
(2, 11)	miss
(3,10)	hit
(4, 11)	miss
(3, 9)	miss

He has hit Janice's battleship using these coordinate pairs! What should he guess next? How do you know? Explain using words and pictures.

(3, 12)



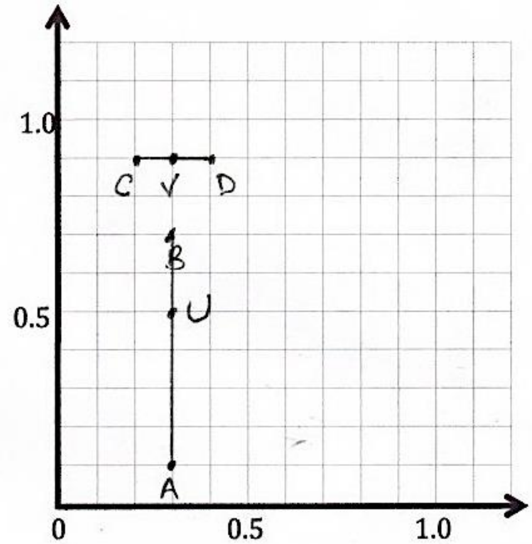
The rest of the ship has to be at (3,12) or greater (depending on what kind of ship) because Adam has already tried all the other options, and the hits have all been at x-coordinate 3. He has to go higher on the y-coordinate because (3, 9) didn't work.

Name Jenny Date ____________

1. Plot the following points and label them on the coordinate plane.

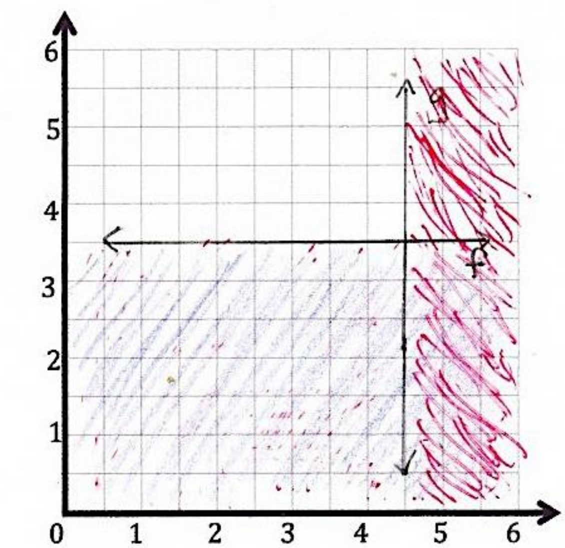
   A: (0.3, 0.1) B: (0.3, 0.7)

   C: (0.2, 0.9) D: (0.4, 0.9)

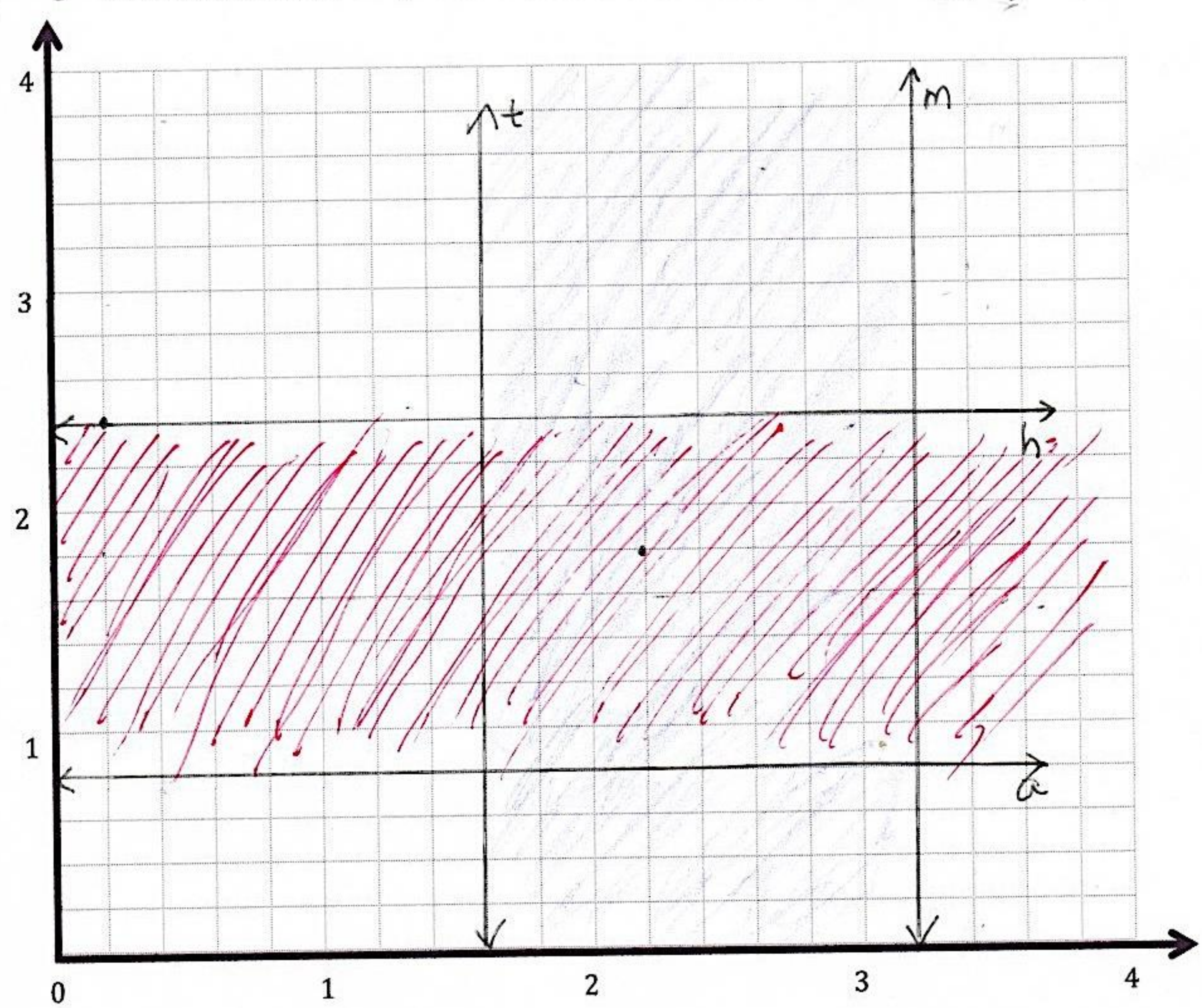


   a. Use a straight edge to construct line segments $\overline{AB}$ and $\overline{CD}$.
   b. Line segment $\overline{CD}$ is parallel to the x-axis and is perpendicular to the y-axis.
   c. Line segment $\overline{AB}$ is parallel to the y-axis and is perpendicular to the x-axis.
   d. Plot a point on line segment $\overline{AB}$, not at the endpoints and name it U.
      Write the coordinates. U (0.3 , 0.5)
   e. Plot a point on line segment $\overline{CD}$ and name it V. Write the coordinates. V (0.3 , 0.9)

2. Construct line f such that the y-coordinate of every point is $3\frac{1}{2}$ and construct line g such that the x-coordinate of every point is $4\frac{1}{2}$.
   a. Line f is $3\frac{1}{2}$ units from the x-axis.
   b. Give the coordinates of the point on line f that is $\frac{1}{2}$ unit from the y-axis. $(\frac{1}{2}, 3\frac{1}{2})$
   c. Shade the portion of the grid that is less than $3\frac{1}{2}$ units from the x-axis with a blue pencil.
   d. Line g is $4\frac{1}{2}$ units from the y-axis.
   e. Give the coordinates of the point on line g that is 5 units from the x-axis. $(4\frac{1}{2}, 5)$
   f. Shade the portion of the grid that is more than $4\frac{1}{2}$ units from the y-axis with a red pencil.



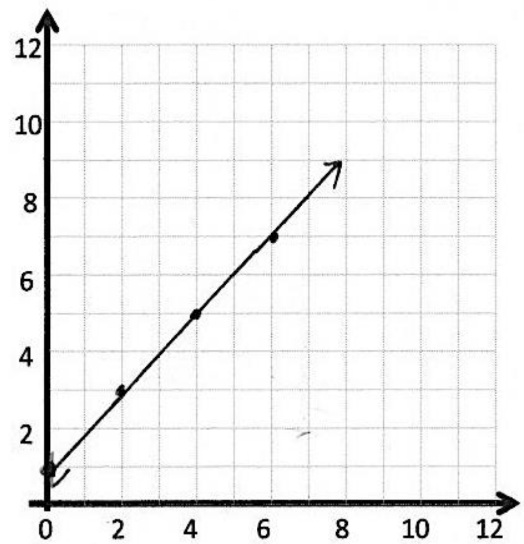
3. Complete the following tasks on the plane below.
   a. Construct a line m that is perpendicular to the x-axis and 3.2 units from the y-axis.
   b. Construct a line a that is 0.8 units from the x-axis.
   c. Construct a line t that is parallel to line m and is halfway between line m and the y-axis.
   d. Construct a line h that is perpendicular to line t and passes through the point (1.2, 2.4).
   e. Shade the region consisting of points that are more than 1.6 units and less than 3.2 units from the y-axis using a blue pencil.
   f. Shade the region consisting of points that are more than 0.8 units and less than 2.4 units from the x-axis using a red pencil.
   g. Give the coordinates of a point that lies in the double-shaded region. (2.2, 1.8)



Name Anna Date ____________

1. Complete the chart. Then plot the points on the coordinate plane below.

x	y	(x, y)
0	1	(0, 1)
2	3	(2, 3)
4	5	(4, 5)
6	7	(6, 7)



a. Use a straight edge to draw a line connecting these points.

b. Write a rule showing the relationship between the x and y-coordinates of points on the line.

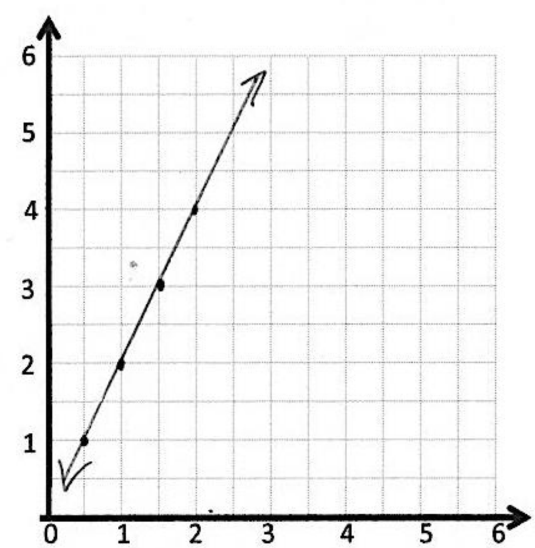
Each y-coordinate is 1 more than its corresponding x-value.

c. Name 2 other points that are on this line.

(7, 8) (9, 10)

2. Complete the chart, then plot the points on the coordinate plane below.

x	y	(x, y)
$\frac{1}{2}$	1	$(\frac{1}{2}, 1)$
1	2	(1, 2)
$1\frac{1}{2}$	3	$(1\frac{1}{2}, 3)$
2	4	(2, 4)



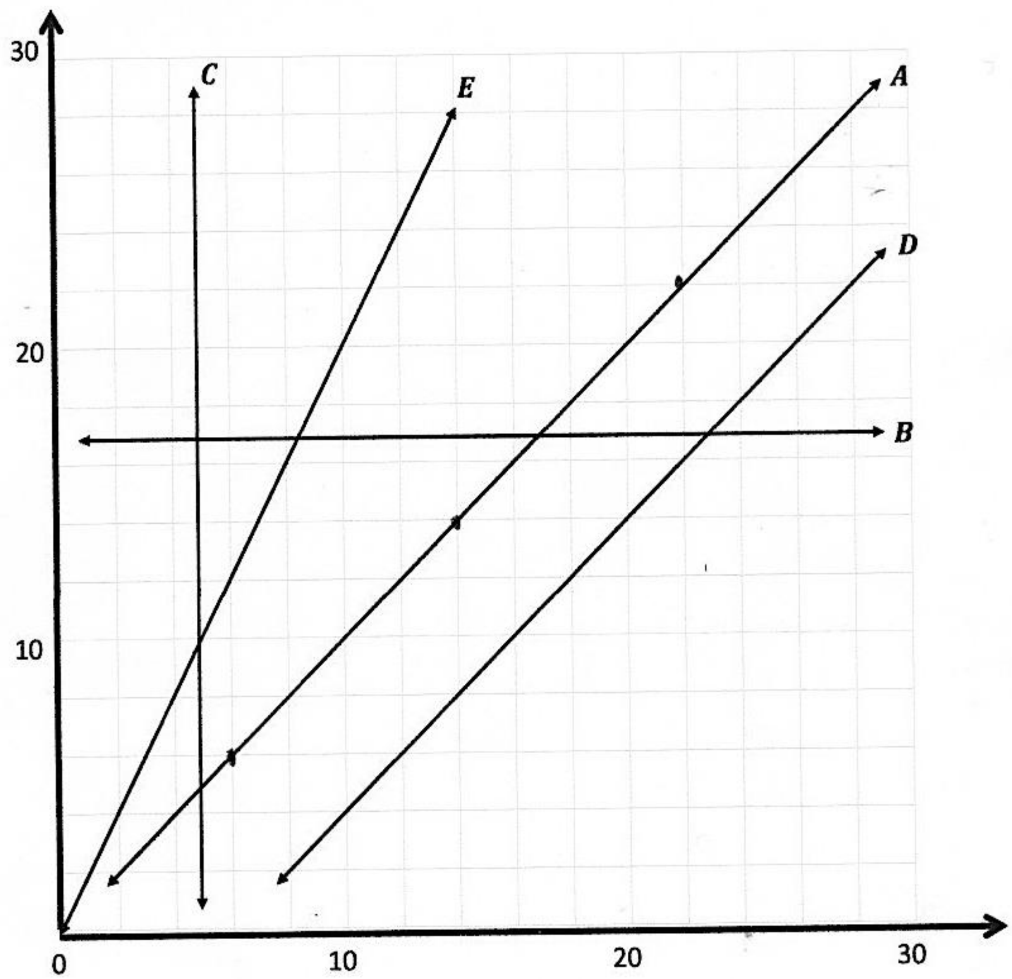
a. Use a straight edge to draw a line connecting these points.

b. Write a rule showing the relationship between the x and y-coordinates.

Each y-coordinate is 2 times its corresponding x-value.

c. Name 2 other points that are on this line. $(2\frac{1}{2}, 5)$ $(3, 6)$

3. Use the coordinate plane below to answer the following questions.



a. Give the coordinates for 3 points that are on line A. $(6, 6)$ $(14, 14)$ $(22, 22)$

b. Write a rule that describes the relationship between the *x*- and *y*-coordinates for the points on line A.

x equals y

c. What do you notice about the *y*-coordinates of every point on line B?

They are all the same.

d. Fill in the missing coordinates for points on line D.

(12 , 6) (6, 0) (30 , 24) (36 , 30) (36 , 30)

e. For any point on line C, the x-coordinate is 5.

f. Each of the points lies on at least 1 of the lines shown in the plane above. Identify a line that contains each of the following points.

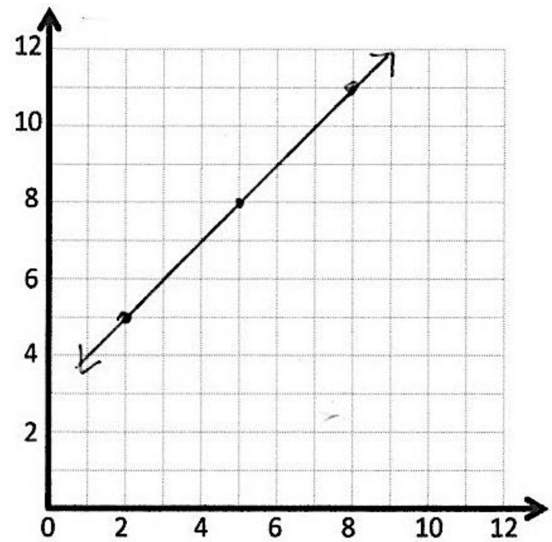
a. (7, 7) ***A***
b. (14 , 8) D
c. (5, 10) C

d. (0 , 17) B
e. (15.3, 9.3) D
f. (20 , 40) E

Name Jared Date ____________

1. Create a table of 3 values for x and y such that each y-coordinate is 3 more than the corresponding x-coordinate.

x	y	(x, y)
2	5	(2, 5)
5	8	(5, 8)
8	11	(8, 11)



a. Plot each point on the coordinate plane.

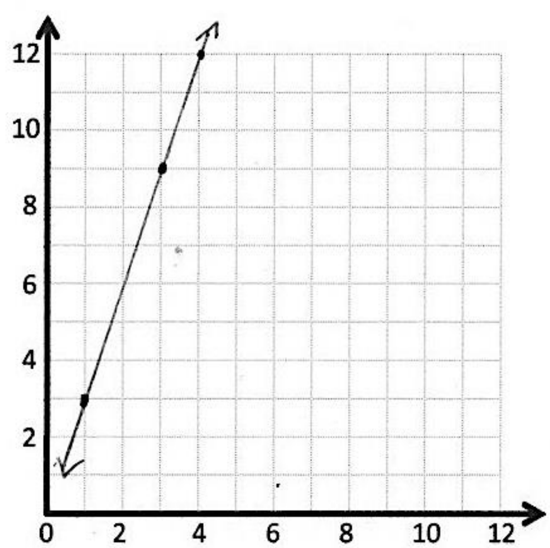
b. Use a straight edge to draw a line connecting these points.

c. Give the coordinates of 2 other points that fall on this line with x-coordinates greater than 12.

(13 , 16) and (20 , 23).

2. Create a table of 3 values for x and y such that each y-coordinate is 3 times as much as its corresponding x-coordinate.

x	y	(x, y)
1	3	(1, 3)
3	9	(3, 9)
4	12	(4, 12)



a. Plot each point on the coordinate plane.

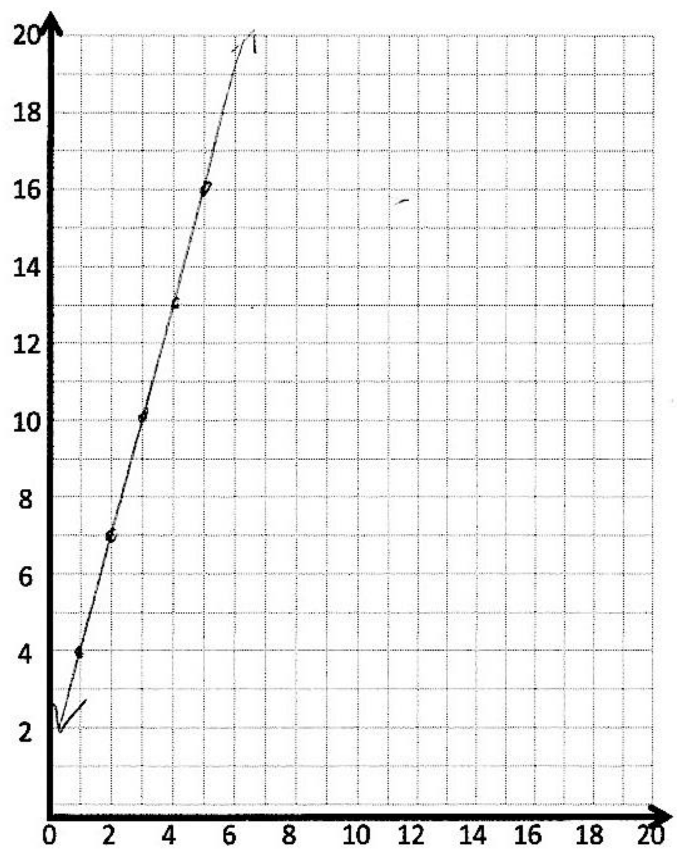
b. Use a straight edge to draw a line connecting these points.

c. Give the coordinates of 2 other points that fall on this line with y-coordinates greater than 25.

(9 , 27) and (10 , 30).

3. Create a table of 5 values for x and y such that each y-coordinate is 1 more than 3 times as much as its corresponding x value.

x	y	(x, y)
1	4	(1, 4)
2	7	(2, 7)
3	10	(3, 10)
4	13	(4, 13)
5	16	(5, 16)



a. Plot each point on the coordinate plane.

b. Use a straight edge to draw a line connecting these points.

c. Give the coordinates of 2 other points that would fall on this line whose x-coordinates are greater than 12.

(13 , 40) and (14 , 43).

4. Use the coordinate plane below to complete the following tasks.

a. Graph the lines on the plane.

line ℓ: x is equal to y

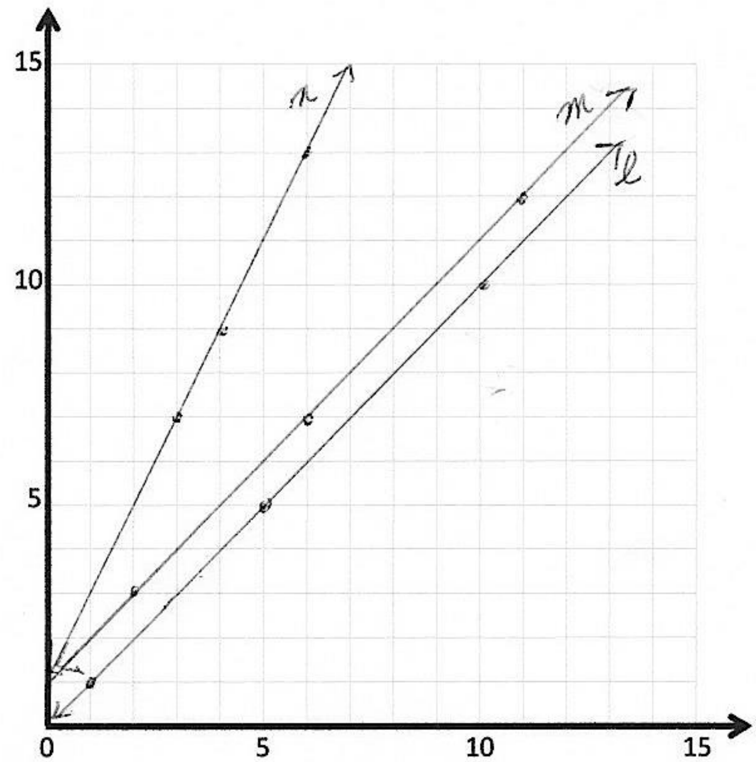
	x	y	(x, y)
A	1	1	(1, 1)
B	5	5	(5, 5)
C	10	10	(10, 10)

line m: y is 1 more than x.

	x	y	(x, y)
G	2	3	(2, 3)
H	6	7	(6, 7)
I	11	12	(11, 12)

line n: y is 1 more than twice x

	x	y	(x, y)
S	3	7	(3, 7)
T	4	9	(4, 9)
U	6	13	(6, 13)



b. Which two lines intersect? Give the coordinates of their intersection.

m and n, at (0, 1)

c. Which two lines are parallel?

l, m

d. Give the rule for another line that would be parallel to the lines you listed in (c).

y is 1 less than x

Name Ricky Date

1. Complete the table for the given rules.

Line A

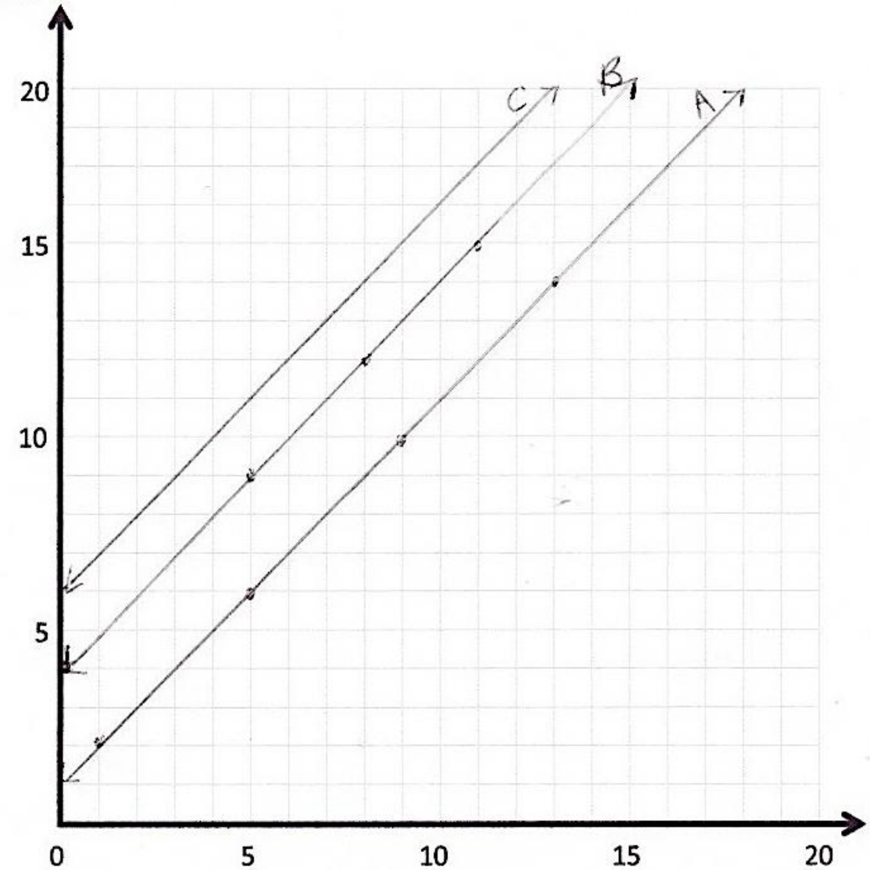
Rule: y is 1 more than x

x	y	(x, y)
1	2	(1, 2)
5	6	(5, 6)
9	10	(9, 10)
13	14	(13, 14)

Line B

Rule: y is 4 more than x

x	y	(x, y)
0	4	(0, 4)
5	9	(5, 9)
8	12	(8, 12)
11	15	(11, 15)



a. Construct each line on the coordinate plane above.

b. Compare and contrast these lines.

They are both parallel. The only difference is that B has y values 3 units greater than A.

c. Based on the patterns you see, predict what line C, whose rule is "7 more than x", would look like.

Draw your prediction on the plane above.

2. Complete the table for the given rules, for *x* values 0, 3, 7, & 9.

Line ***E***

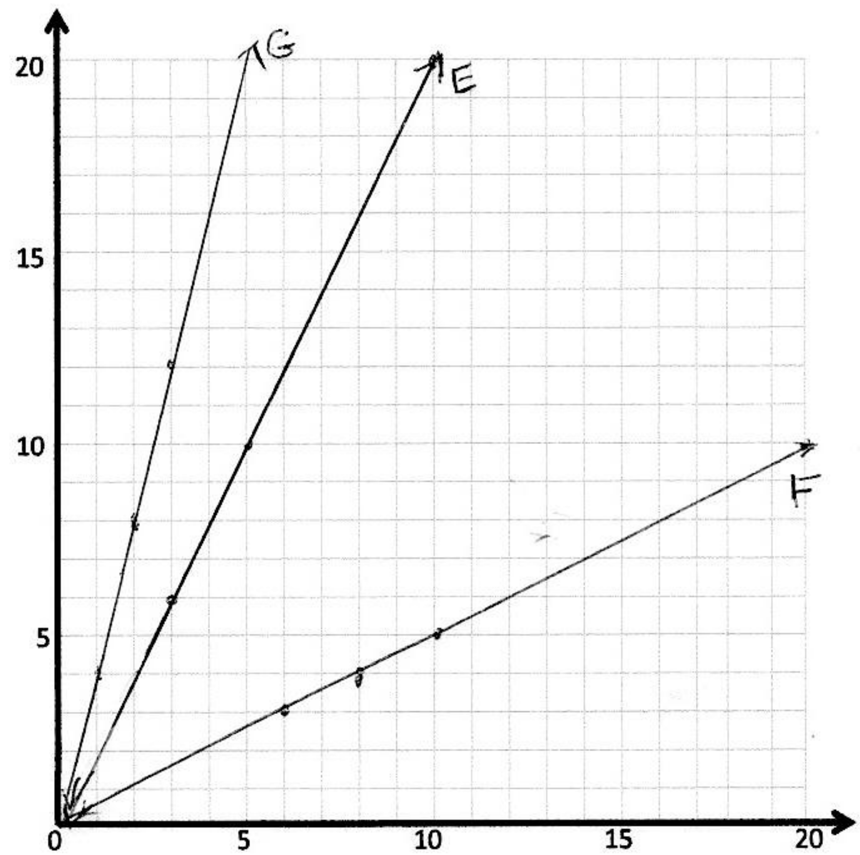
Rule: *y* is twice as much as *x*

x	y	(x, y)
0	0	(0,0)
3	6	(3,6)
5	10	(5,10)
10	20	(10, 20)

Line ***F***

Rule: *y* is half as much as *x*

x	y	(x, y)
6	3	(6,3)
8	4	(8,4)
10	5	(10, 5)
20	10	(20,10)



a. Construct each line on the coordinate plane above.

b. Compare and contrast these lines.

E is much steeper than F. The y values get big very quickly, but on F, they go up slower than the x values.

c. Based on the patterns you see, predict what line ***G***, whose rule is "4 times as much as *x*", would look like. Draw your prediction in the plane above.

Name Madison Date ____________

1. Use the coordinate plane below to complete the following tasks.

   a. Line p represents the rule, "x and y are equal".

   b. Construct a line, d, that is parallel to line p and contains point D.

   c. Name 3 coordinates pairs on line d.

   $(1\frac{1}{2}, 3\frac{1}{2})$, $(2\frac{1}{2}, 4\frac{1}{2})$, $(3, 5)$

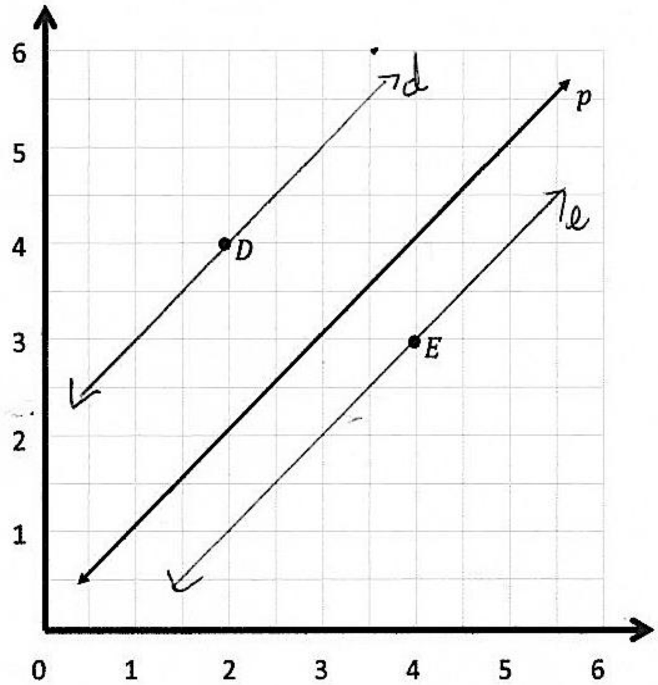
   d. Identify a rule to describe line d.

   y is 2 more than x.

   e. Construct a line, e, that is parallel to line p and contains point E.

   f. Name 3 points on line e.

   $(2, 1)$, $(3, 2)$, $(5, 4)$



   g. Identify a rule to descibe line e.

   y is 1 less than x.

   h. Compare and contrast lines d and e, in terms of their relationship to line p.

   Line d has y-coordinates that are 3 greater than line e's Otherwise, they are both parallel to line p.

2. Write a rule for a 4th line that would be parallel to those above, and contain the point $(3\frac{1}{2}, 6)$.

   a. Explain how you know. Y is $2\frac{1}{2}$ more than x. I know because since it's parallel, it would follow the same pattern except have higher y-values.

3. Use the coordinate plane below to complete the following tasks.

   a. Line p represents the rule, "x and y are equal".

   b. Construct a line, v, that contains the origin and point V.

   c. Name 3 points on line v.

   (1,2), (3,6), (5,10)

   d. Identify a rule to describe line v.

   y is 2 times x.

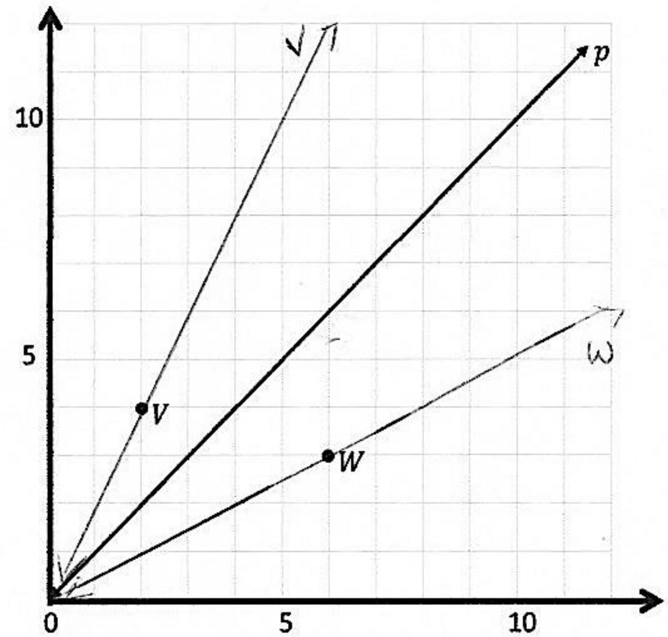
   e. Construct a line, w, that contains the origin and point W.

   f. Name 3 points on line w.

   (2,1), (4,2), (8,4)

   g. Identify a rule to describe line w.

   y is $\frac{1}{2}$ of x.



   h. Compare and contrast lines v and w, in terms of their relationship to line p.

   v is steeper, and w is shallower than p. They both use multiplication of x, but line V multiplies by a greater number.

   i. What patterns do you see in lines that are generated by multiplication rules?

   They aren't parallel to lines where x is equal to y. They are steeper or shallower.

4. Circle the rules that generate lines that are parallel to each other.

Add 5 to x *Multiply x by $\frac{2}{3}$* *x plus $\frac{1}{2}$* *x times $1\frac{1}{2}$*

Name David Date

1. Complete the tables for the given rules.

Line ℓ

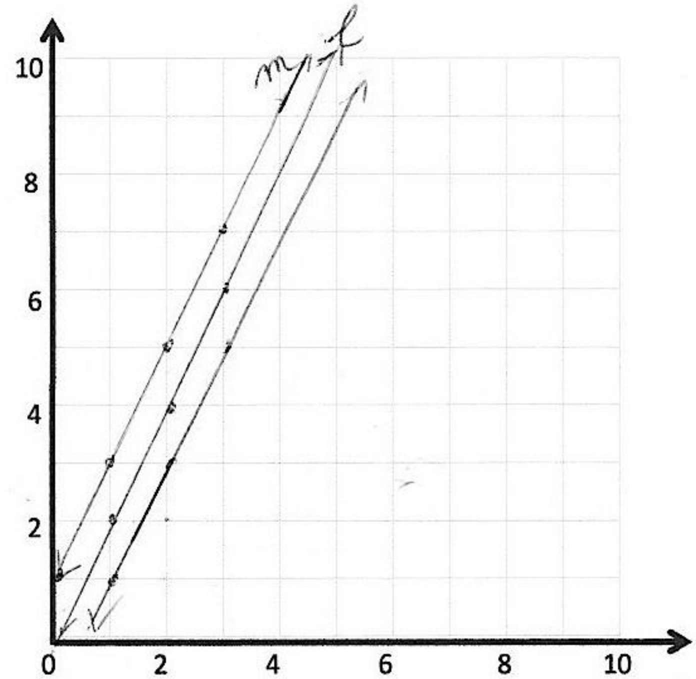
Rule: *Double x*

x	y	(x, y)
0	0	(0, 0)
1	2	(1, 2)
2	4	(2, 4)
3	6	(3, 6)

Line m

Rule: *Double x, then add 1*

x	y	(x, y)
0	1	(0, 1)
1	3	(1, 3)
2	5	(2, 5)
3	7	(3, 7)



a. Draw each line on the coordinate plane above.

b. Compare and contrast these lines.

They are parallel. Line m is one y-value higher than line n.

c. Based on the patterns you see, predict what the line for the rule "Double *x, then subtract 1*" would look like. Draw your prediction on the plane above.

2. Circle the point(s) that the line for rule, "multiply by $\frac{1}{3}$, then add 1" would contain.

$(0, \frac{1}{3})$ $(2, 1\frac{2}{3})$ $(1\frac{1}{2}, 1\frac{1}{2})$ $(2\frac{1}{4}, 2\frac{1}{4})$

a. Explain how you know.

I multiplied the fractions. $2 \times \frac{1}{3} = \frac{2}{3}$, add 1 becomes $1\frac{2}{3}$. $1\frac{1}{2}$ or $\frac{3}{2} \times \frac{1}{3} = \frac{1}{2}$, add 1 becomes $1\frac{1}{2}$, the others don't work.

b. Give two other points that fall on this line.

$(4, 2\frac{1}{3})$, $(6, 3)$

3. Complete the tables for the given rules.

Line ℓ

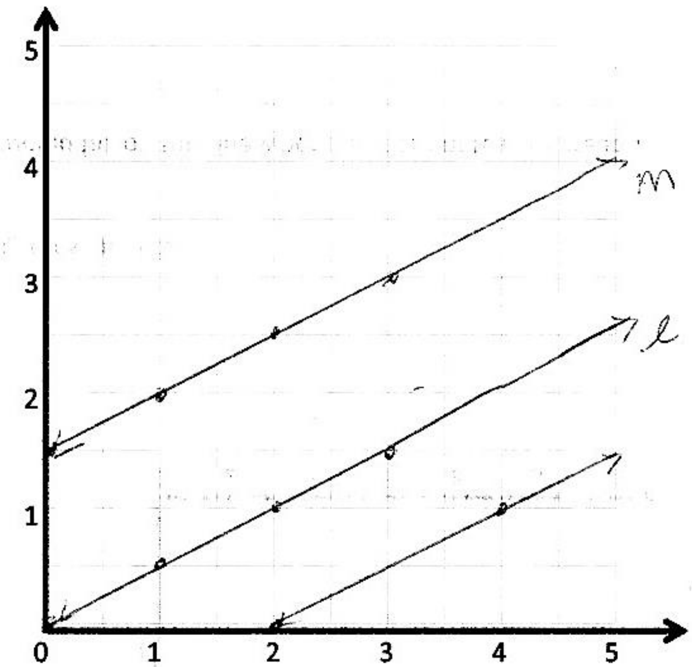
Rule: *Half x*

x	y	(x, y)
0	0	(0, 0)
1	$\frac{1}{2}$	$(1, \frac{1}{2})$
2	1	(2, 1)
3	$1\frac{1}{2}$	$(3, 1\frac{1}{2})$

Line m

Rule: *Half x, then add* $1\frac{1}{2}$

x	y	(x, y)
0	$1\frac{1}{2}$	$(0, 1\frac{1}{2})$
1	2	(1, 2)
2	$2\frac{1}{2}$	$(2, 2\frac{1}{2})$
3	3	(3, 3)



a. Draw each line on the coordinate plane above.

b. Compare and contrast these lines.

They are parallel, but line m is $1\frac{1}{2}$ units higher on the y axis than line ℓ

c. Based on the patterns you see, predict what the line for the rule "Half *x, then subtract 1*" would look like. Draw your prediction on the plane above.

4. Circle the point(s) that the line for rule, "multiply by $\frac{2}{3}$, then subtract 1" would contain.

$(1\frac{1}{3}, \frac{1}{9})$ $(2, \frac{1}{3})$ $(1\frac{3}{2}, 1\frac{1}{2})$ $(3, 1)$

a. Explain how you know.

I used fraction multiplication and simplified.

b. Give two other points that fall on this line.

$(6, 3)$, $(8, 4\frac{1}{3})$

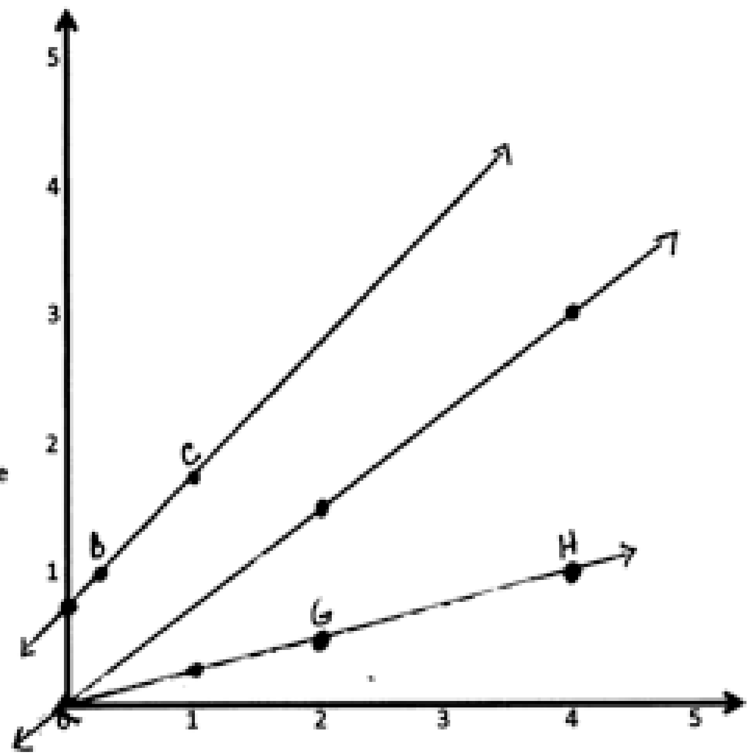
Name Haley Date ____________

1. Write a rule for the line that contains the points $(0, \frac{3}{4})$ and $(2\frac{1}{2}, 3\frac{1}{4})$.

y is $\frac{3}{4}$ more than x

a. Identify 2 more points on this line, then draw it on the grid below.

Point	x	y	(x, y)
B	$\frac{1}{4}$	1	$(\frac{1}{4}, 1)$
C	1	$1\frac{3}{4}$	$(1, 1\frac{3}{4})$



b. Write a rule for a line that is parallel to $\overleftrightarrow{BC}$, and goes through point $(1, \frac{1}{4})$.

x is $\frac{3}{4}$ less than y.

2. Create a rule for the line that contains the points $(1, \frac{1}{4})$ and $(3, \frac{3}{4})$.

y is $\frac{1}{4}$ x

a. Identify 2 more points on this line, then draw it on the grid at right.

Point	x	y	(x, y)
G	2	$\frac{1}{2}$	$(2, \frac{1}{2})$
H	4	1	$(4, 1)$

b. Write a rule for a line that passes through the origin and lies between $\overleftrightarrow{BC}$ and $\overleftrightarrow{GH}$.

multiply x by $\frac{3}{4}$

3. Create a rule for a line that contains the point $(\frac{1}{4}, 1\frac{1}{4})$ using the operation or description below. Then name 2 other points that would fall on each line.

a. Addition: add 1 to x

Point	x	y	(x, y)
T	2	3	(2,3)
U	4	5	(4,5)

b. A line parallel to the x-axis: y is always $1\frac{1}{4}$

Point	x	y	(x, y)
G	$\frac{1}{2}$	$1\frac{1}{4}$	$(\frac{1}{2}, 1\frac{1}{4})$
H	$2\frac{1}{2}$	$1\frac{1}{4}$	$(2\frac{1}{2}, 1\frac{1}{4})$

c. Multiplication: multiply x by 5

Point	x	y	(x, y)
A	$\frac{1}{2}$	$2\frac{1}{2}$	$(\frac{1}{2}, 2\frac{1}{2})$
B	1	5	(1,5)

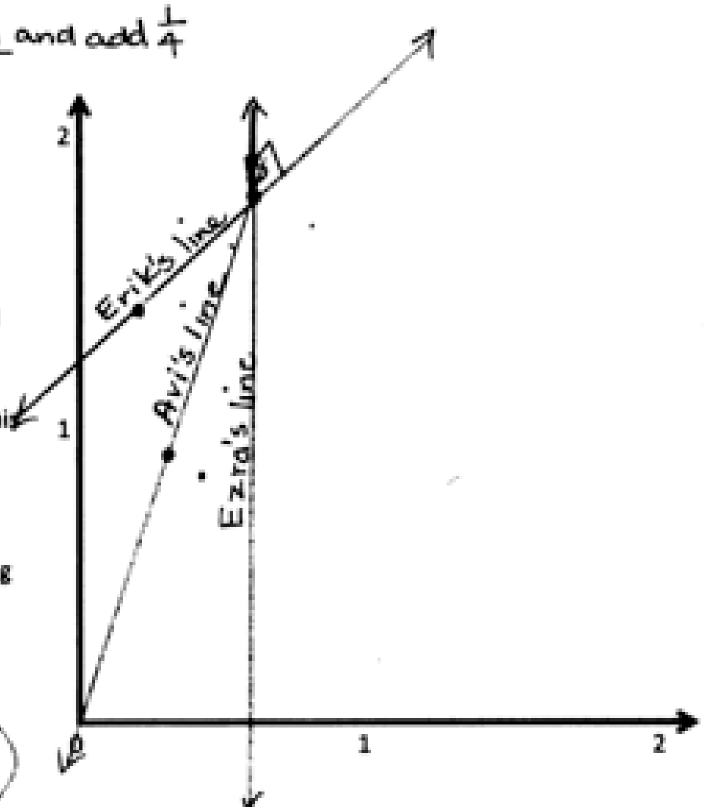
d. A line parallel to the y-axis: x is always $\frac{1}{4}$

Point	x	y	(x, y)
V	$\frac{1}{4}$	6	$(\frac{1}{4}, 6)$
W	$\frac{1}{4}$	12	$(\frac{1}{4}, 12)$

e. Multiplication with addition: multiply x by 4 and add $\frac{1}{4}$

Point	x	y	(x, y)
R	2	$8\frac{1}{4}$	$(2, 8\frac{1}{4})$
S	$\frac{1}{2}$	$2\frac{1}{4}$	$(\frac{1}{2}, 2\frac{1}{4})$

4. Mrs. Boyd asked her students to give a rule that could describe a line that contains the point (0.6, 1.8). Avi said the rule could be, "multiply x by 3". Ezra claims this could be a vertical line and the rule could be, "x is always 0.6". Erik thinks the rule could be, "Add 1.2 to x". Mrs. Boyd says that all the lines they are describing could describe a line that contains the point she gave. Explain how that is possible and draw on the coordinate plane to support your response.



Mrs. Boyd only gave 1 point (B) on the line. Lots of lines could contain that point. Without 2 points you can't tell the rule for the line

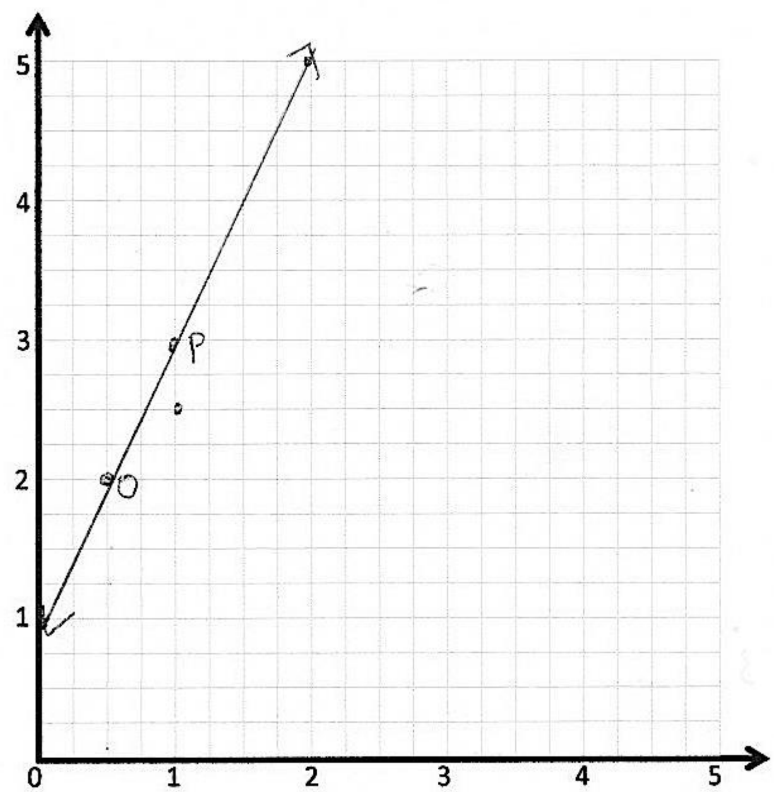
Challenge:

5. Create a mixed operation rule for the line that contains the points (0, 1) and (1, 3).

multiply x by 2 and add 1

Point	x	y	(x, y)
O	$\frac{1}{2}$	2	$(\frac{1}{2}, 2)$
P	2	5	(2, 5)

a. Identify 2 more points, O and P, on this line. Then draw it on the grid.

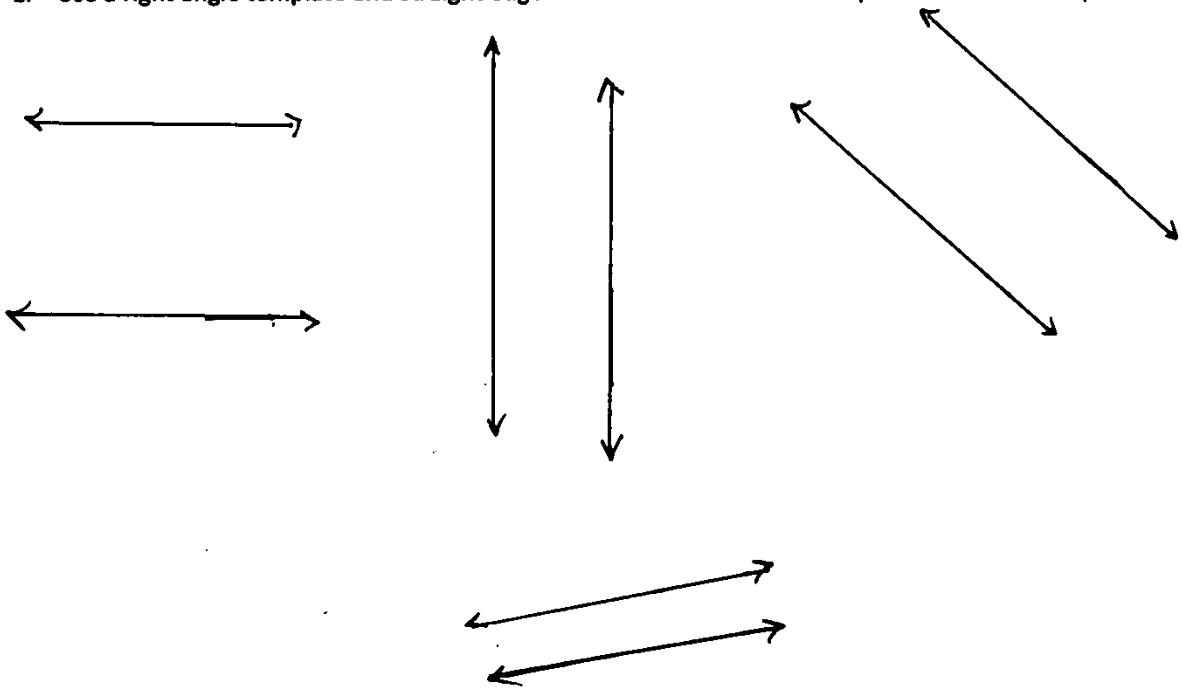


b. Write a rule for a line that is parallel to $\overleftrightarrow{OP}$, and goes through point $(1, 2\frac{1}{2})$.

multiply x by 2 and add $\frac{1}{2}$

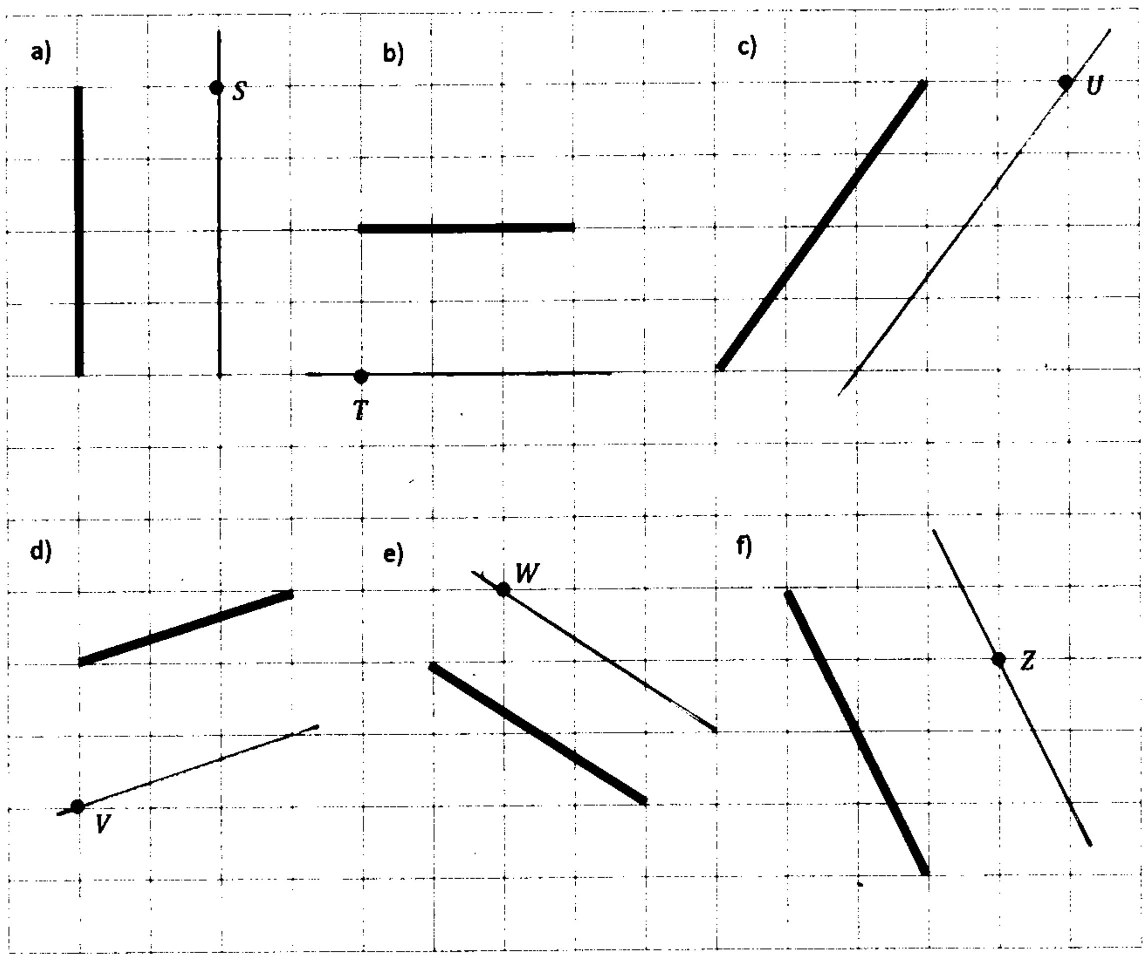
Name Taja Date ____________

1. Use a right angle template and straight edge to draw at least four sets of parallel lines in the space below.

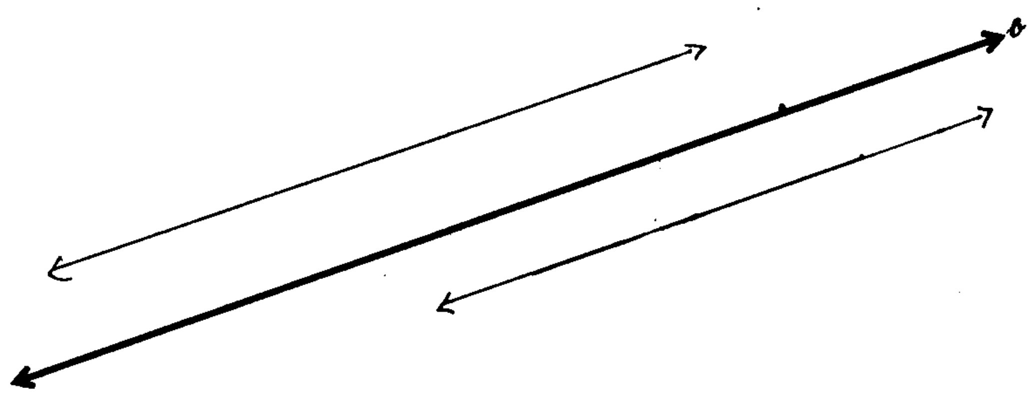


2. Circle the segments that are parallel.

3. Use your straight edge to draw a segment parallel to each segment through the given point.

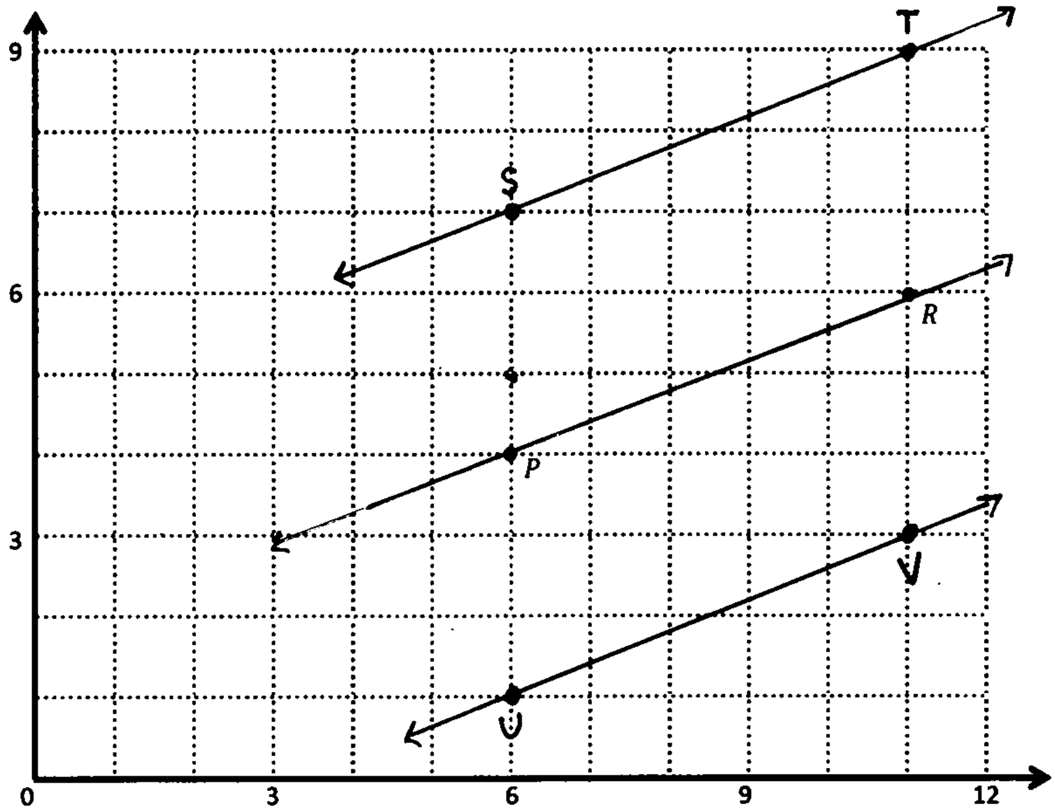


4. Draw 2 different lines parallel to line b.



Name Jefferson Date

1. Use the coordinate plane below to complete the following tasks.



a. Identify the locations of P and R. P: (6 , 4) R: (11 , 6)

b. Draw $\overleftrightarrow{PR}$.

c. Plot the following coordinate pairs on the plane.

S: (6, 7) T: (11, 9)

d. Draw $\overleftrightarrow{ST}$.

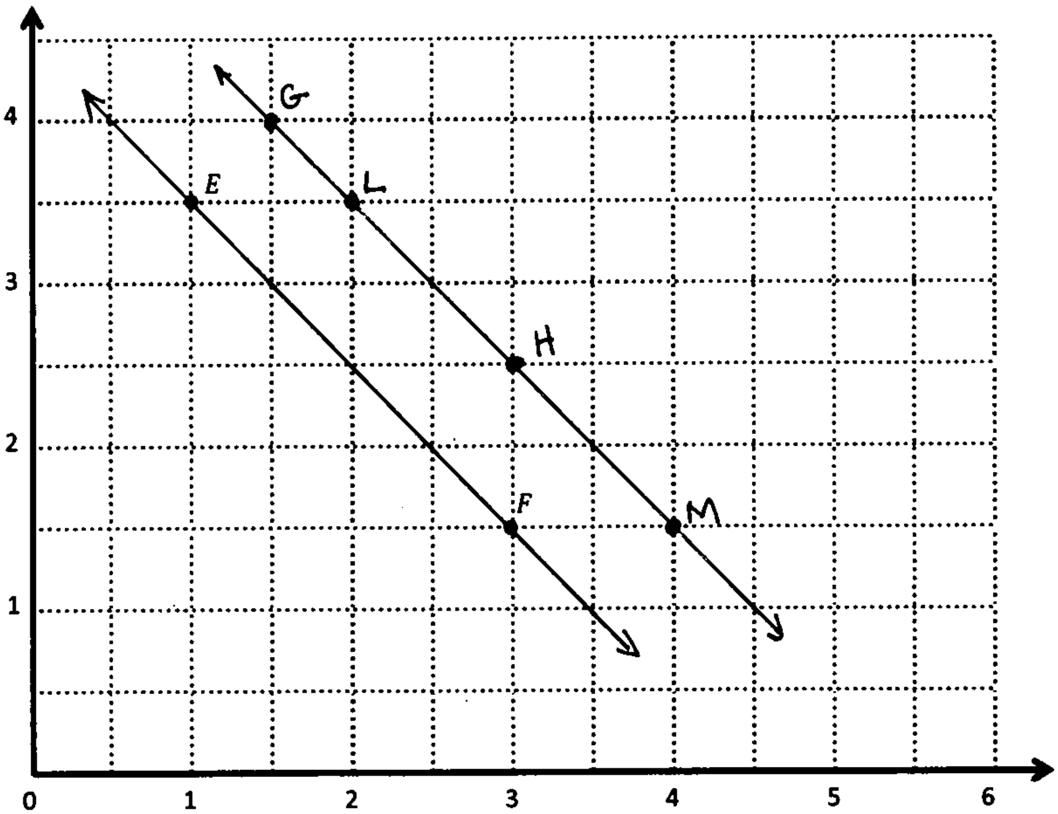
e. Circle the relationship between $\overleftrightarrow{PR}$ and $\overleftrightarrow{ST}$. $\overleftrightarrow{PR} \perp \overleftrightarrow{ST}$ $\overleftrightarrow{PR} \parallel \overleftrightarrow{ST}$

f. Give the coordinates of a pair of points, U and V, such that $\overleftrightarrow{UV} \parallel \overleftrightarrow{PR}$.

U: (6 , 1) V: (11 , 3)

g. Draw $\overleftrightarrow{UV}$.

2. Use the coordinate plane below to complete the following tasks.



a. Identify the locations of E and F. E: (1 , 3.5) F: (3 , 1.5)

b. Draw $\overleftrightarrow{EF}$.

c. Generate coordinate pairs for L and M, such that $\overleftrightarrow{EF} \parallel \overleftrightarrow{LM}$.

L: (2 , 3.5) M: (4 , 1.5)

d. Draw $\overleftrightarrow{LM}$.

e. Explain the pattern you made use of when generating coordinate pairs for L and M. I just moved my x's over 2 units and kept my y's the same.

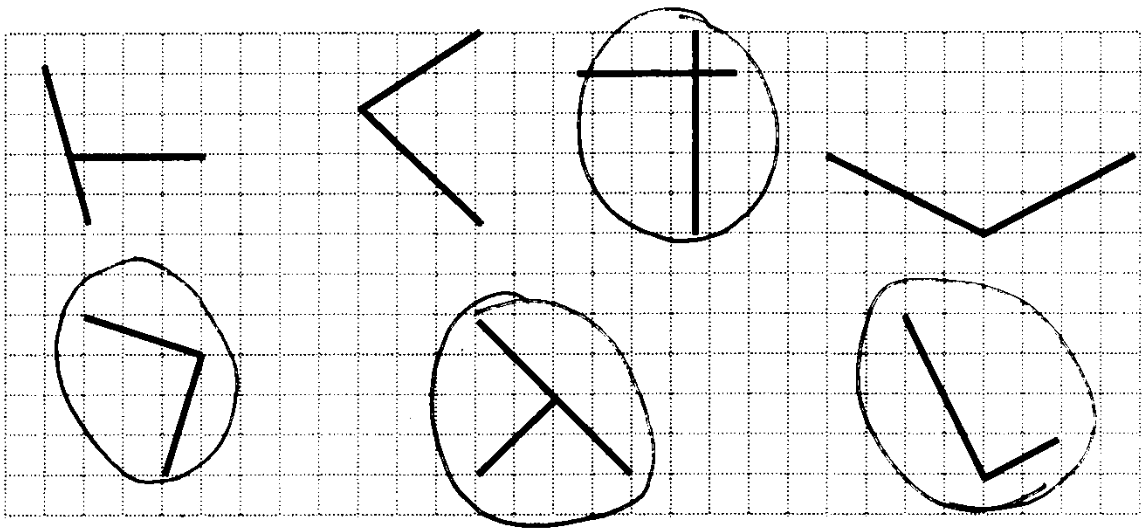
f. Give the coordinates of a point, H, such that $\overleftrightarrow{EF} \parallel \overleftrightarrow{GH}$.

G: $(1\frac{1}{2}, 4)$ H: (3 , 2.5)

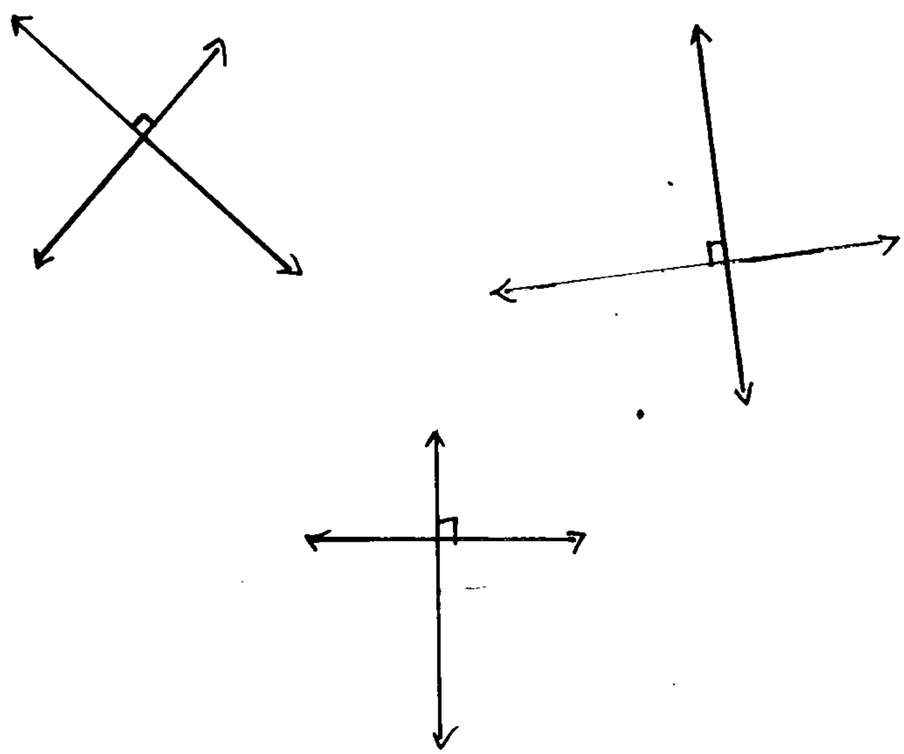
g. Explain how you chose the coordinates for H. I plotted G first + then found another point on $\overleftrightarrow{EF}$. I moved over on the x 2 units to find H.

Name Carter Date ____________

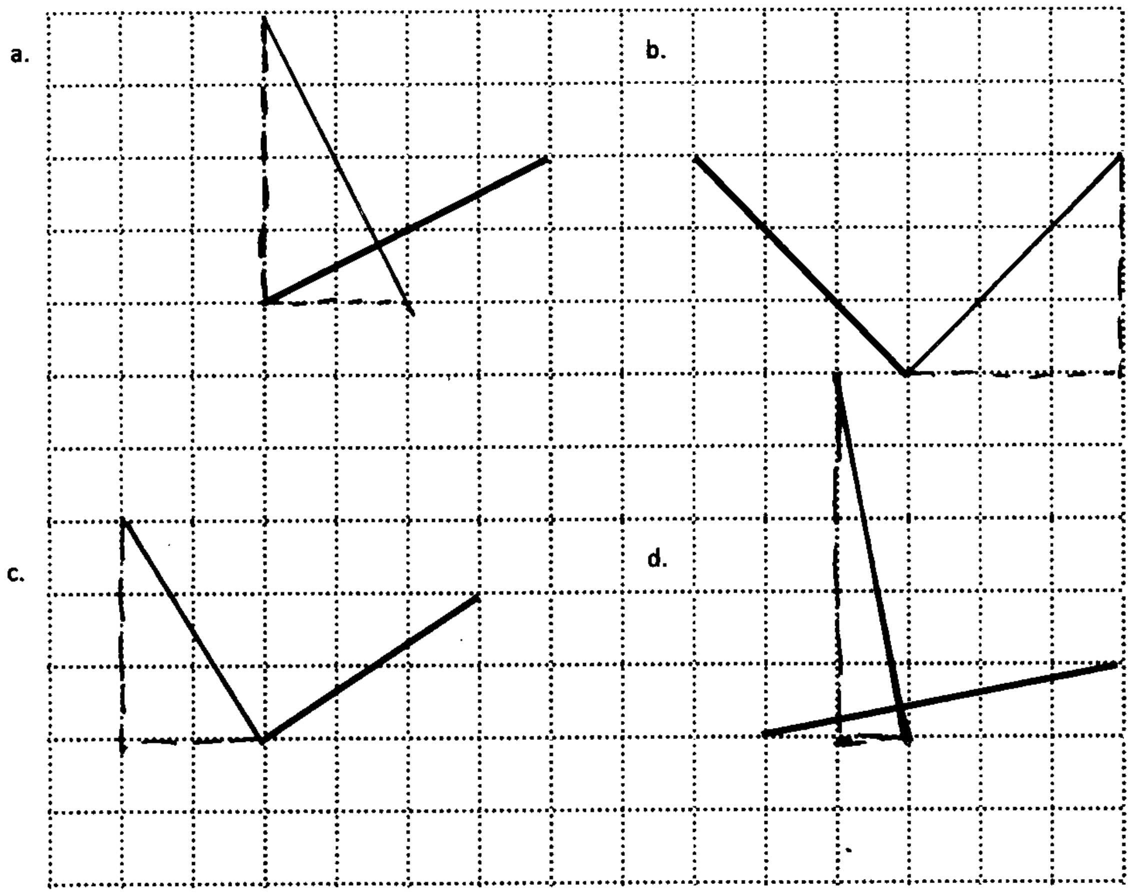
1. Circle the pairs of segments that are perpendicular.



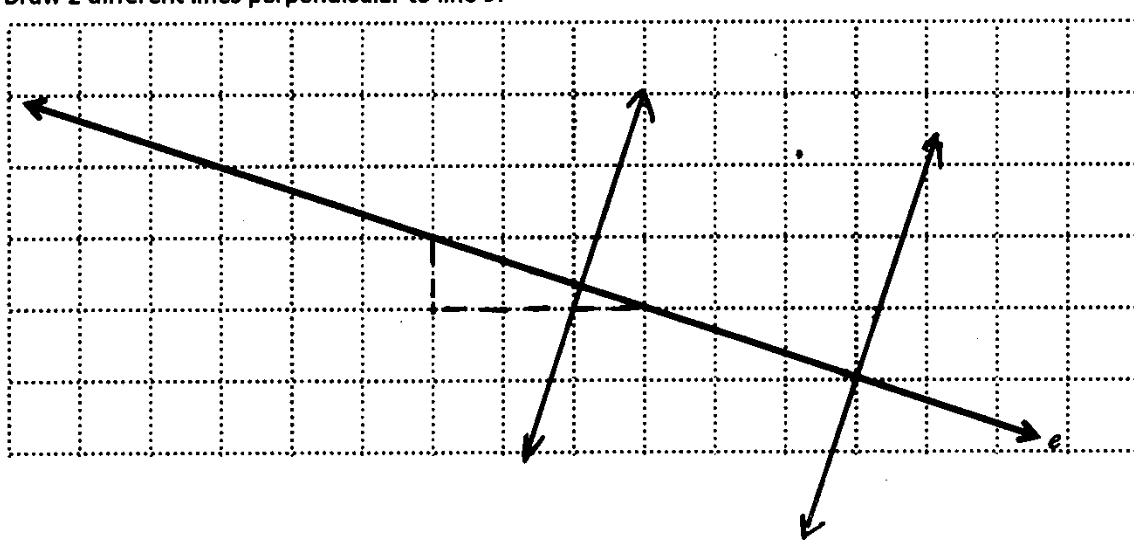
2. In the space below, use your right triangle templates to draw at least 3 different sets of perpendicular lines.



3. Draw a segment perpendicular to each given segment. Show your thinking by sketching triangles as needed.



4. Draw 2 different lines perpendicular to line *e*.

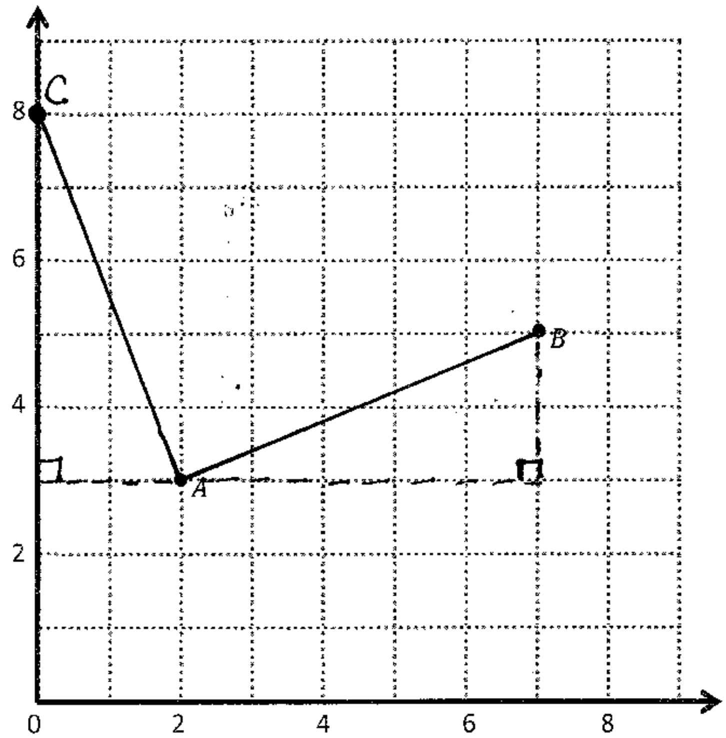


Name Jie Date

1. Use the coordinate plane below to complete the following tasks.

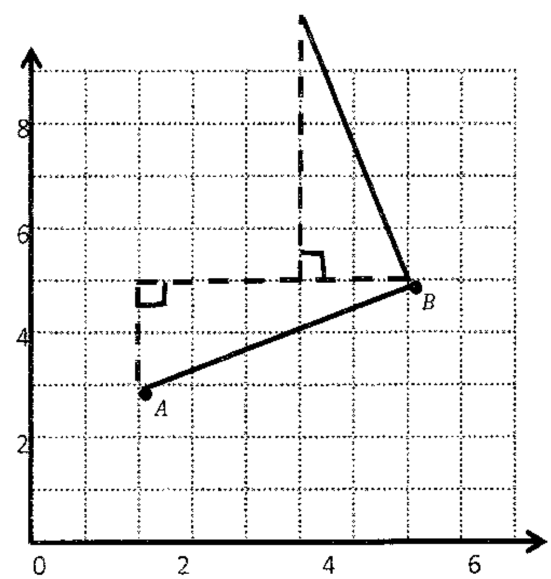
   a. Draw $\overline{AB}$
   b. Plot point C (0, 8).
   c. Draw $\overline{AC}$.
   d. Explain how you know $\angle CAB$ is a right angle without measuring it.

   ∠CAB is a right angle because I can draw the triangle that has $\overline{AB}$ as its long side. The length is 5 units and the height is 2 units. When I slid the triangle to the left and rotated, I know the 2 acute angles will form a 90° right angle.



   e. Sean drew the picture to the right to find a segment perpendicular to $\overline{AB}$. Explain why Sean is correct.

   Sean is correct because I see that he slid and rotated the triangle and the 2 acute angles will form a 90° right angle.



2. Use the coordinate plane below to complete the following tasks.

   a. Draw $\overline{QT}$.

   b. Plot point R $(2, 6\frac{1}{2})$.

   c. Draw $\overline{QR}$

   d. Explain how you know $\angle RQT$ is a right angle without measuring it.

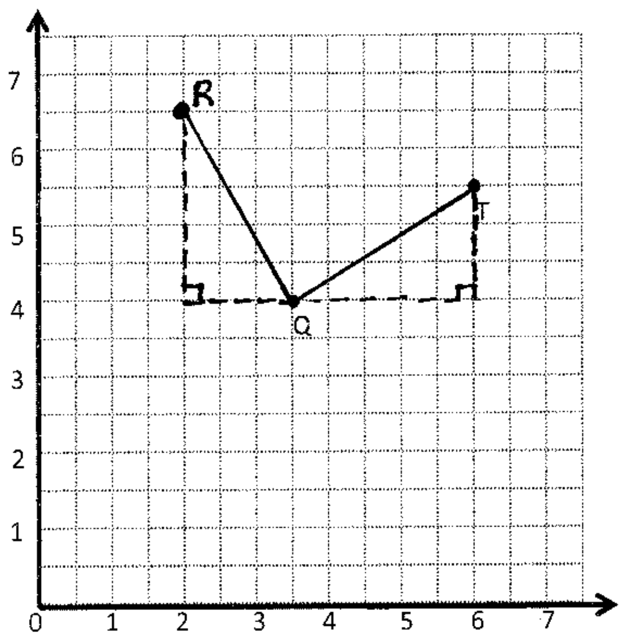
   I drew the triangle. Then I slid and rotated the triangle. I know the 2 aacte angles will form 90°.

   e. Compare the coordinates of points Q and T. What is the difference of the x coordinates? the y coordinates?

   $Q(3\frac{1}{2}, 4)$ The difference:
   $T(6, 5\frac{1}{2})$ X coordinates → $2\frac{1}{2}$
   Y coordinates → $1\frac{1}{2}$

   f. Compare the coordinates of points Q and R. What is the difference of the x coordinates? the y coordinates?

   $Q(3\frac{1}{2}, 4)$ X coordinates → $1\frac{1}{2}$
   $R(2, 6\frac{1}{2})$ Y coordinates → $2\frac{1}{2}$



   g. What is the relationship of the differences you found in (e) and (f) to the triangles of which these two segments are a part?

   When compared (e) and (f), I noticed that the X-coordinate of $2\frac{1}{2}$ is the same as the Y-coordinate. The Y-coordinate of $1\frac{1}{2}$ is the same as the X-coordinate. The numbers flipped.

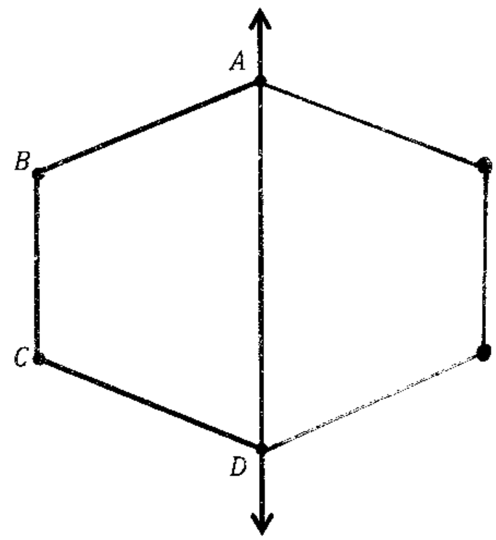
3. $\overleftrightarrow{EF}$ contains the following points. E: (4, 1) F: (8, 7)

   a. Give the coordinates of a pair of points, G and H, such that $\overleftrightarrow{EF} \perp \overleftrightarrow{GH}$.

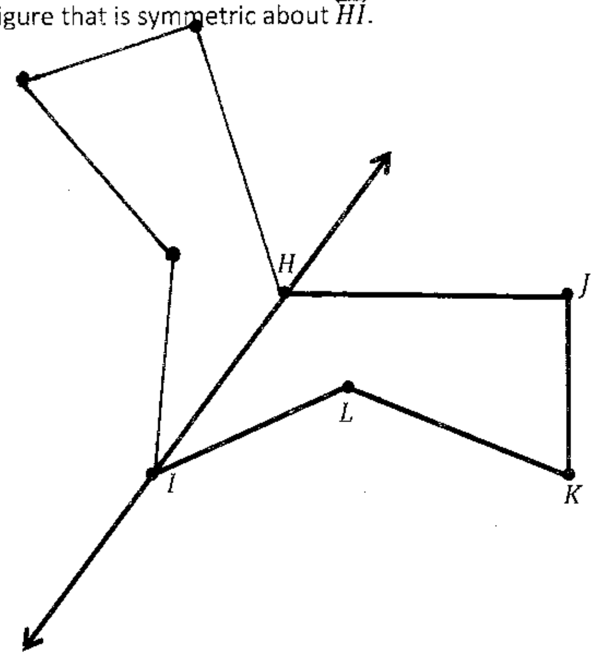
   G: (1, 8) H: (7, 4)

Name Jenny Date

1. Draw to create a figure that is symmetric about $\overleftrightarrow{AD}$.



2. Draw precisely to create a figure that is symmetric about $\overleftrightarrow{HI}$.

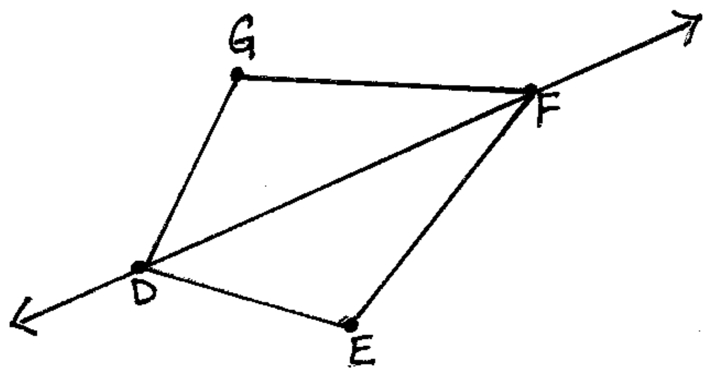


3. Complete the following construction in the space below.

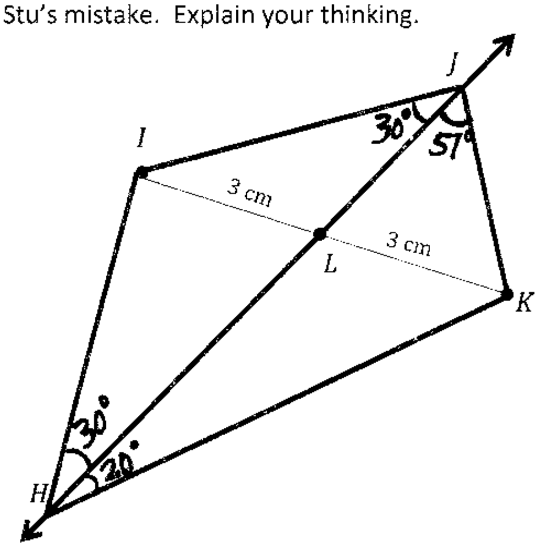
   a. Plot 3 non-collinear points, D, E, and F.

   b. Draw $\overline{DE}$, $\overline{EF}$, and $\overleftrightarrow{DF}$.

   c. Plot point G, and draw the remaining sides, such that quadrilateral $DEFG$ is symmetric about $\overleftrightarrow{DF}$.



4. Stu says that quadrilateral $HIJK$ is symmetric about $\overleftrightarrow{HJ}$ because $IL = LK$. Use your tools to determine Stu's mistake. Explain your thinking.



Even though IL = LK, but the adjacent angles from the line of symmetry ($\overleftrightarrow{HJ}$) should be the same size. ∠LJK should equal to ∠LJI, and ∠LHK should also equal to ∠LHI.

Name Samad Date

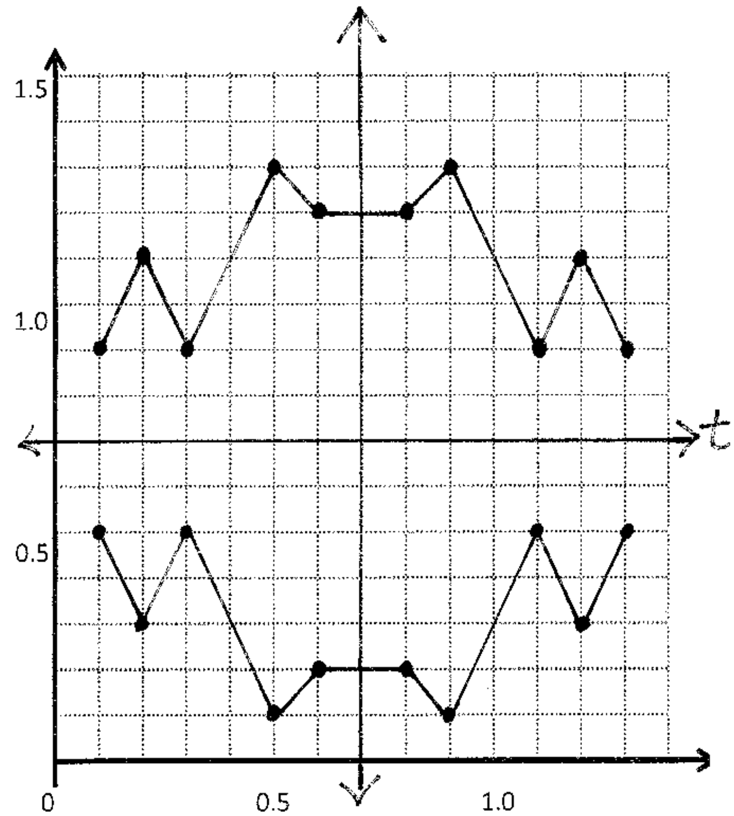
1. Use the plane at right to complete the following tasks.
   a. Draw a line t whose rule is, "y is always 0.7".
   b. Plot the points from Table A on the grid in order. Then draw line segments to connect the points.

Table A

(0.1, 0.5)
(0.2, 0.3)
(0.3, 0.5)
(0.5, 0.1)
(0.6, 0.2)
(0.8, 0.2)
(0.9, 0.1)
(1.1, 0.5)
(1.2, 0.3)
(1.3, 0.5)

Table B

(0.1, 0.9)
(0.2, 1.1)
(0.3, 0.9)
(0.5, 1.3)
(0.6, 1.2)
(0.8, 1.2)
(0.9, 1.3)
(1.1, 0.9)
(1.2, 1.1)
(1.3, 0.9)



   c. Complete the drawing to create a figure that is symmetric about line t. For each point in Table A, record the corresponding point on the other side of the line of symmetry in Table B.
   d. Compare the y-coordinates in Table A with those in Table B. What do you notice?

The difference between 2 points in Table A are the same as the difference in Table B.

   e. Compare the x-coordinates in Table A with those in Table B. What do you notice?

The X-coordinates in Table A are the same as those in Table B.

2. This figure has a second line of symmetry. Draw the line on the plane and write the rule for this line.

The rule is "X is always 0.7".

3. Use the plane below to complete the following tasks.

   a. Draw a line u whose rule is, "y is equal to $x + \frac{1}{4}$".

   b. Construct a figure with a total of 6 points all on the same side of the line.

   c. Record the coordinates of each point, in the order in which they were drawn, in Table A.

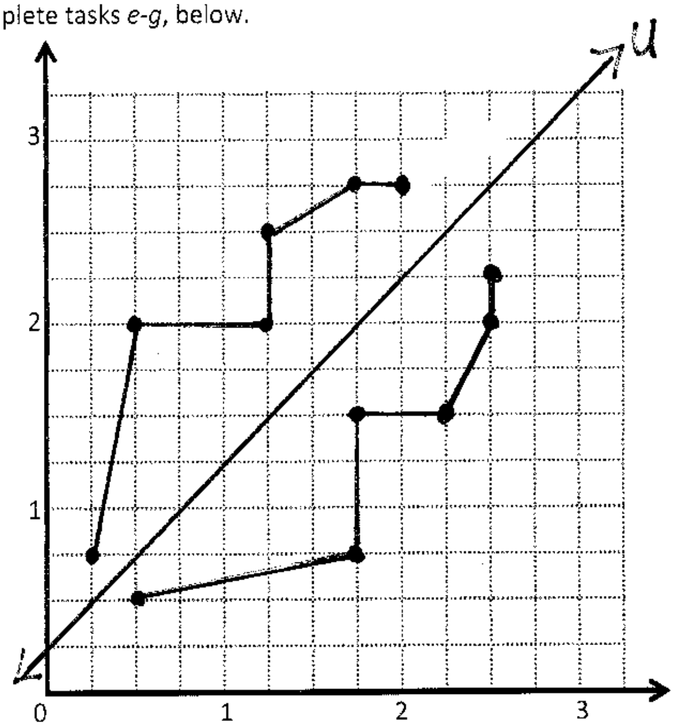
   d. Swap your paper with a neighbor and have them complete tasks *e*-*g*, below.

Table A

(x, y)
$(\frac{1}{4}, \frac{3}{4})$
$(\frac{2}{4}, 2)$
$(1\frac{1}{4}, 2)$
$(1\frac{1}{4}, 2\frac{2}{4})$
$(1\frac{2}{4}, 2\frac{3}{4})$
$(2, 2\frac{3}{4})$

Table B

(x, y)
$(\frac{2}{4}, \frac{2}{4})$
$(1\frac{3}{4}, \frac{3}{4})$
$(1\frac{3}{4}, 1\frac{2}{4})$
$(2\frac{1}{4}, 1\frac{2}{4})$
$(2\frac{2}{4}, 2)$
$(2\frac{2}{4}, 2\frac{1}{4})$



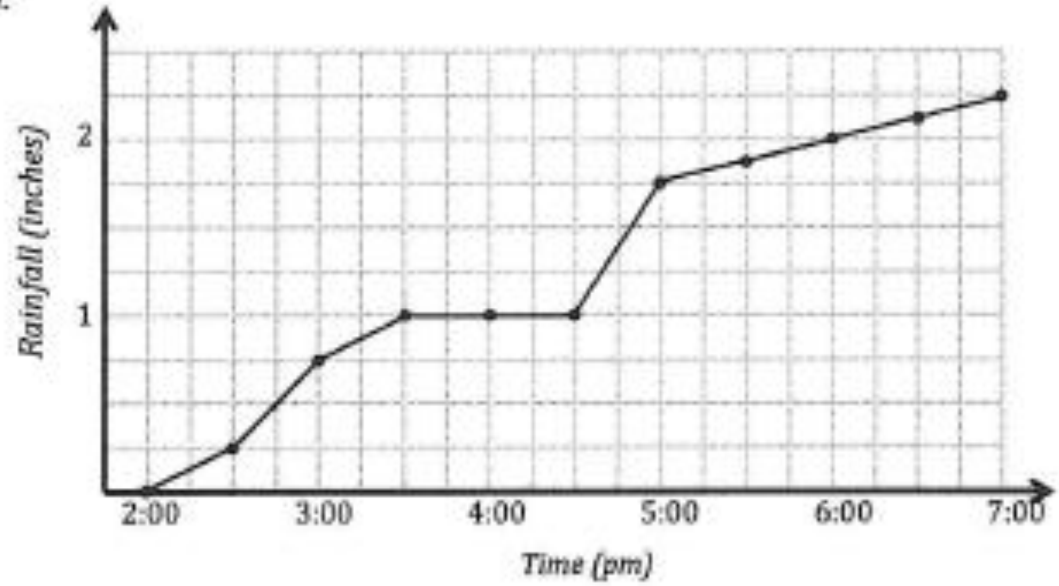
   e. Complete the drawing to create a figure that is symmetric about u. For each point in Table A, record the corresponding point on the other side of the line of symmetry in Table B.

   f. Explain how you found the points symmetric to your partner's about u.

   Using the line of symmetry, u, I counted the units. The units should be equal distance from line u. I have to be careful because line u's rule is, y is equal to x+1/4.

Name Kathy Date

1. The line graph below tracks the rain accumulation, measured every half-hour, during a rainstorm that began at 2:00pm and ended at 7:00pm. Use the information in the graph to answer the questions that follow.



a. How many inches of rain fell during this 5-hour period?

$2\frac{1}{4}$ or 2.25 inches of rain fell during this 5-hour period.

b. During which half-hour period did $\frac{1}{2}$ inch rain fall? Explain how you know.

$\frac{1}{2}$ inch of rain fell between 2:30 and 3:00 pm. The line went up $\frac{1}{2}$ inch as time went from 2:30 to 3:00 pm.

c. During which half-hour period did rain fall most rapidly? Explain how you know.

Rain fell most rapidly from 4:30 to 5:00 pm because the line is steepest.

d. Why do you think the line is horizontal between 3:30pm and 4:30pm?

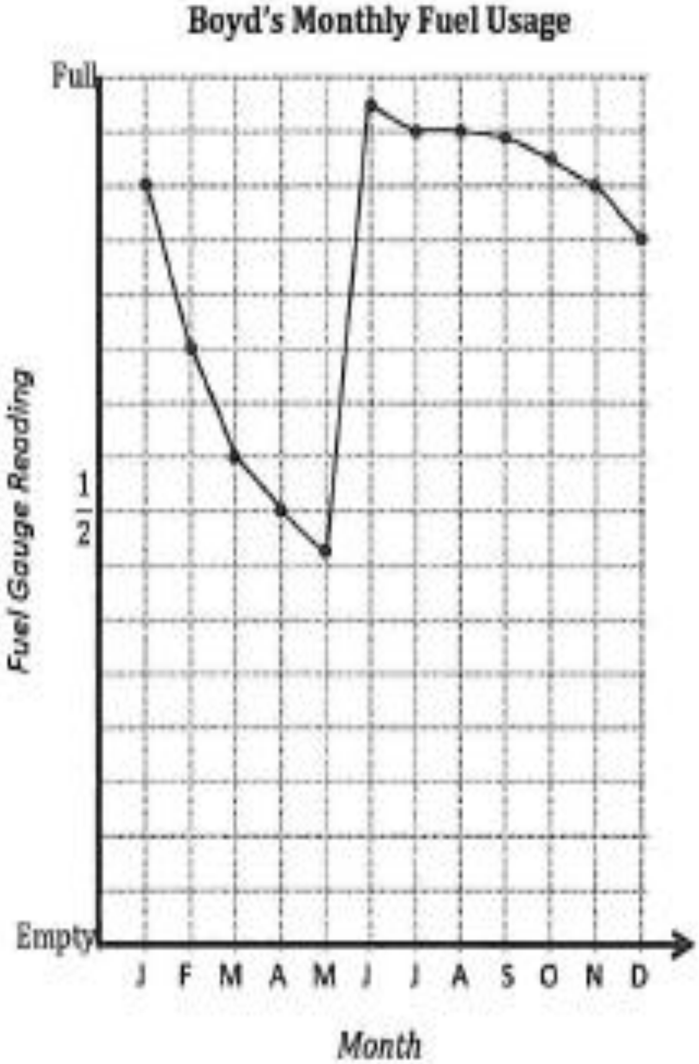
No rain fell from 3:30 to 4:30 pm.

e. For every inch of rain that fell here, a nearby community in the mountains received a foot and a half of snow. How many inches of snow fell in the mountain community between 5:00pm and 7:00pm?

A total of $\frac{1}{2}$ inch of rain fell between 5:00 and 7:00 pm. That means the mountain community got $\frac{1}{2}$ of a foot and a half of snow or $\frac{3}{4}$ of a foot (9 inches) of snow.

$\frac{1}{2}$(18 inches) = 9 inches or $\frac{1}{2}(1\frac{1}{2}\text{ feet}) = \frac{1}{2}(\frac{3}{2}\text{ ft}) = \frac{3}{4}\text{ ft.}$

2. Mr. Boyd checks the gauge on his home's fuel tank on the first day of every month. The line graph at right was created using the data he collected.



a. According to the graph, during which month(s) does the amount of fuel decrease most rapidly?

January is the month in which fuel decreases most rapidly.

b. The Boyds took a month-long vacation. During which month did this most likely occur? Explain how you know using the data in the graph.

In July no fuel was used because the line is flat. That is when they went on vacation.

c. Mr. Boyd's fuel company filled his tank once this year. During which month did this most likely occur? Explain how you know.

The tank was filled in May because the line went up meaning fuel was added.

d. The Boyd's fuel tank holds 284 gallons of fuel when full. How many gallons of fuel did the Boyds use in February?

$\frac{284}{16} = 17.75$

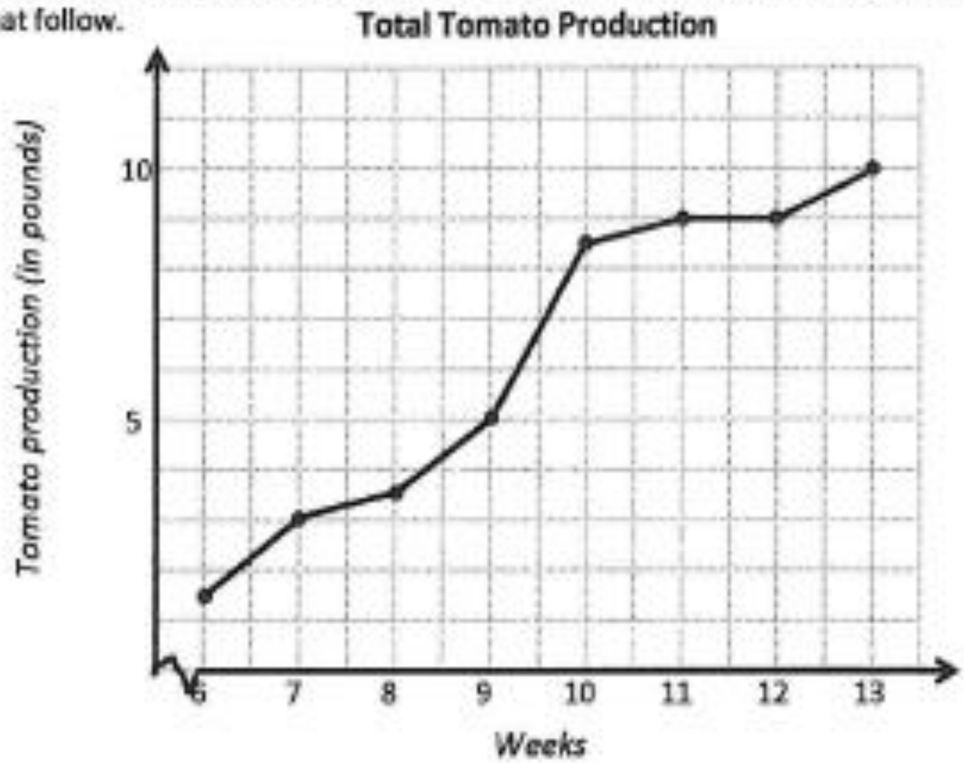
If full means the tank contains 284 gallons, each interval on the Fuel Gauge Reading represents 17.75 gallons. In February the line went down 2 units or 35.5 gallons (2x17.75) meaning 35.5 gallons of fuel were used.

e. Mr. Boyd pays $3.54 per gallon of fuel. What is the cost of the fuel used in February and March?

In February the line went down 2 units and in March 1 unit for a total of 3 units in these 2 months. That is a total of 53.25 gallons (3x17.75). Each gallon costs $3.54 so the total fuel cost is $188.51 (53.25 x 3.54).

Name John Date ____________

1. The line graph below tracks the total tomato production for one tomato plant. The total tomato production is plotted at the end of each of 8 weeks. Use the information in the graph to answer the questions that follow.



a. How many pounds of tomatoes did this plant produce at the end of 13 weeks?
The plant produced 10 lbs of tomatoes at the end of 13 weeks.

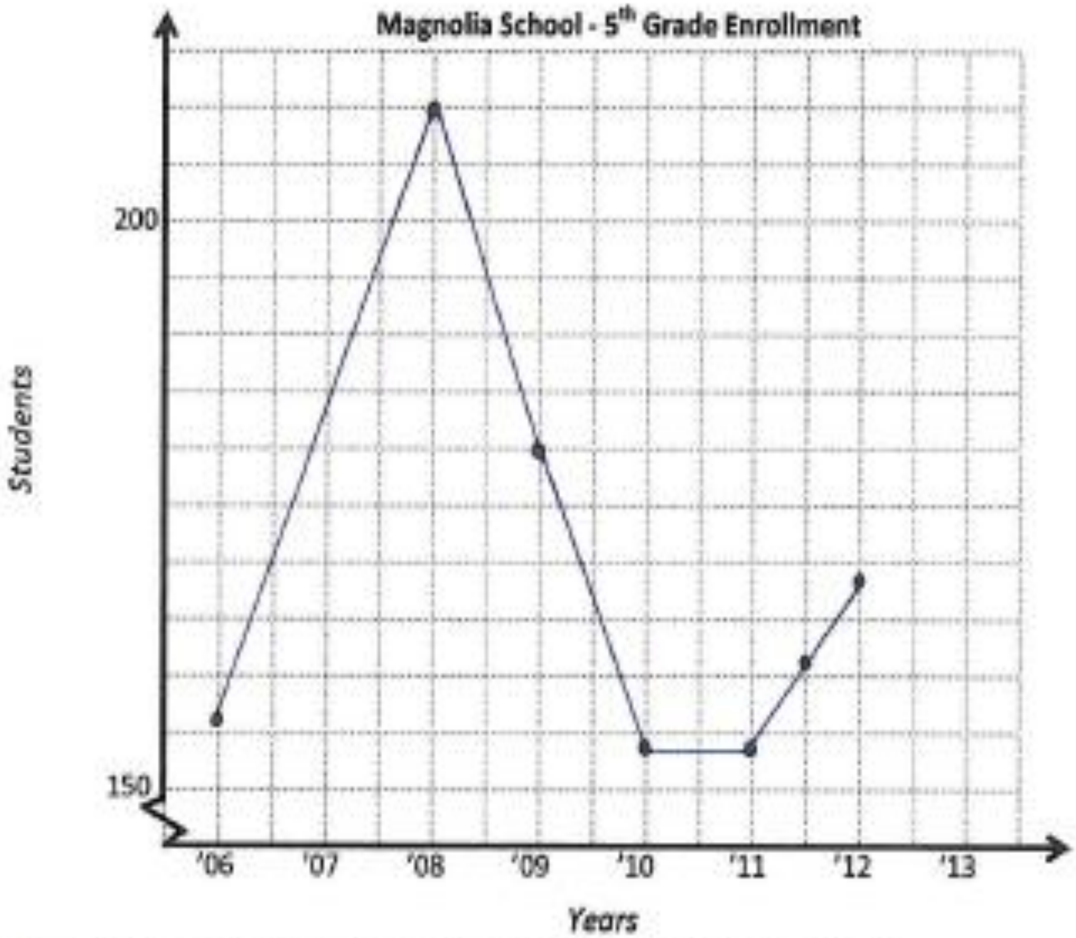
b. How many pounds of tomatoes did this plant produce from week 7 to week 11? Explain how you know. The plant produced 6 lbs of tomatoes from week 7 to 11. It had 3 lbs at week 7 and it was up to 9 lbs by week 11. The difference is 6 lbs.

c. Which one-week period showed the greatest change in tomato production? The least? Explain how you know. Week 9 to 10 was the greatest change. The least was week 11 to 12. The line is much steeper between weeks 9 + 10 than any other time and it is flat between weeks 11 + 12. That means it didn't make any tomatoes then.

d. During weeks 6-8, Jason fed the tomato plant just water. During weeks 8-10, he used a mixture of water and fertilizer A, and in weeks 10-13 he used water and fertilizer *B* on the tomato plant. Compare the tomato production for these periods of time.
The water helped make tomatoes, but fertilizer A seemed to make more tomatoes than just the water. Fertilizer B didn't seem to help at all because the plant hardly increased production during weeks 10-13.

2. Use the story context below to sketch a line graph. Then answer the questions that follow.

The number of 5th grade students attending Magnolia School has changed over time. The school opened in 2006, with 156 5th graders. The student population grew the same amount each year, before reaching its largest class of 210 students in 2008. The following year, Magnolia lost one seventh of its fifth graders. In 2010 the enrollment dropped to 154 students and remained constant in 2011. For the next 2 years, the enrollment grew by 7 students each year.



a. How many more 5th grade students attend Magnolia in 2009 than in 2013?

$$\begin{array}{r} 180 \\ -168 \\ \hline 12 \end{array}$$

There are 12 more students in 2009.

b. Between which 2 years was there the greatest change in student population?

Between 2008 + 2009 the school lost $\frac{1}{7}$ (or 30) students. This was the greatest change in population. $\frac{1}{7}(210)=30$

c. If the 5th grade population continues to grow in the same pattern as in 2012 and 2013, in what year will the number of students match 2008's enrollment?

2012 → 2013
7 more students each year

2008: 210
2013: −168
42 students

42÷7= 6 more years
2013+6 = 2019

If the 5th grade population continues to grow at 7 students per year, the population will reach 210 again by 2019.

Analysis and Solution Strategies for Problems 1–9

Problem 1: Pierre's Paper

Pierre folded a square piece of paper vertically to make two rectangles. Each rectangle had a perimeter of 39 inches. How long is each side of the original square? What is the area of the original square? What is the area of one of the rectangles?

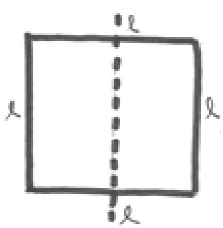
This problem calls on student knowledge of the properties of squares and rectangles as well as their knowledge of area and perimeter. Understanding the relationships between the lengths of the rectangle's sides is the key to solving it.

If students are having difficulty moving forward, the following questions may help them:

- How does knowing that this figure is a square help us know about the dimensions of the rectangle? How are the dimensions of the rectangle related to each other?
- What is the unit we are counting?
- Think of the rectangle's shorter side (or longer side) as 1 unit.

Below, Solution A solves for the longer side of the rectangle and uses a more abstract representation of the thinking, while Solution B solves for the shorter side of the rectangle.

Solution A



Each side length = ℓ

$\ell + \ell + \frac{1}{2}\ell + \frac{1}{2}\ell = 39''$

$3\ell = 39''$

Each side of the square is 13".

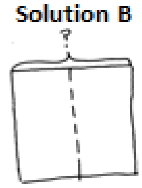
Square's area is $13 \times 13 = 169$ in².

The area of the rectangle is

$13 \times 6\frac{1}{2} = (13 \times 6) + (13 \times \frac{1}{2}) =$

$78 + 6.5 = 84.5$ in²

Solution B



Rectangle p = 39 in

Rectangle length × 2
rectangle width × 2 } 39

6 units = 39

1 unit = $6\frac{1}{2}$

Square's sides $6\frac{1}{2} + 6\frac{1}{2} = 13$

Square's area $13 \times 13 = 169$

Rectangle area $169 \div 2 = 84.5$

The square's sides are 13 inches long.

The area of the square is 169 in².

The area of the rectangle is 84.5 in².

Problem 2: Shopping with Elise

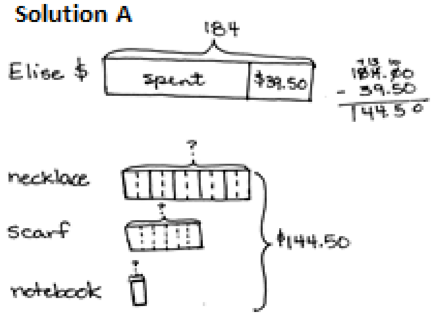
Elise saved $184. She bought a scarf, a necklace, and a notebook. After her purchases, she still had $39.50. The scarf cost three-fifths the cost of the necklace, and the notebook was one-sixth as much as the scarf. What was the cost of each item? How much more did the necklace cost than the notebook?

This problem is fairly straightforward mathematically. However, students will need to find a common unit for all three items in order to determine the cost of the notebook. Once this is established, the costs of the other items may be found easily. Students may attempt to find a solution through fraction multiplication. This approach may stall when trying to determine the fraction of the money spent on the necklace. The following may provide scaffolding for students experiencing difficulty:

- Which item's tape should be the longest? The shortest?
- How can we make these units the same size?
- Begin with the notebook as 1 unit. If the notebook is 1 sixth the cost of the scarf, then how many times as much is the scarf's cost to the cost of the notebook?

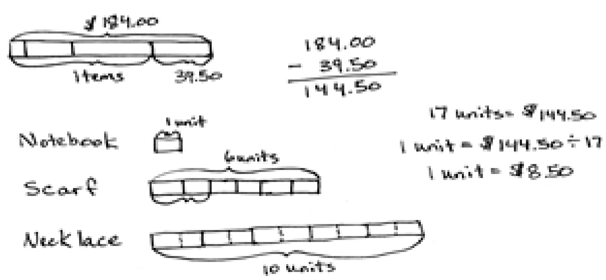
Both solutions below begin by finding the amount spent on the three items. While both use the cost of the notebook as 1 unit, Solution A begins with the necklace and uses the fraction information to subdivide the other tapes. Solution B uses a multiplicative approach thinking of the scarf's cost as 6 times as much as the cost of the notebook.

Solution A



17 units = 144.50
1 unit = 8.50
necklace $8.50 × 10 = $85
scarf $8.50 × 6 = $51
notebook $8.50 × 1 = $8.50
The necklace cost $85, The scarf costs $51. The notebook costs $8.50

Solution B



Notebook costs $8.50.
The scarf costs $8.50 × 6 = $51.00.
The necklace costs $8.50 × 10 = $85.00 or
$51.00 ÷ 3 = $17.00 $17. × 5 = $85.00
$85 + $51. + $8.50 = $144.50
$144.50 + 39.50 = $184.00

Problem 3: The Hewitt's Carpet

The Hewitt family is buying carpet for two rooms. The dining room is a square that measures 12 feet on each side. The den is 9 yards by 5 yards. Mrs. Hewitt has budgeted $2,650 for carpeting both rooms. The green carpet she is considering costs $42.75 per square yard, and the brown carpet's price is $4.95 per square foot. What are the ways she can carpet the rooms and stay within her budget?

MP.2

While the calculations for solving this problem are simple multiplication and addition, the path to finding the appropriate numbers on which to operate requires a high degree of organization. Students must attend not only to finding the various combinations that are possible, but they must also attend to the units in which the areas and prices are given. Students may choose to use only one unit of measure for the areas and prices, or they may use a combination. The following scaffolds may support struggling students:

- Are the areas expressed in the same unit? Can we use them as they are or must we convert?
- How might we organize the information so that we can keep track of our thinking?
- What are the combinations of carpet that Mrs. Hewitt can choose? Predict which combination will be the most expensive? Which the least expensive? How do you know? How can that prediction help you to move forward?
- Consider the prices per square yard and per square foot. Which of these carpets is the more expensive? How do you know? How might this information help you to organize your thoughts?

Both of the solutions to the right show good organization of the calculations used to solve. Solution A converts the carpet prices to match the area units of the rooms. Solutions B converts the dimensions of the rooms to match the units of the prices.

Solution A

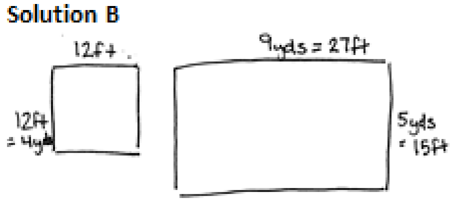
Green $42.75 yd²
4.75 ft²

Brown $44.55 yd²
$4.95 ft²

Dining	Den	Total
144 ft² x $4.75 = $684. Green	45 yd² x 42.75 = $1,923.75 Green	$2,607.75
Green $684.00	Brown 45 yd² x $44.55 = $2004.75	$2,688.75
Brown 144 ft² x $4.95 = $712.80	Green $1,923.75	$2,636.55
Brown $712.80	Brown 2,004.75	$2,717.55

Mrs. Hewitt has 2 choices: both rooms in green, or the den in green and the dining room in brown.

Solution B



Budget $2650
Green: $42.75/yd²
Brown: $4.95/ft²

DR Green → 16yd² x $42.75 = $684.00
Brown → 144ft² x $4.95 = $712.80

Den Green → 45yd² x $42.75 = $1923.75
Brown → 405ft² x $4.95 = $2004.75

Den	$\boxed{G}$ $1923.75	$\boxed{G}$ $1923.75	$\boxed{B}$ $2004.75	$\boxed{B}$ $2004.75
Dining Rm	$\boxed{G}$ + 684.00	$\boxed{B}$ + 712.80	$\boxed{B}$ + 712.80	$\boxed{G}$ + 684.00
	$ 2607.75	$2636.55	$2717.55	2688.75

Mrs. Hewitt can have both rooms green or the den green + the dining room brown.

Problem 4: AAA Taxi

AAA Taxi charges $1.75 for the first mile and $1.05 for each additional mile. How far could Mrs. Leslie travel for $20 if she tips the cab driver $2.50?

Students encounter a part–part–whole problem with varying unit size in the AAA Taxi Problem. They must first consider the cost of the first mile and tip, and then determine how many groups of $1.05 can be made from the remaining $15.75.

To scaffold, consider the following:

- Will all of the $20 be used to pay for the mileage? Why not?
- Do all the miles cost the same? How do we account for that in our model?
- How would you solve this if all the miles cost the same? What if the tip was the same as the cost for the miles?

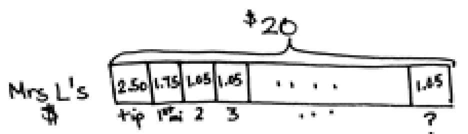
Solution A begins by counting on from the first mile. Solution B chooses to represent the problem with a tape diagram and divides to find how many units with a value of $1.05 there are once the sum of the tip and first mile are subtracted from the $20.

Solution A

Mile	
1	$1.75 + 2.50 (tip) = $4.25
2	$4.25 + 1.05 = $5.30
3	$5.30 + 1.05 = $6.35
6	$6.35 + 3.15 = $9.50
9	$9.50 + 3.15 = $12.65
12	$12.65 + 3.15 = $15.80
15	$15.80 + 3.15 = $18.95
16	$18.95 + 1.05 = $20.00

Mrs. Leslie can travel 16 miles for $20.

Solution B



20.00 − 2.50 − 1.75 = 15.75

1.05 × ? units = 15.75

$$\begin{array}{r} 15 \\ 105\,\overline{)\,1575} \\ -105 \\ \hline 525 \\ -525 \\ \hline 0 \end{array}$$

Mrs. Leslie can go 16 miles.

Problem 5: Pumpkins and Squash

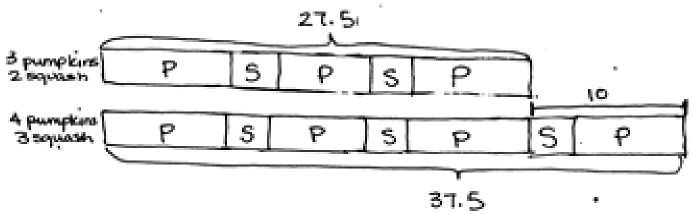
Three pumpkins and two squash weigh 27.5 pounds. Four pumpkins and three squash weigh 37.5 pounds. Each pumpkin weighs the same as the other pumpkins, and each squash weighs the same as the other squash. How much does each pumpkin weigh? How much does each squash weigh?

This problem is a departure from the routine problems in most of Grade 5 in that students must unitize two different variables (1 pumpkin and 1 squash) as a single unit. Once the difference is found between the quantities, students have several avenues for finding the weights of the individual pumpkin and squash.

- Draw the tapes to represent the weights for the two situations. Which tape is longer? How much longer?
- How many more pumpkins are in the second tape? How many more squash?
- Outline the difference with a red pen. Can you find this same combination in the rest of the tape? How many can you find?

Both solutions below use tape diagrams to show that the difference between the two known facts is a combination of one pumpkin and one squash. Next, they reason that the sum of the weights of a pumpkin and squash is 10 pounds. From there, they can see two of those pumpkin and squash units in relationship to the 27.5 pound group. It is clear then that the weight of the pumpkin has to be 7.5 pounds.

Solution A



1 unit = P S = 10 lbs

2 units + P = 27.5 lbs

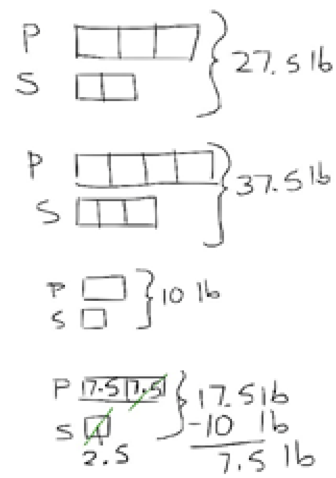
20 + P = 27.5 lbs

1 pumpkin = 7.5 lbs

10 − 7.5 = 2.5

One pumpkin weighs 7.5 pounds + one squash weighs 2.5 pounds.

Solution B



Problem 6: Toy Cars and Trucks

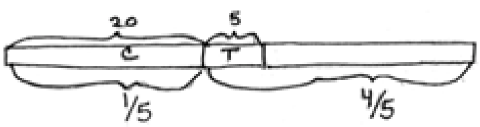
Henry had 20 convertibles and 5 trucks in his miniature car collection. After Henry's aunt bought him some more miniature trucks, Henry found that one-fifth of his collection consisted of convertibles. How many trucks did his aunt buy?

This problem requires students to process a before-and-after scenario. The larger quantity in the *before* situation becomes the smaller quantity in the *after* situation. This change in fractional relationship may be depicted in various ways. Students should be careful to model only 5 fifths in the *after* model—1 fifth for the convertibles and 4 fifths for the trucks. Use the following to scaffold student understanding:

- Draw Henry's convertibles and trucks before his aunt gave him more trucks. Draw the convertibles and trucks after his aunt gave him more.
- What amount stayed the same?
- Which is more, the cars or trucks? (Ask for both before and after. Have students simply draw the bars longer and shorter.)
- Refer to the convertibles tape in the after model. Ask, "If this is 1 fifth, what is the whole?"

Solution A combines the before and after models into one tape. The numbering on the top represents the *before* while the numbering below represents the *after*. Solution B also uses fraction division to determine the whole. Solution C uses a unit approach, with the number of trucks in the beginning as 1 unit.

Solution A



$\frac{1}{5} \times y = 20$

$20 \div \frac{1}{5} = y$

$y = 100$

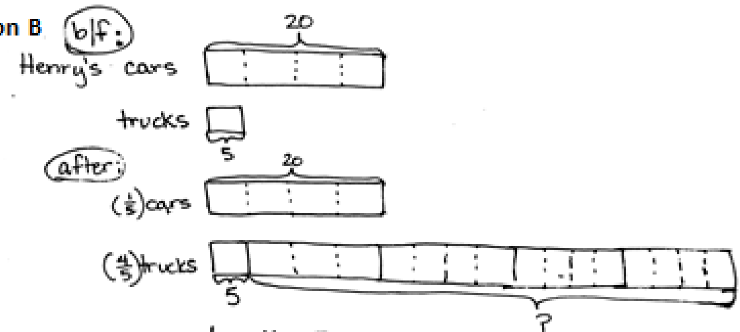
20 is $\frac{1}{5}$ of 100.

100 - 20 convertibles = 80

80 - 5 trucks he already had = 75

His aunt bought 75 trucks.

Solution B



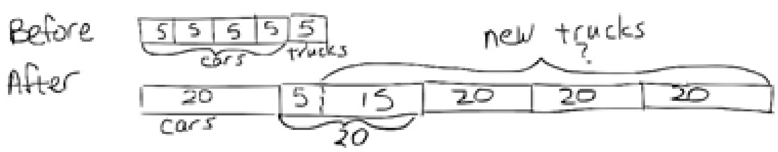
1 unit = 5

15 units = 5 × 15

= 75

Henry's aunt bought him 75 trucks.

Solution C



$3 \times 20 + 15 = 75$

His aunt bought 75 trucks.

That's a lot of trucks!

Problem 7: Pairs of Scouts:

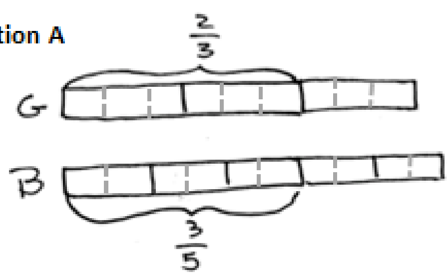
Some girls in a Girl Scout troop are pairing up with some boys in a Boy Scout troop to practice square dancing. Two-thirds of the girls are paired with three-fifths of the boys. What fraction of the scouts is square dancing?

This problem challenges students to consider what they know about fraction equivalence. The key to this problem lies in recognizing the need for equal numbers of units. That is, equal numerators must be found! Once students can visualize that 6 of the girls' units are the same as 6 of the boys' units, a fraction of the total number of units can be found. Scaffold with the following:

- We know the same number of girls as boys are dancing. Are these units the same size? How can we make them the same size?
- How can 2 units be the same amount as 3 units? Only if one unit is larger than the other. For example, 2 yards equals 6 feet if we consider 1 larger unit and a smaller unit.
- Make sure that once students make 6 units in each tape for the dancing scouts, they also subdivide the remaining units in each bar. This will create the 19 total units.

Solution A uses a tape diagram to model the equal amounts and then decompose to make the boy and girls units equal. Solution B uses an array approach to match up girls and boys.

Solution A



I know: 2 girl units = 3 boy units

I can make these units the same size! $\frac{2}{3} = \frac{6}{9}$ and $\frac{3}{5} = \frac{6}{10}$

So, now... 6 girl units = 6 boy units

There are 9 of these units for the girls and 10 of these units for the boys.

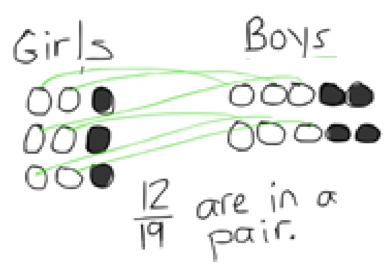
$$\text{Fraction dancing} = \frac{\#\text{ units dancing}}{\text{total units}}$$

$$= \frac{6+6}{9+10}$$

$$= \frac{12}{19} \text{ dancing}$$

$\frac{12}{19}$ of the scouts are dancing.

Solution B



Problem 8: Sandra's Measuring Cups

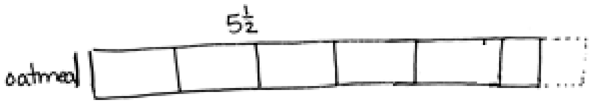
Sandra is making cookies that require $5\frac{1}{2}$ cups of oatmeal. She has only two measuring cups: a one-half cup and a three-fourths cup. What is the smallest number of scoops that she could make in order to get $5\frac{1}{2}$ cups?

Recognizing that using a larger unit will require fewer scoops is the beginning of understanding this problem. Students may try to name the total using all halves or all fourths, but will find that neither measure can be used exclusively. Using the larger measure first to scoop as much as possible, then moving to scoop the remainder with the smaller cup is the more efficient method of solving. To scaffold, ask the following questions:

- Which measuring cup is larger? How does knowing which is larger help you?
- Predict which measuring cup will do the job more quickly? How do you know?
- How many scoops will it take using just the half-cup measure? How many if only the larger cup is used? Is it possible to scoop all the oatmeal and fill the three-fourths cup every time?

All three solutions pictured below use the strategy of beginning with the larger cup measure. However, Solution A uses a unitary approach, decomposing the fourths into a multiple of 3 and a multiple of 2. Solution B counts on by three-fourths and then by halves. Solution C works at the numerical level to guess and check.

Solution A



11 halves in $5\frac{1}{2}$ X all $\frac{1}{2}$ c = 11 scoops

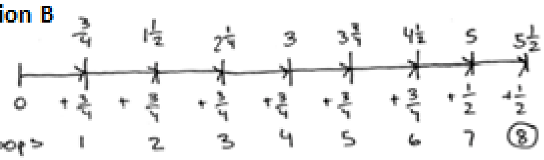
22 fourths in $5\frac{1}{2}$ X all $\frac{3}{4}$ c = 7 scoops w/ $\frac{1}{4}$ left

22 fourths = 18 fourths + 4 fourths

(6 x 3 fourths) + (2 x 2 fourths)

8 scoops (6 with $\frac{3}{4}$ c and 2 with $\frac{1}{2}$ c) will be the fewest.

Solution B



The Least number of scoops is 8.

Solution C

$\frac{3}{4} > \frac{1}{2}$

$5\frac{1}{2} = \frac{11}{2} = \frac{22}{4}$

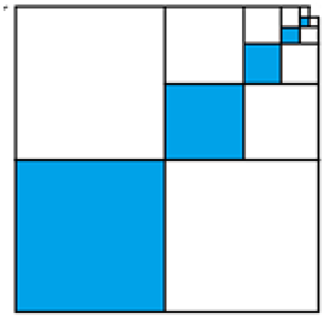
$7 \times \frac{3}{4} = \frac{21}{4}$ but only $\frac{1}{4}$ left

$6 \times \frac{3}{4} = \frac{18}{4}$ with $\frac{4}{4}$ or $\frac{2}{2}$ left

So 6 $\frac{3}{4}$-scoops and 2 $\frac{1}{2}$-scoops

8 total scoops minimum

Problem 9: Blue Squares



The dimensions of each successive blue square pictured to the right are half that of the previous blue square. The lower left blue square measures 6 inches by 6 inches.

a. *Find the area of the shaded part.*

b. *Find the total area of the shaded and unshaded parts.*

c. *What fraction of the figure is shaded?*

There are multiple ways to visualize this graphic, each leading to a different approach to solving. Students may see that there are 3 identical sets of graduated squares. Out of these 3 identical sets, only 1 set is shaded. Students may also do the work to find the fraction of the whole that the smallest shaded square represents and use an additive approach to finding the shaded area. The shaded area might then be used to find the total area. In contrast, the fraction that is shaded might be used in conjunction with the total area to name the area of the shaded parts. Scaffolds could include the following:

- Can you find the shaded area of just the first three squares (or L's)?
- Cut the graphic apart into separate L's or separate squares. What can you say about the fraction that is shaded in each one?
- How long is the side of each shaded square?
- What if the little square wasn't missing? What would be the area of the whole square? What part of that whole is missing?

Solution A uses the additive approach mentioned above to find the shaded area, which is multiplied by 3 to find the total. Solution B works backwards to name the fraction that is shaded, then finds the total area by using subtraction from a 12 by 12 square's area. These two pieces of information are then used to find the area of the shaded region in square inches.

a) **Solution A**

Shaded Area: $(6\times6)+(3\times3)+(1\frac{1}{2}\times1\frac{1}{2})+(\frac{3}{4}\times\frac{3}{4})+(\frac{3}{8}\times\frac{3}{8})$

$= 36 + 9 + 2\frac{1}{4} + \frac{9}{16} + \frac{9}{64}$

$= 47 + \frac{16}{64} + \frac{36}{64} + \frac{9}{64}$

$= 47 + \frac{61}{64}$

$= 47\frac{61}{64}$

b) Total Area: $47\frac{61}{64}\times 3$

$= 141\frac{183}{64}$

$64\overline{)183}$ $= 2\frac{55}{64}$; -128; 55

$= 141 + 2\frac{55}{64}$

$= 143\frac{55}{64}$

c) Fraction shaded: 1 out of 3 sets of squares $= \frac{1}{3}$

Shaded area is $47\frac{61}{64}$ in^2

Total area is $143\frac{55}{64}$ in^2

Fraction shaded is $\frac{1}{3}$.

Solution B

This is easier if you do the fraction first. There are 3 sets of graduated squares. 1 out of 3 sets is shaded.

c) Fraction shaded $= \frac{1}{3}$

b) Total area $= (12\text{ in}\times12\text{ in}) - (\frac{3}{8}\text{ in}\times\frac{3}{8}\text{ in})$

$= 144\text{ in}^2 - \frac{9}{64}\text{ in}^2$

$= 143\frac{55}{64}\text{ in}^2$

a) area shaded $= \frac{1}{3}\times 143\frac{55}{64}\text{ in}^2$

$= 47\frac{2}{3}\text{ in}^2 + \frac{55}{192}\text{ in}^2$

$= 47\frac{128}{192}\text{ in}^2 + \frac{55}{192}\text{ in}^2$

$= 47\frac{183}{192}\text{ in}^2$

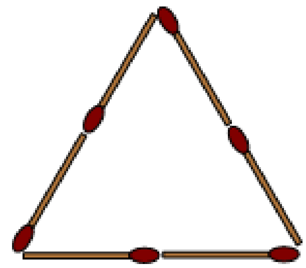
$= 47\frac{61}{64}\text{ in}^2$

Name ______________________________ Date ________________

Pat's Potato Farm grew 490 pounds of potatoes. Pat delivered $\frac{3}{7}$ of the potatoes to a vegetable stand. The owner of the vegetable stand delivered $\frac{2}{3}$ of the potatoes he bought to a local grocery store which packaged half of the potatoes that were delivered into 5-pound bags. How many 5-pound bags did the grocery store package?

The following problems are for your enjoyment. They are intended to encourage working together and family problem solving fun. They are not a required element of this homework assignment.

Six matchsticks are arranged into an equilateral triangle. How can you arrange them into 4 equilateral triangles without breaking or overlapping any of them? Draw the new shape.



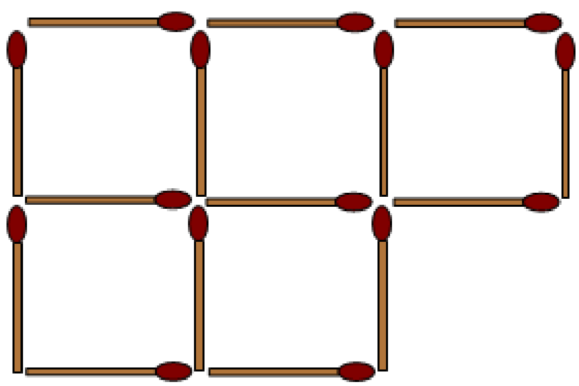
Kenny's dog, Charlie, is really smart! Last week, Charlie buried 7 bones in all. He buried them in 5 straight lines and put 3 bones in each line. How is this possible? Sketch how Charlie buried the bones.

Name ______________________________ Date ______________

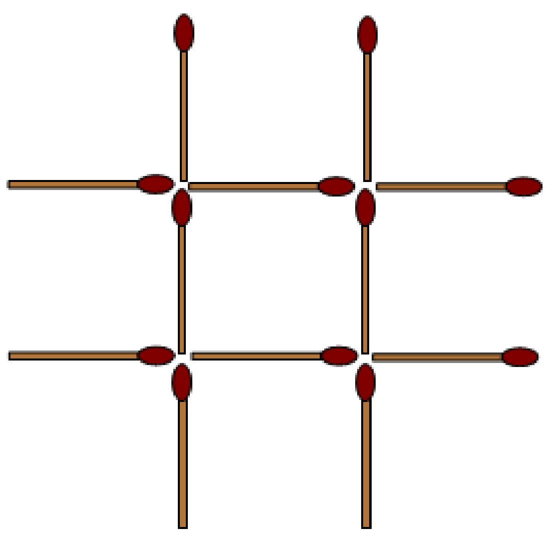
Fred and Ethyl had 132 flowers altogether at first. After Fred sold $\frac{1}{4}$ of his flowers and Ethyl sold 48 of her flowers, they had the same number of flowers left. How many flowers did each of them have at first?

The following problems are puzzles for your enjoyment. They are intended to encourage working together and family problem solving fun. They are not a required element of this homework assignment.

Without removing any, move 2 matchsticks to make 4 identical squares. Which matchsticks did you move? Draw the new shape.



Move 3 matchsticks to form exactly (and only) 3 identical squares. Which matchsticks did you move? Draw the new shape.



Name Vincent Date

1. For each written phrase, write a numerical expression and then evaluate your expression.

a. three fifths of the sum of thirteen and six

Numerical expression:

$\frac{3}{5}(13+6)$

Solution:

$\frac{3}{5}(19) = \frac{57}{5} = 11\frac{2}{5}$

b. Subtract four thirds from one seventh of sixty-three

Numerical expression:

$\frac{1}{7}(63) - \frac{4}{3}$

Solution:

$\frac{63}{7} - \frac{4}{3} = 9 - \frac{4}{3} =$

$7\frac{6}{3} - \frac{4}{3} = 7\frac{2}{3}$

c. six copies of the sum of nine fifths and three

Numerical expression:

$6(\frac{9}{5}+3)$

Solution:

$6(\frac{9}{5}+3) = 6(1\frac{4}{5}+3) =$

$6(4\frac{4}{5}) = 24\frac{24}{5}$

$= 28\frac{4}{5}$

d. three fourths of the product of four fifths and fifteen

Numerical expression:

$\frac{3}{4}(\frac{4}{5} \times 15)$

Solution:

$\frac{3}{4}(\frac{4}{\cancel{5}_1} \times \cancel{15}^3) = \frac{3}{\cancel{4}_1}(\cancel{12}^3) =$

9

2. Write at least 2 numerical expressions for each phrase below. Then solve.

a. two thirds of eight

$\frac{2}{3} \times 8$ or $\frac{2}{3}(8)$

$\frac{2 \times 8}{3} = \frac{16}{3} = 5\frac{1}{3}$

b. one sixth of the product of four and nine

$\frac{1}{6}(4 \times 9)$ or $\frac{1}{6}(9 \times 4)$ $\frac{1}{6}(4 \times 9) = \frac{1}{6}(36) = 6$

3. Use <, >, or = to make true number sentences without calculating. Explain your thinking.

a. $217 \times \left(42 + \frac{48}{5}\right)$ > $(217 \times 42) + \frac{48}{5}$

The left choice is multiplying by a bigger number.

b. $\left(687 \times \frac{3}{16}\right) \times \frac{7}{12}$ > $\left(687 \times \frac{3}{16}\right) \times \frac{3}{12}$

$\frac{7}{12}$ is bigger than $\frac{3}{12}$. So multiplying the same factor by $\frac{7}{12}$ will give a greater answer than multiplying by $\frac{3}{12}$, or $\frac{1}{4}$

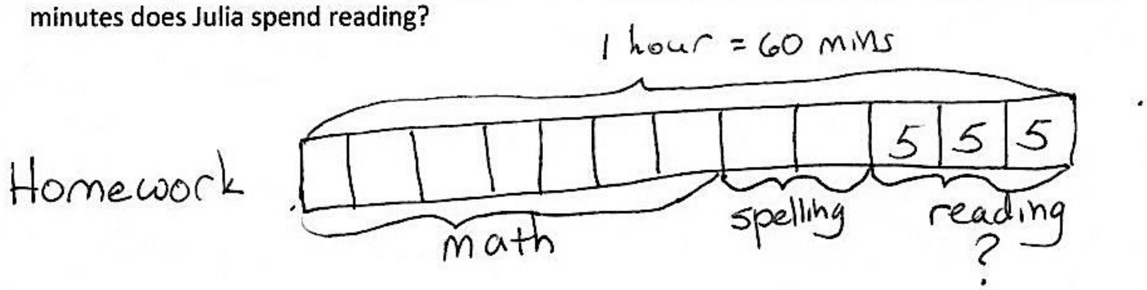
c. $5 \times 3.76 + 5 \times 2.68$ < 5×6.99

If you add 3.76 and 2.68, it's not as much as 6.99, and using the distributive property, the first equation could be $5 \times (3.76 + 2.68)$.

Name Emilie Date ____________

1. Use the RDW process to solve the word problems below.

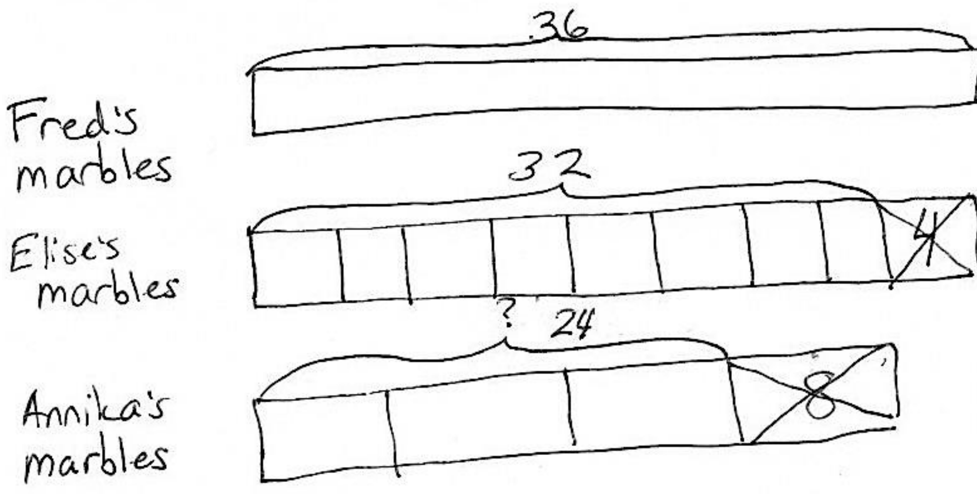
   a. Julia completes her homework in an hour. She spends $\frac{7}{12}$ of the time doing her math homework and $\frac{1}{6}$ of the time practicing her spelling words. The rest of the time she spends reading. How many minutes does Julia spend reading?



$60 \div 12 = 5$

She spends 15 minutes reading.

   b. Fred has 36 marbles. Elise has $\frac{8}{9}$ as many marbles as Fred. Annika has $\frac{3}{4}$ as many marbles as Elise. How many marbles does Annika have?



$36 \div 9 = 4$
$36 - 4 = 32$

$32 \div 4 = 8$
$32 - 8 = 24$

Annika has 24 marbles.

2. Write and solve a word problem that might be solved using the expressions in the chart below.

Expression	Word Problem	Solution
$\frac{2}{3} \times 18$	Jeri buys a carton of 18 eggs. She uses $\frac{2}{3}$ of them to bake a cake. How many eggs did she use?	$\cancel{18}^{6} \times \frac{2}{\cancel{3}_{1}} = 12$ She used 12 eggs.
$(26+34)\times\frac{5}{6}$	Walter had 26 candies after an hour of trick or treating. Then he got 34 more. His parents made him give $\frac{5}{6}$ of them away. How many candies did Walter get to eat?	$34 + 26 = 60$ $\cancel{60}^{10} \times \frac{5}{\cancel{6}_{1}} = 10 \times 5 = 50$ $60 - 50 = 10$ Walter ate 10 candies.
$7-\left(\frac{5}{12}+\frac{1}{2}\right)$	The party had 7 pizzas cut into 12 slices each. Jack ate 5 slices, and Art ate $\frac{1}{2}$ of a pizza. What fraction of the pizzas were left?	$\frac{5}{12} + \frac{1}{2} = \frac{5}{12} + \frac{6}{12} = \frac{11}{12}$ $7 - \frac{11}{12} = 6\frac{1}{12}$ There were $6\frac{1}{12}$ pizzas left.

Name Amber Date ____________

1. Answer the following questions about fluency.

   a. What does being fluent with a math skill mean to you?

   It means I know how to do it without having to think too hard about it.

   b. Why is fluency with certain math skills important?

   It helps us be more efficient and learn new concepts that are harder than the ones we know.

   c. With which math skills do you think you should be fluent?

   Fractions, decimals, addition, subtraction, multiplication and division.

   d. With which math skills do you feel most fluent? Least fluent?

   Most: multiplication and division, especially mental.

   Least: volume and coordinate planes.

   e. How can you continue to improve your fluency?

   I need to keep practicing what I already learned.

2. Use the chart below to list skills with which you are fluent from today's activities.

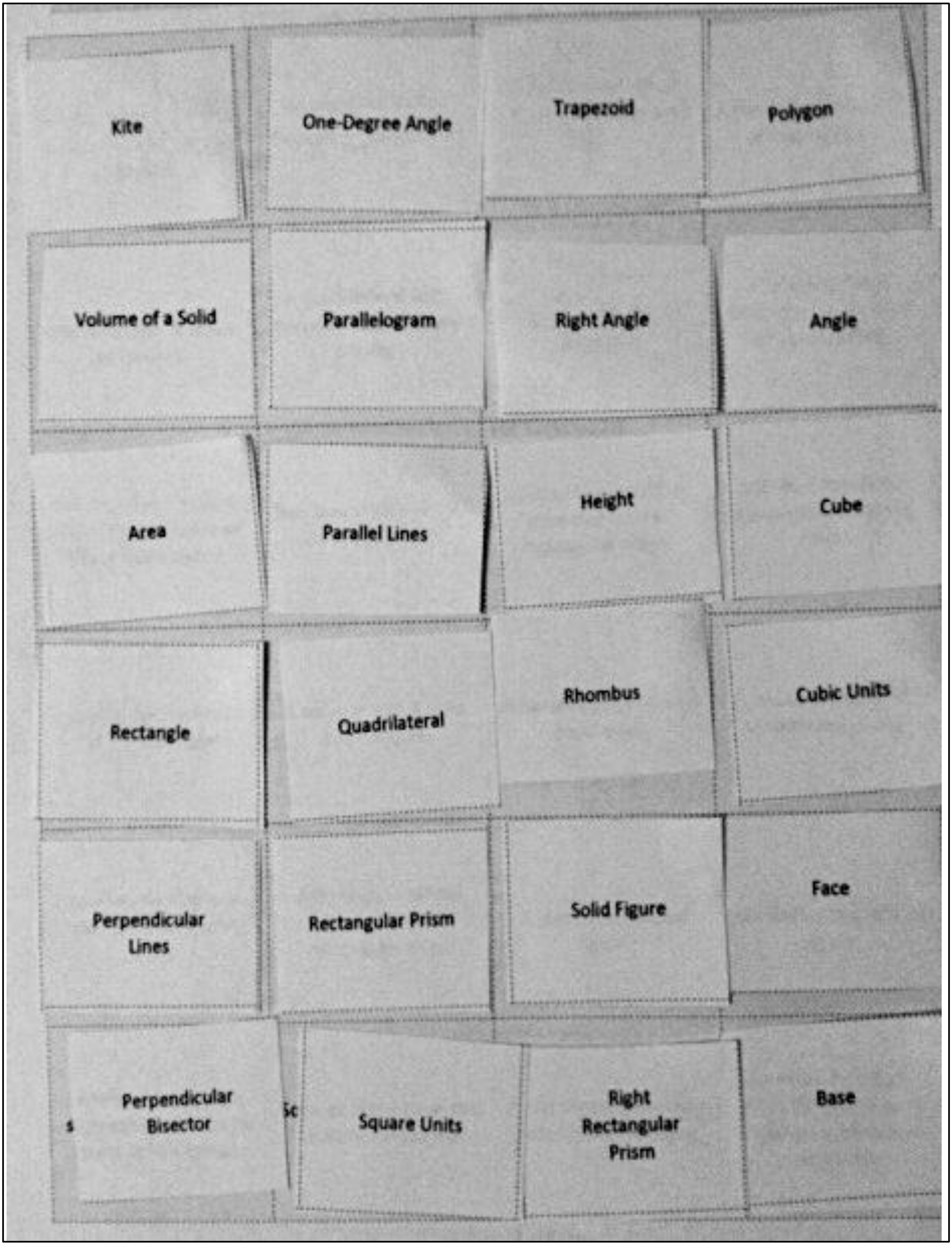
Skills with which I am fluent
Fraction of a set
Convert to hundredths
Add and subtract decimals
Unit conversions

3. Use the chart below to list skills we practiced today that are less fluent.

Fluency skills I need to practice more
Write fractions as mixed numbers
Multiply a fraction and a whole number
Decompose decimals
Round to the nearest one

A quadrilateral with two pairs of equal sides that are also adjacent.	An angle that turns through $\frac{1}{360}$ of a circle.	A quadrilateral with at least one pair of parallel lines.	A closed figure made up of line segments.
Measurement of space or capacity.	A quadrilateral with opposite sides that are parallel.	An angle measuring 90 degrees.	The union of two different rays sharing a common vertex.
The number of square units that covers a two-dimensional shape.	Two lines in a plane that do not intersect.	The number of adjacent layers of the base that form a rectangular prism.	A three-dimensional figure with six square sides.
A quadrilateral with four 90-degree angles.	A polygon with 4 sides and 4 angles.	A parallelogram with all equal sides.	Cubes of the same size used for measuring.
Two intersecting lines that form 90-degree angles.	A three-dimensional figure with six rectangular sides.	A three-dimensional figure.	Any flat surface of a 3-D figure.
A line that cuts a line segment into two equal parts at 90 degrees.	Squares of the same size, used for measuring.	A rectangular prism with only 90-degree angles.	One face of a 3-D solid, often thought of as the surface upon which the solid rests.

Base	Volume of a Solid	Cubic Units	Kite
Height	One-Degree Angle	Face	Trapezoid
Right Rectangular Prism	Perpendicular Bisector	Cube	Area
Perpendicular Lines	Rhombus	Parallel Lines	Angle
Polygon	Rectangular Prism	Parallelogram	Rectangle
Right Angle	Quadrilateral	Solid Figure	Square Units


Kite
One-Degree Angle
Trapezoid
Polygon
Volume of a Solid
Parallelogram
Right Angle
Angle
Area
Parallel Lines
Height
Cube
Rectangle
Quadrilateral
Rhombus
Cubic Units
Perpendicular Lines
Rectangular Prism
Solid Figure
Face
Perpendicular Bisector
Square Units
Right Rectangular Prism
Base

Attribute Buzz:

Number of players: 2

Description: Players place geometry vocabulary cards face down in a pile and, as they select cards, name the attributes of each figure within 1 minute.

- Player A flips the first card and says as many attributes as possible within 30 seconds.
- Player B says, "Buzz," when or if Player A states an incorrect attribute or time is up.
- Player B explains why the attribute is incorrect (if applicable), and can then start listing attributes about the figure for 30 seconds.
- Players score a point for each correct attribute.

Play continues until students have exhausted the figure's attributes. A new card is selected and play continues. The player with the most points at the end of the game wins.

Concentration:

Number of players: 2–6

Description: Players persevere to match term cards with their definition and description cards.

- Create two identical arrays side by side, one of term cards and one of definition and description cards.
- Players take turns flipping over pairs of cards to find a match. A match is a vocabulary term and its definition or description card. Cards keep their precise location in the array if not matched. Remaining cards are not reconfigured into a new array.
- After all cards are matched, the player with the most pairs is the winner.

Three Questions to Guess my Term!

Number of players: 2–4

Description: A player selects and secretly views a term card. Other players take turns asking yes or no questions about the term.

- Players can keep track of what they know about the term on paper.
- Only yes or no questions are allowed (e.g., "What kind of angles do you have?" is not allowed.)
- A final guess must be made after 3 questions, but may be made sooner. Once a player says, "This is my guess," no more questions may be asked by that player.
- If the term is guessed correctly after 1 or 2 questions, 2 points are earned. If all 3 questions are used, only 1 point is earned.
- If no player guesses correctly, the card holder receives the point.
- The game continues as the player to the card holder's left selects a new card and questioning begins again.
- The game ends when a player reaches a predetermined score.

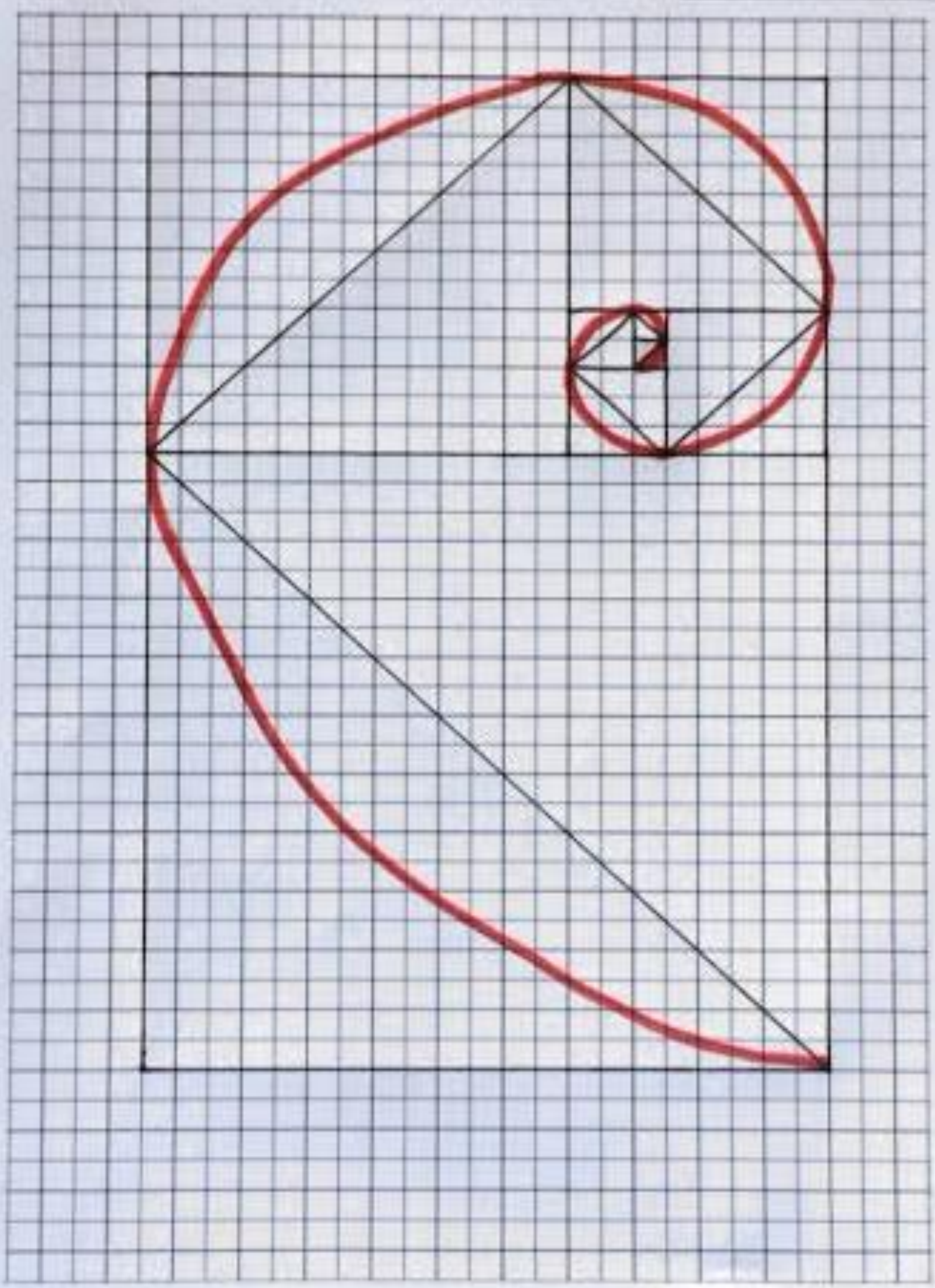
Bingo:

Number of players: 4–whole class

Description: Players match definitions to terms to be the first to fill a row, column or diagonal.

- Players write a vocabulary term in each box of the math bingo game template. Each term should be used only once. The box that says Math Bingo is a free space.
- Players place the filled-in math bingo template in their personal boards.
- One person is the caller and reads the definition on a vocabulary card.
- Players cross off or cover the term that matches the definition.
- "Bingo!" is called when 5 vocabulary terms in a row are crossed off diagonally, vertically, or horizontally. The free space counts as 1 box towards the needed 5 vocabulary terms.
- The first player to have 5 in a row, reads each crossed off word, states the definition, and gives a description or an example of each word. If all words are reasonably explained as determined by the caller, the player is declared the winner.

Name Clarke Date ____________



Name Marie Date ____________

1. Ashley decides to save money this year, but she wants to build up to it over the year. She decides to start with $1.00 and add 1 more dollar each week of the year. Complete the table to show how much she will have saved by the end of the year.

Week	Add	Total
1	$1.00	$1.00
2	$2.00	$3.00
3	$3.00	$6.00
4	$4.00	$10.00
5	$5	$15
6	$6	$21
7	$7	$28
8	$8	$36
9	$9	$45
10	$10	$55
11	$11	$66
12	$12	$78
13	$13	$91
14	$14	$105
15	$15	$120
16	$16	$136
17	$17	$153
18	$18	$171
19	$19	$190
20	$20	$210
21	$21	$231
22	$22	$253
23	$23	$276
24	$24	$300
25	$25	$325
26	$26	$351

Week	Add	Total
27	$27	$378
28	$28	$406
29	$29	$435
30	$30	$465
31	$31	$496
32	$32	$528
33	$33	$561
34	$34	$595
35	$35	$630
36	$36	$666
37	$37	$703
38	$38	$741
39	$39	$780
40	$40	$820
41	$41	$861
42	$42	$903
43	$43	$946
44	$44	$990
45	$45	$1,035
46	$46	$1,081
47	$47	$1,128
48	$48	$1,176
49	$49	$1,225
50	$50	$1,275
51	$51	$1,326
52	$52	$1,378

2. Carly wants to save money too, but she has to start with the smaller denomination of quarters. Complete the second chart to show how much she will have saved by the end of the year if she adds a quarter more each week. Then try it yourself, if you can and want to!

Week	Add	Total
1	$0.25	$0.25
2	$0.50	$0.75
3	$0.75	$1.50
4	$1.00	$2.50
5	$1.25	$3.75
6	$1.50	$5.25
7	$1.75	$7.00
8	$2.00	$9.00
9	$2.25	$11.25
10	$2.50	$13.75
11	$2.75	$16.50
12	$3.00	$19.50
13	$3.25	$22.75
14	$3.50	$26.25
15	$3.75	$30.00
16	$4.00	$34.00
17	$4.25	$38.25
18	$4.50	$42.75
19	$4.75	$47.50
20	$5.00	$52.50
21	$5.25	$57.75
22	$5.50	$63.25
23	$5.75	$69.00
24	$6.00	$75.00
25	$6.25	$81.25
26	$6.50	$87.75

Week	Add	Total
27	$6.75	$94.50
28	$7.00	$101.50
29	$7.25	$108.75
30	$7.50	$116.25
31	$7.75	$124.00
32	$8.00	$132.00
33	$8.25	$140.25
34	$8.50	$148.75
35	$8.75	$157.50
36	$9.00	$166.50
37	$9.25	$175.75
38	$9.50	$185.25
39	$9.75	$195.00
40	$10.00	$205.00
41	$10.25	$215.25
42	$10.50	$225.75
43	$10.75	$236.50
44	$11.00	$247.50
45	$11.25	$258.75
46	$11.50	$270.25
47	$11.75	$282.00
48	$12.00	$294.00
49	$12.25	$306.25
50	$12.50	$318.75
51	$12.75	$331.50
52	$13.00	$344.50

3. David decides he wants to save even more money than Ashley did. He does so by adding the next Fibonacci number instead of adding $1.00 each week. Use your calculator to fill in the chart and find out how much money he will have saved by the end of the year. Is this realistic for most people? Explain your answer.

Week	Add	Total	Week	Add	Total
1	$1	$1	27	$196,418	$514,278
2	$1	$2	28	$317,811	$832,039
3	$2	$4	29	$514,229	$1,346,268
4	$3	$7	30	$832,040	$2,178,308
5	$5	$12	31	$1,346,269	$3,524,577
6	$8	$20	32	$2,178,309	$5,702,886
7	$13	$33	33	$3,524,578	$9,227,464
8	$21	$54	34	$5,702,887	$14,930,351
9	$34	$88	35	$9,227,465	$24,157,816
10	$55	$143	36	$14,930,352	$39,088,168
11	$89	$232	37	$24,157,817	$63,245,985
12	$144	$376	38	$39,088,169	$102,334,154
13	$233	$609	39	$63,245,986	$165,580,140
14	$377	$986	40	$102,334,155	$267,914,295
15	$610	$1,596	41	$165,580,141	$433,494,436
16	$987	$2,583	42	$267,914,296	$701,408,732
17	$1597	$4,180	43	$433,494,437	$1,134,903,169
18	$2584	$6,764	44	$701,408,733	$1,836,311,902
19	$4181	$10,945	45	$1,134,903,170	$2,971,215,072
20	$6,765	$17,710	46	$1,836,311,903	$4,807,526,975
21	$10,946	$28,656	47	$2,971,215,073	$7,778,742,048
22	$17,711	$46,367	48	$4,807,526,976	$12,586,269,024
23	$28,657	$75,024	49	$7,778,742,049	$20,365,011,073
24	$46,368	$121,392	50	$12,586,269,025	$32,951,280,098
25	$75,025	$196,417	51	$20,365,011,074	$53,316,291,173
26	$121,393	$317,810	52	$32,951,280,099	$86,267,571,272

Name Edna Date

Record the dimensions of your boxes and lid below. Explain your reasoning for the dimensions you chose for Box 2.

BOX 1 (Can hold Box 2 inside.)

The dimensions of Box 1 are 19cm x 13cm x 4cm.

Its volume is:

$V = l \times w \times h$

$V = 19\text{ cm} \times 13\text{ cm} \times 4\text{ cm}$

$V = 19\text{ cm} \times 52\text{ cm}^2$

$V = 988\text{ cm}^3$

$$\begin{array}{r} 52 \\ \times\ 19 \\ \hline 468 \\ +\ 520 \\ \hline 988 \end{array}$$

BOX 2 (Fits inside of Box 1.)

The dimensions of Box 2 are 9.5cm x 12.5cm x 3.5cm.

Reasoning: I wanted the smaller box to be just about the same width & height, but only take up half the length.

LID (Fits snugly over Box 1 to protect the contents.)

The dimensions of the lid are 19.5cm x 13.5cm x 2cm.

Reasoning: The legth & width need only to be a little bit longer than the box (0.25 cm on each side) & the height of the lid probably needs to be 2cm.

1. What steps did you take to determine the dimensions of the lid?

Dimensions of Box 1: 19 cm x 13 cm x 4 cm

- First, I decided to add 0.25 cm to the length & the width, so it was just slightly bigger than the box.
- Then I figured that the edges of the lid should cover about half the height of the box.
- Then I checked to make sure that the 21 cm x 27 cm had enough material... it did!

2. Find the volume of Box 2. Then find the difference in the volumes of Boxes 1 and 2.

Box 1: $V = 988 \text{ cm}^3$

Box 2: $V = l \times w \times h$

$V = 9.5 \text{ cm} \times 12.5 \text{ cm} \times 3.5 \text{ cm}$

$V = 9.5 \text{ cm} \times 43.75 \text{ cm}^2$

$V = 415.625 \text{ cm}^3$

$$\begin{array}{r} 12.5 \\ \times\ 3.5 \\ \hline 625 \\ +3750 \\ \hline 43.75 \end{array} \qquad \begin{array}{r} 43.75 \\ \times\ 9.5 \\ \hline 21875 \\ +393750 \\ \hline 415.625 \end{array}$$

$$\begin{array}{r} 988.000 \text{ cm}^3 \\ -\ 415.625 \text{ cm}^3 \\ \hline 572.375 \text{ cm}^3 \end{array}$$

Difference in V of boxes: 572.375 cm^3

3. Imagine Box 3 is created such that each dimension is one centimeter less than that of Box 2, what would the volume be of Box 3?

Box 3: $V = l \times w \times h$

$V = 8.5 \text{ cm} \times 11.5 \text{ cm} \times 2.5 \text{ cm}$

$V = 8.5 \text{ cm} \times 28.75 \text{ cm}^2$

$V = 244.375 \text{ cm}^3$

$$\begin{array}{r} 11.5 \text{ cm} \\ \times\ 2.5 \text{ cm} \\ \hline 575 \\ +2300 \\ \hline 28.75 \text{ cm}^2 \end{array} \qquad \begin{array}{r} 28.75 \text{ cm}^2 \\ \times\ 8.5 \text{ cm} \\ \hline 14375 \\ 230000 \\ \hline 244.375 \text{ cm}^3 \end{array}$$

Name Ethel Date

I reviewed Edna 's work.

Use the chart below to evaluate your friend's 2 boxes and lid. Measure and record the dimensions and calculate the box volumes. Then assess suitability and suggest improvements in the adjacent columns.

Dimensions and Volume	Is the box or lid suitable? Explain.	Suggestions for improvement
BOX 1 dimensions 19cm x 13cm x 4cm Total volume: V= 988 cm³	Yes, it's suitable. It can be folded to make a box & uses up the entire piece of paper.	None. These are the dimensions we agreed to use. By the way, I love the way you decorated this box!
BOX 2 dimensions 9.5cm x 12.5cm x 3.5cm Total volume: V= 415.625 cm³	Yes, it works. It takes up about half of box 1 & the lid fits. Also, they materials all fit inside.	I really like how snugly this box fits inside of Box 1. You might want to put your name on this box, in case it gets separated from Box 1.
LID dimensions 19.5 cm x 13.5 cm x 2cm	It fits, but it's not exactly "snug".	You might want to make the length & width a tad smaller. Or you could make the height longer, too.