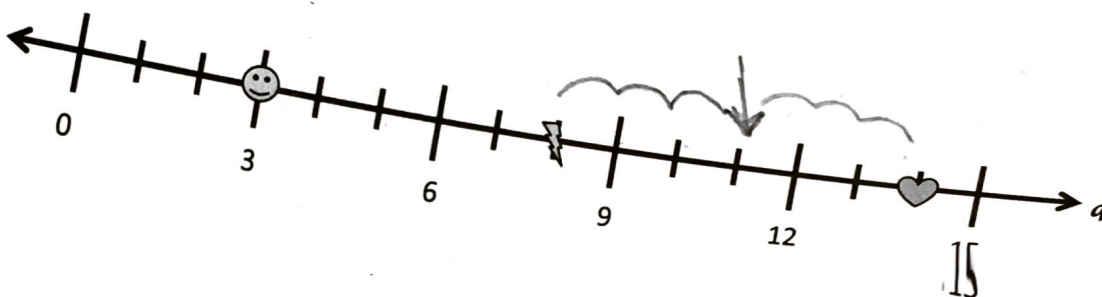Name _____   Date _____
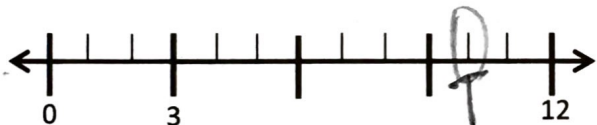
1. Answer the following questions using number line q below.
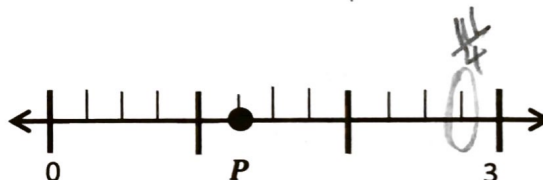
    a. What is the coordinate, or the distance from the origin, of the 😊 ? _____**3**_____

    b. What is the coordinate of the ⚡ ? _____**8**_____

    c. What is the coordinate of the 💙 ? _____**14**_____

    d. What is the coordinate at the midpoint of the ⚡ and the 💙 ? _____**11**_____

2. Use the number lines to answer the questions.

    Plot T so that its distance from the origin is 10.

    Plot a point that is 0.15 closer to the origin than Z.

    Plot M so that its distance is $\frac{11}{4}$ from the origin. What is the distance from P to M?
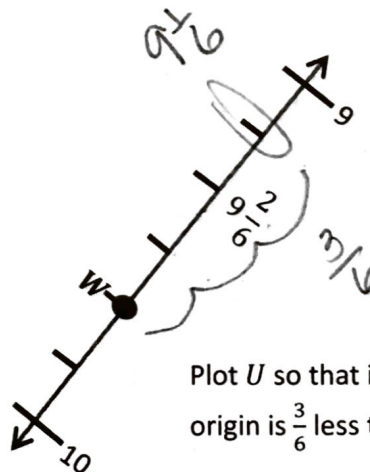
    Plot U so that its distance from the origin is $\frac{3}{6}$ less than that of W.

3. Number line k shows 12 units. Use number line k below to answer the questions.

C   F   G   B   A D.

12 $1\frac{1}{2}$ 10   8   6   5   4 $3\frac{1}{2}$ 2   1   0

$\frac{1}{2}$
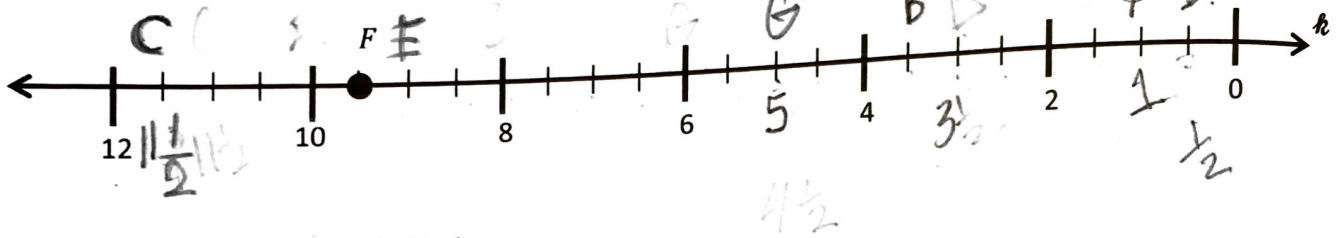
a. Plot a point at 1. Label it A.

b. Label a point that lies at $3\frac{1}{2}$ as B.

c. Label a point, C, whose distance from zero is 8 units farther than that of B.

The coordinate of C is ___$11\frac{1}{2}$___.

d. Plot a point, D, whose distance from zero is $\frac{6}{2}$ (3) less than that of B.

The coordinate of D is ___$\frac{1}{2}$___.

e. What is the coordinate of the point that lies $\frac{17}{2}$ farther from the origin than D?

Label this point E.

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

Label this point G.

4. Mr. Baker's fifth-grade class buried a time capsule in the field behind the school. They drew a map and marked the location of the capsule with an ✖ so that his class can dig it up in ten years. What could Mr. Baker's class have done to make the capsule easier to find?

PLAYGROUND   ✖

BASEBALL

SCHOOL

Mr. Baker could have made a coordinate map to locate it easier.

Lesson 1:   Construct a coordinate system on a line.

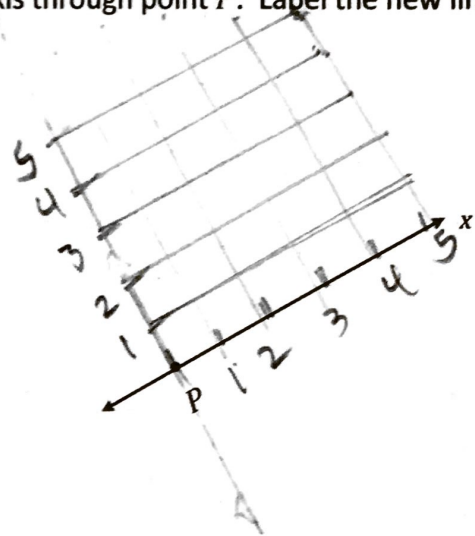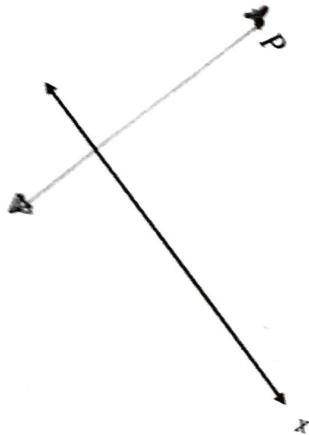©2018 Great Minds®. eureka-math.org

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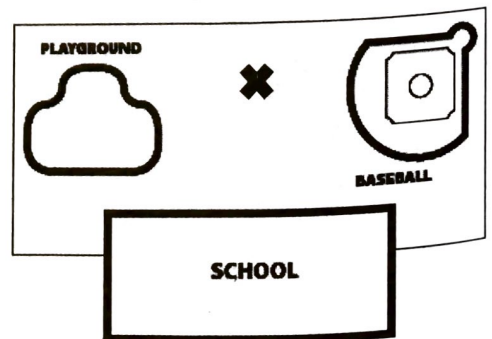
Name _____   Date _____

1.

   a. Use a set square to draw a line perpendicular to the x-axis through point P. Label the new line as the y-axis.

   b. Choose one of the sets of perpendicular lines above, and create a coordinate plane. Mark 5 units on each axis, and label them as whole numbers.

2. Use the coordinate plane to answer the following.

   a. Name the shape at each location.

x-coordinate	y-coordinate	Shape
2	4	◎
5	4	◈
1	5	△
5	1	♡
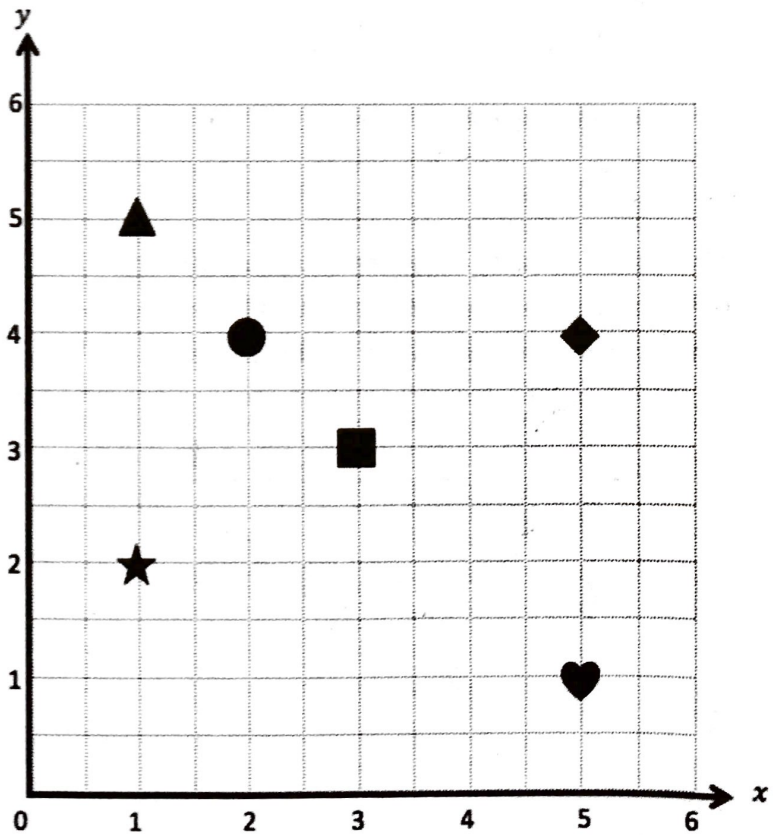
   b. Which shape is 2 units from the x-axis?

   c. Which shape has the same x- and y-coordinate?

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Lesson 2:   Construct a coordinate system on a plane.

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3.   Use the coordinate plane to answer the following.

   a.   Name the coordinates of each shape.

Shape	x-coordinate	y-coordinate
Moon	2 ½	4
Sun	4	3
Heart	1	2
Cloud	0	4 ½
Smiley Face	3 ½	5 ½
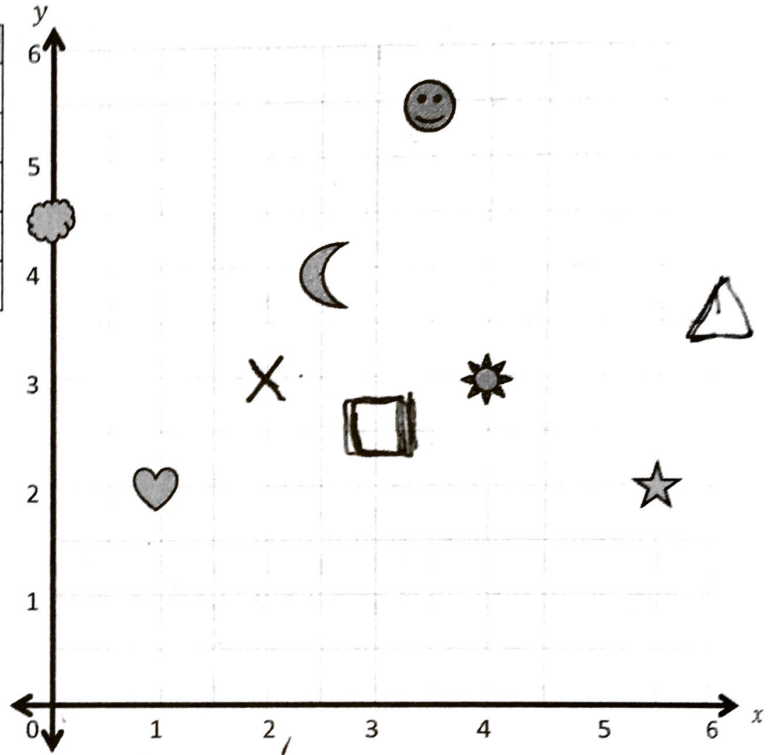
   b.   Which 2 shapes have the same y-coordinate?

   heart and star

   c.   Plot an X at (2, 3).

   d.   Plot a square at (3, 2 $\frac{1}{2}$).

   e.   Plot a triangle at (6, 3 $\frac{1}{2}$).

4.   Mr. Palmer plans to bury a time capsule 10 yards behind the school. What else should he do to make naming the location of the time capsule more accurate?

   Make a coordinate plane to mark the point.

Lesson 2:   Construct a coordinate system on a plane.

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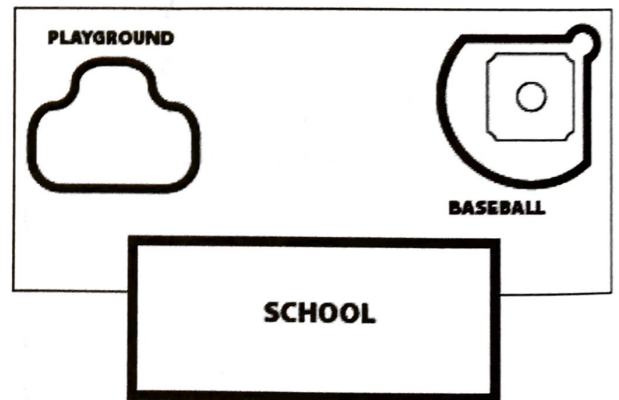
Name _____   Date _____

1. Use the grid below to complete the following tasks.

    a. Construct a y-axis that passes through points Y and Z.

    b. Construct a perpendicular x-axis that passes through points Z and X.

    c. Label the origin as 0.

    d. The y-coordinate of W is $2\frac{3}{5}$. Label the whole numbers along the y-axis.

    e. The x-coordinate of V is $2\frac{2}{5}$. Label the whole numbers along the x-axis.

Lesson 3:   Name points using coordinate pairs, and use the coordinate pairs to plot points.

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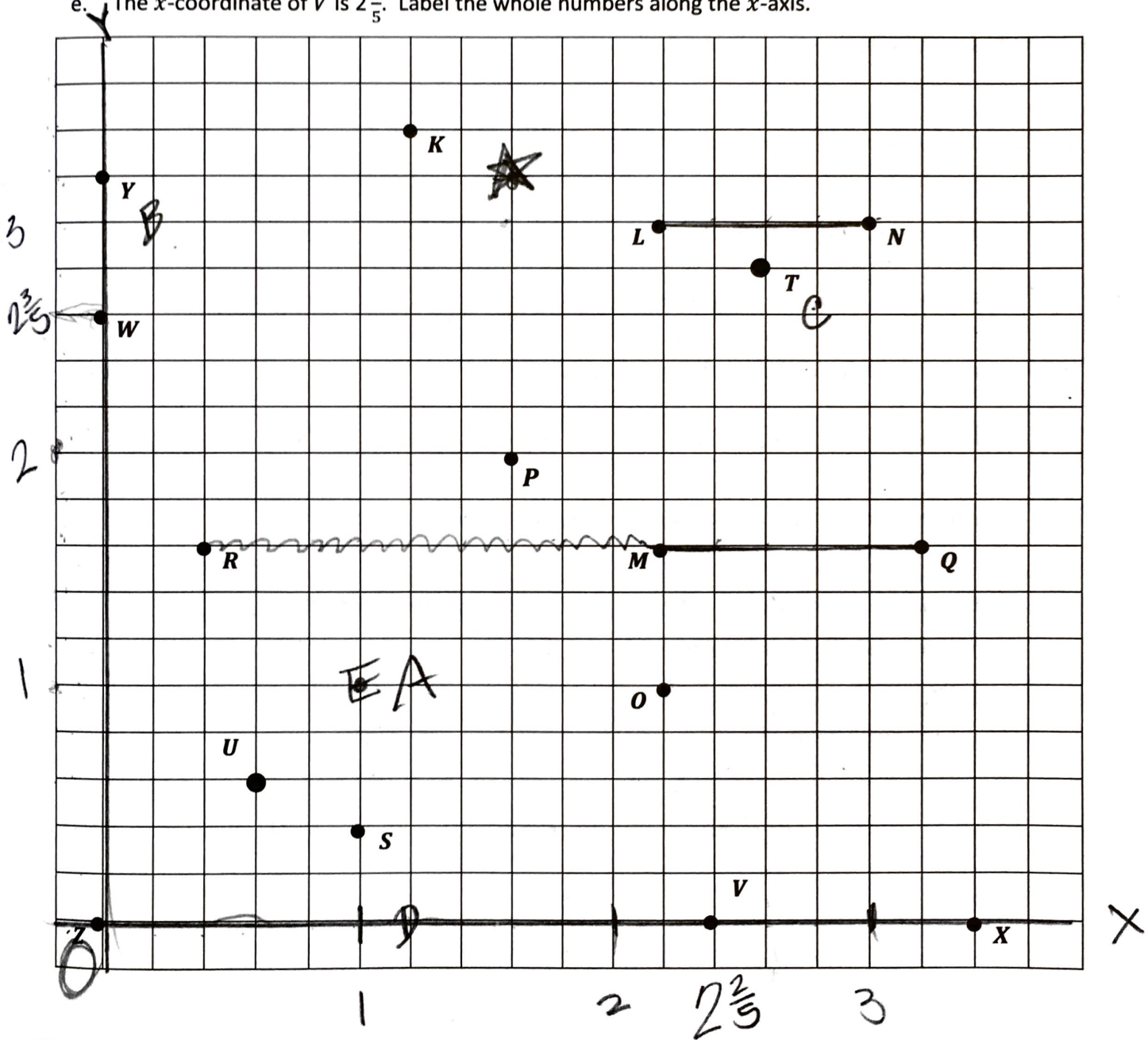
2. For all of the following problems, consider the points K through X on the previous page.

   a. Identify all of the points that have a y-coordinate of $1\frac{3}{5}$. R M Q

   b. Identify all of the points that have an x-coordinate of $2\frac{1}{5}$. O M L

   c. Which point is $1\frac{3}{5}$ units above the x-axis and $3\frac{1}{5}$ units to the right of the y-axis? Name the point, and give its coordinate pair.

   $A \left(1\frac{3}{5}, 3\frac{1}{5}\right)$

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

   e. Which point is located $\frac{2}{5}$ unit along the x-axis? S

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

   $T:$ $\left(2\frac{3}{5}, 2\frac{4}{5}\right)$ $U:$ $\left(\frac{3}{5}, \frac{3}{5}\right)$ $S:$ $\left(1, \frac{2}{5}\right)$ $K:$ $\left(1\frac{1}{5}, 3\frac{2}{5}\right)$

   g. Name the points located at the following coordinates.

   $\left(\frac{3}{5}, \frac{3}{5}\right)$ U $\left(3\frac{2}{5}, 0\right)$ X $\left(2\frac{1}{5}, 3\right)$ L $\left(0, 2\frac{3}{5}\right)$ W

   h. Plot a point whose x- and y-coordinates are equal. Label your point E.

   i. What is the name for the point on the plane where the two axes intersect? Z
   Give the coordinates for this point. (0 , 0)

   j. Plot the following points.

   $A:$ $\left(1\frac{1}{5}, 1\right)$ $B:$ $\left(\frac{1}{5}, 3\right)$ $C:$ $\left(2\frac{4}{5}, 2\frac{2}{5}\right)$ $D:$ $\left(1\frac{1}{5}, 0\right)$

   k. What is the distance between L and N, or LN?

l. What is the distance of MQ? $1\frac{1}{5}$

m. Would RM be greater than, less than, or equal to $LN + MQ$?

$LN + MQ$

$2\frac{1}{5} = 2\frac{1}{5}$

n. Leslie was explaining how to plot points on the coordinate plane to a new student, but she left off some important information. Correct her explanation so that it is complete.

X Y

"All you have to do is read the coordinates; for example, if it says (4, 7), count four, then seven, and put a point where the two grid lines intersect."

4 is on the X-axis
7 is on the Y-axis

Battleship Rules

Goal: To sink all of your opponent's ships by correctly guessing their coordinates.

Materials
- 1 My Ships grid sheet (per person/per game)
- 1 Enemy Ships grid sheet (per person/per game)
- Red crayon/marker for hits
- Black crayon/marker for misses
- Folder to place between players

Ships
- Each player must mark 5 ships on the grid.
  - Aircraft Carrier—Plot 5 points
  - Battleship—Plot 4 points
  - Cruiser—Plot 3 points
  - Submarine—Plot 3 points
  - Patrol Boat—Plot 2 points

Setup
- With your opponent, choose a unit length and fractional unit for the coordinate plane.
- Label chosen units on both grid sheets.
- Secretly select locations for each of the 5 ships on your My Ships grid.
  - All ships must be placed horizontally or vertically on the coordinate plane.
  - Ships can touch each other, but they may not occupy the same coordinate.

Play
- Players take turns firing one shot to attack enemy ships.
- On your turn, call out the coordinates of your attacking shot. Record the coordinates of each attack shot.
- Your opponent checks his My Ships grid. If that coordinate is unoccupied, your opponent says, "Miss." If you named a coordinate occupied by a ship, your opponent says, "Hit."
- Mark each attempted shot on your Enemy Ships grid. Mark a black ✖ on the coordinate if your opponent says, "Miss." Mark a red ✓ on the coordinate if your opponent says, "Hit."
- On your opponent's turn, if he hits one of your ships, mark a red ✓on that coordinate of your My Ships grid. When one of your ships has every coordinate marked with a ✓, say, "You've sunk my [name of ship]."

Victory
- The first player to sink all (or the most) opposing ships wins.

Name _____   Date _____

Your homework is to play at least one game of Battleship with a friend or family member. You can use the directions from class to teach your opponent. You and your opponent should record your guesses, hits, and misses on the sheet as you did in class.

When you have finished your game, answer these questions.

1. When you guess a point that is a hit, how do you decide which points to guess next?

2. How could you change the coordinate plane to make the game easier or more challenging?

3. Which strategies worked best for you when playing this game?

Name _____   Date _____

1. Use the coordinate plane to answer the questions.

   a. Use a straightedge to construct a line that goes through points A and B. Label the line g.

   b. Line g is parallel to the ___X___-axis and is perpendicular to the ___Y___-axis.

   c. Draw two more points on line g. Name them C and D.

   d. Give the coordinates of each point below.

   A: (4,8)   B: (9,8)

   C: (5,8)   D: (6,8)
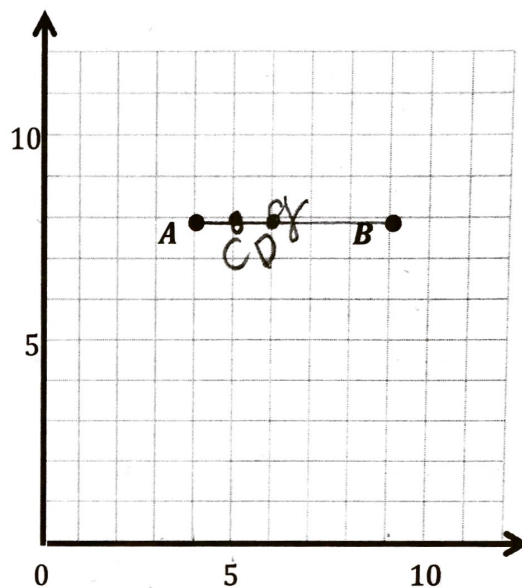
   e. What do all of the points on line g have in common?   the Y point is 8

   f. Give the coordinates of another point that falls on line g with an x-coordinate greater than 25.
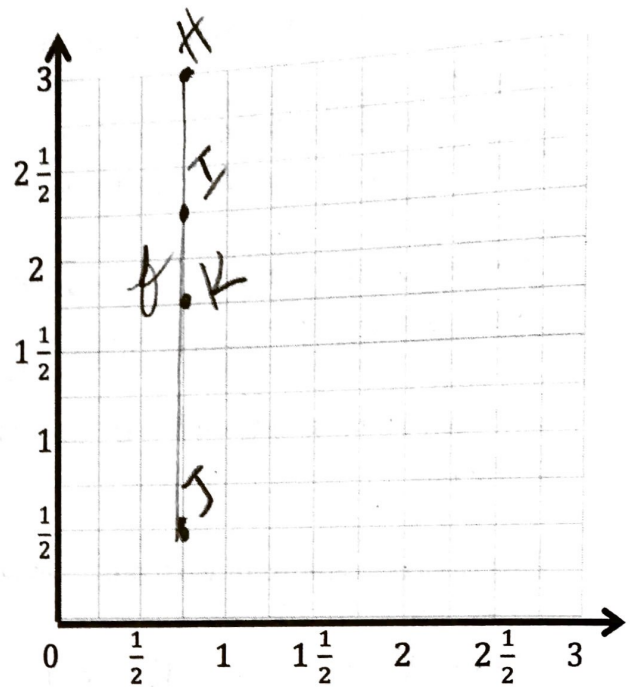
   (26, 8)

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

H: $\left(\frac{3}{4}, 3\right)$ I: $\left(\frac{3}{4}, 2\frac{1}{4}\right)$

J: $\left(\frac{3}{4}, \frac{1}{2}\right)$ K: $\left(\frac{3}{4}, 1\frac{3}{4}\right)$

a. Use a straightedge to draw a line to connect these points. Label the line f.

b. In line f, $x = \underline{\frac{3}{4}}$ for all values of y.

c. Circle the correct word:

Line f is (parallel) perpendicular to the x-axis.

Line f is parallel (perpendicular) to the y-axis.

d. What pattern occurs in the coordinate pairs that make line f vertical?

All x values are the same   3/4

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. (3.2, 7) and (5, 7)

parallel to x-axis

b. (8, 8.4) and (8, 8.8)

perpendicular to x-axis

c. $\left(6\frac{1}{2}, 12\right)$ and (6.2, 11)

neither parallel or perpendicular

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. (3.2, 8.5) and (3.22, 24)

b. $\left(13\frac{1}{3}, 4\frac{2}{3}\right)$ and $\left(13\frac{1}{3}, 7\right)$

parallel to the y-axis

c. (2.9, 5.4) and (7.2, 5.4)

perpendicular to the y-axis

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

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

a. $(2, 0)$ b. $(3, 0)$ c. $(4, 0)$

7. Leslie and Peggy are playing Battleship on axes labeled in halves. Presented in the table is a record of Peggy's guesses so far. What should she guess next? How do you know? Explain using words and pictures.

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

Peggy should guess using the 4 on the x-axis, like 4,6 or 4,3

Name _____   Date _____
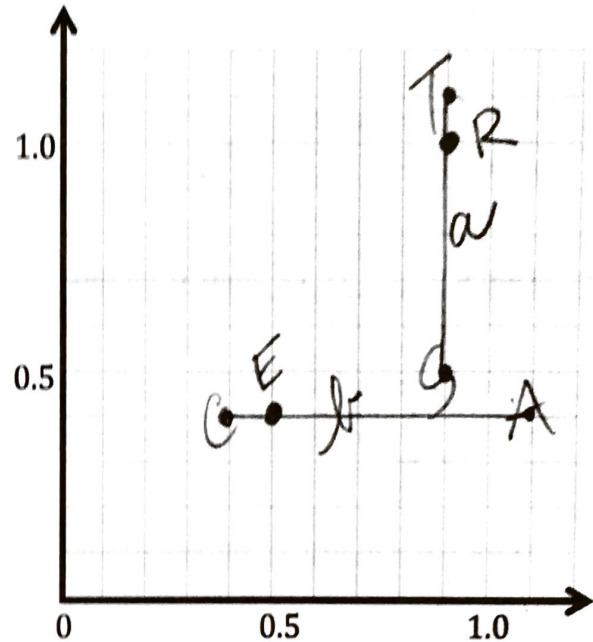
1. Plot and label the following points on the coordinate plane.

   C: (0.4, 0.4)   A: (1.1, 0.4)   S: (0.9, 0.5)   T: (0.9, 1.1)

   a. Use a straightedge to construct line segments $\overline{CA}$ and $\overline{ST}$.

   b. Name the line segment that is perpendicular to the x-axis and parallel to the y-axis.

      _____ a

   c. Name the line segment that is parallel to the x-axis and perpendicular to the y-axis.

      _____ t

   d. Plot a point on $\overline{CA}$, and name it E. Plot a point on line segment $\overline{ST}$, and name it R.

   e. Write the coordinates of points E and R.

      E (0.5 , 0.4)   R (0.9 , 1.0)

Investigate patterns in vertical and horizontal lines, and interpret points
distances from the axes.

2. Construct line m such that the y-coordinate of every point is $1\frac{1}{2}$, and construct line n such that the x-coordinate of every point is $5\frac{1}{2}$.

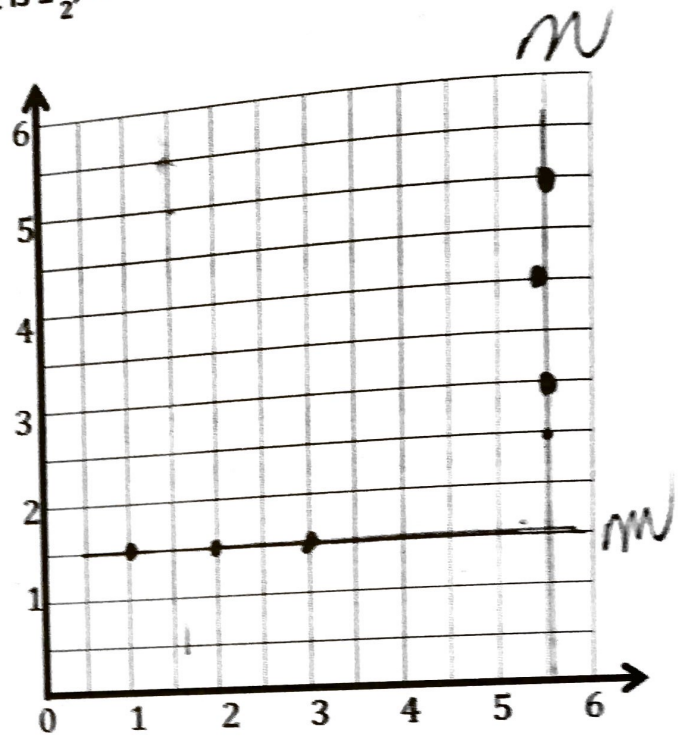a. Line m is ___$1\frac{1}{2}$___ units from the x-axis.

b. Give the coordinates of the point on line m that is 2 units from the y-axis. ___$(2, 1\frac{1}{2})$___

c. With a blue pencil, shade the portion of the grid that is less than $1\frac{1}{2}$ units from the x-axis.

d. Line n is ___$5\frac{1}{2}$___ units from the y-axis.

e. Give the coordinates of the point on line n that is $3\frac{1}{2}$ units from the x-axis.

f. With a red pencil, shade the portion of the grid that is less than $5\frac{1}{2}$ units from the y-axis.
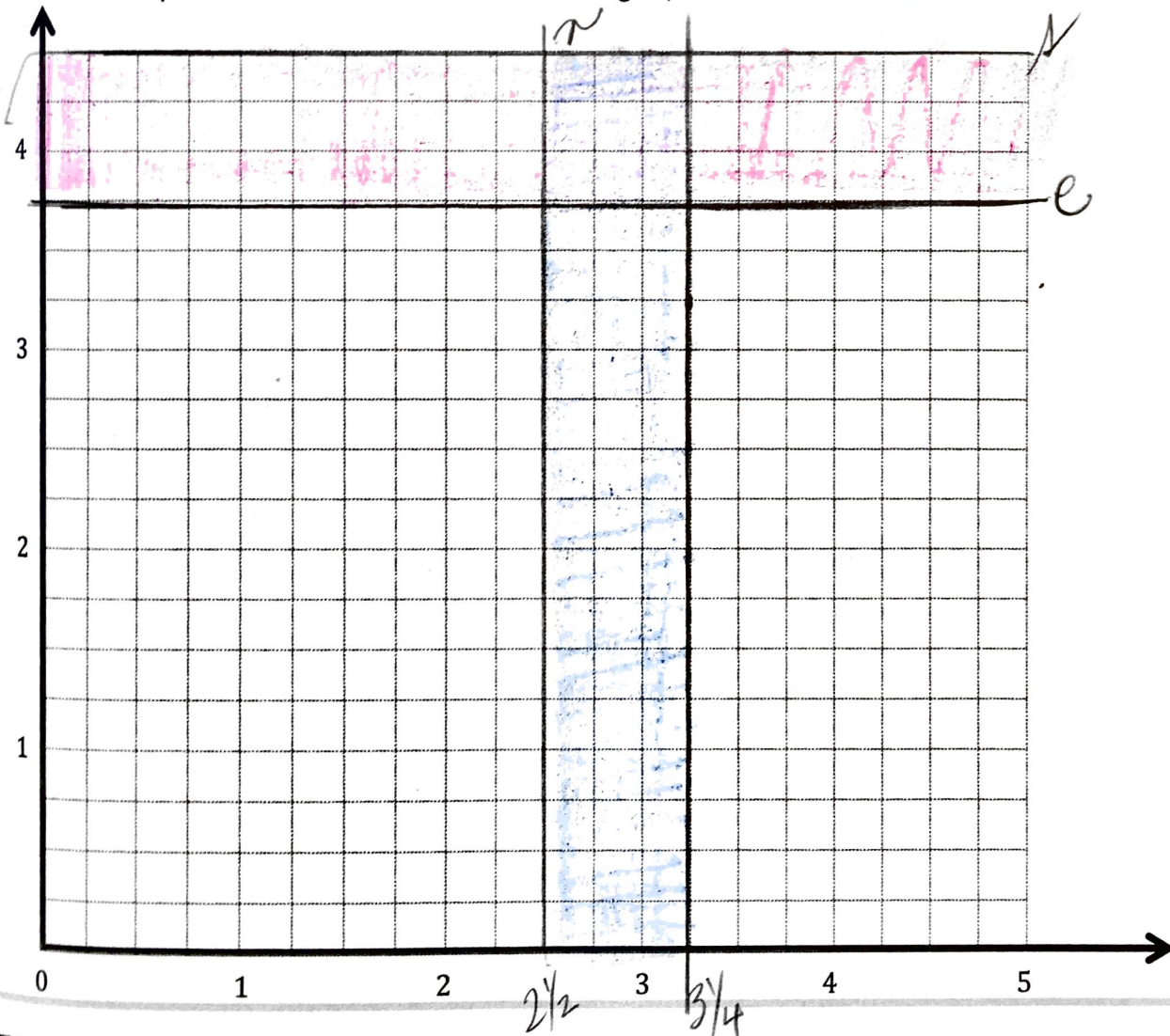
3. Construct and label lines e, r, s, and o on the plane below.

   a. Line e is 3.75 units above the x-axis.

   b. Line r is 2.5 units from the y-axis.

   c. Line s is parallel to line e but 0.75 farther from the x-axis.

   d. Line o is perpendicular to lines s and e and passes through the point $(3\frac{1}{4}, 3\frac{1}{4})$.

4. Complete the following tasks on the plane.

   a. Using a blue pencil, shade the region that contains points that are more than $2\frac{1}{2}$ units and less than $3\frac{1}{4}$ units from the y-axis.

   b. Using a red pencil, shade the region that contains points that are more than $3\frac{3}{4}$ units and less than $4\frac{1}{2}$ units from the x-axis.

   c. Plot a point that lies in the double-shaded region, and label its coordinates.

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Lesson 6:   Investigate patterns in vertical and horizontal lines, and interpret points on the plane as distances from the axes.

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Name _____   Date _____

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

x	y	(x,y)
2	0	(2,0)
$3\frac{1}{2}$	$1\frac{1}{2}$	$(3\frac{1}{2}, 1\frac{1}{2})$
$4\frac{1}{2}$	$2\frac{1}{2}$	$(4\frac{1}{2}, 2\frac{1}{2})$
6	4	(6,4)
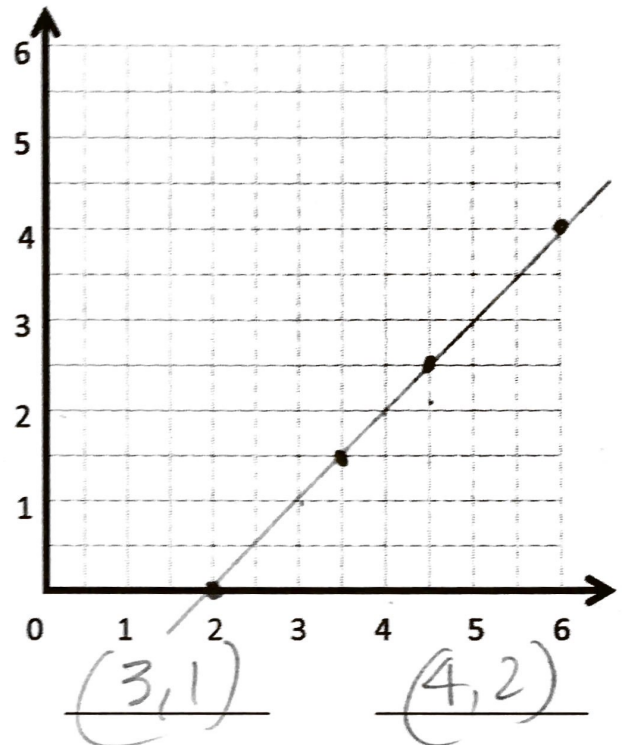
a. Use a straightedge to draw a line connecting these points.

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

y is 2 less than x

c. Name two other points that are also on this line.

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

2. Complete the chart. Then, plot the points on the coordinate plane.

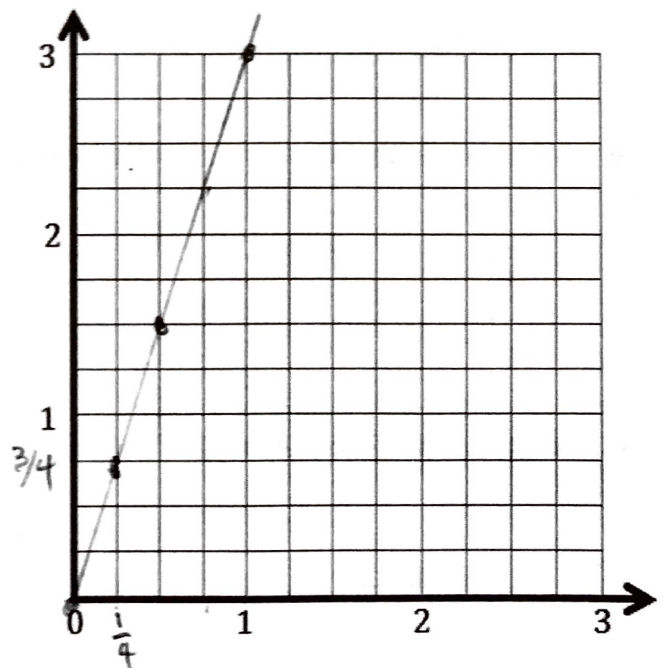| x	y	(x,y)
0	0	(0,0)
$\frac{1}{4}$	$\frac{3}{4}$	$(\frac{1}{4}, \frac{3}{4})$
$\frac{1}{2}$	$1\frac{1}{2}$	$(\frac{1}{2}, 1\frac{1}{2})$
1	3	(1,3)

a. Use a straightedge to draw a line connecting these points.

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

y is three times as much as x

c. Name two other points that are also on this line.

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

Plot points, use them to draw lines in the plane, and describe patterns

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

    a. For any point on line *m*, the *x*-coordinate is

        _10_.
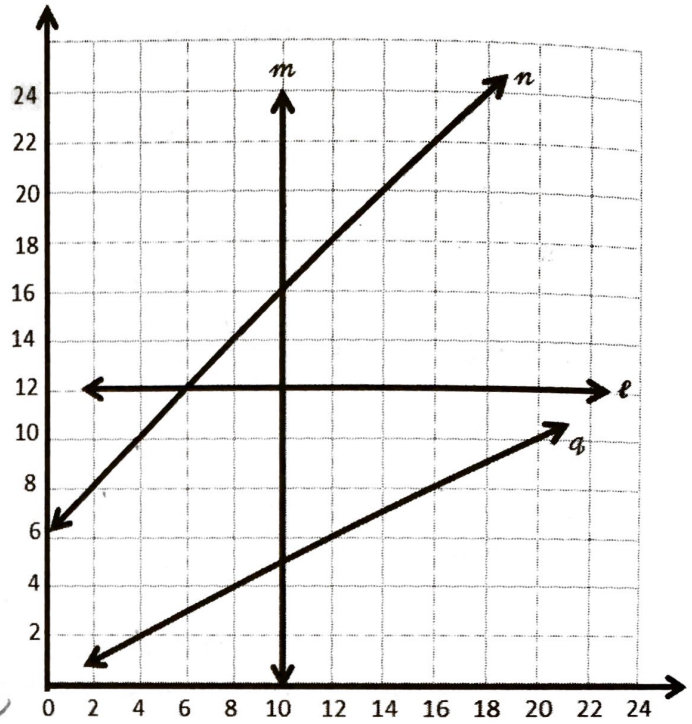
    b. Give the coordinates for 3 points that are on
        line *n*.

        $(2,8) (4,10) (6,12)$

    c. Write a rule that describes the relationship
        between the *x*- and *y*-coordinates on line *n*.

        y is 6 more than x

    d. Give the coordinates for 3 points that are on line *q*.

        $(4,2) (8,4) (16,8)$

    e. Write a rule that describes the relationship between the *x*- and *y*-coordinates on line *q*.

        y is half of x

    f. Identify a line on which each of these points lie.

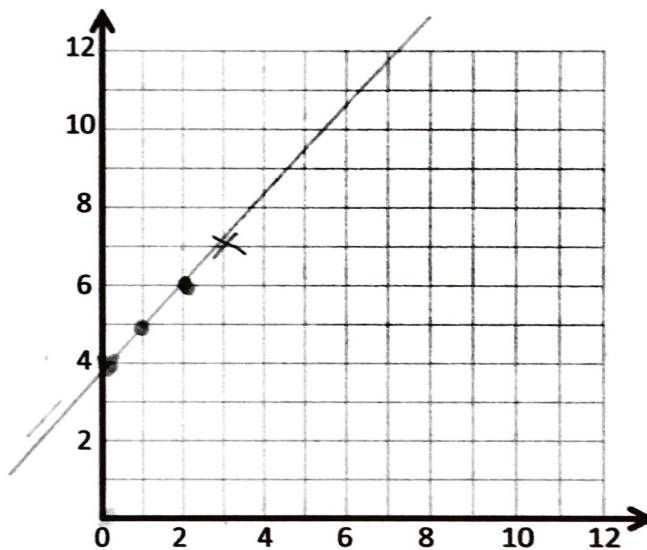   i. (10, 3.2) ___m___   ii. (12.4, 18.4) ___n___

        iii. (6.45, 12) ___ℓ___   iv. (14, 7) ___q___

Lesson 7:   Plot points, use them to draw lines in the plane, and describe patterns
within the coordinate pairs.

Name _____   Date _____

1. Complete this table such that each *y*-coordinate is 4 more than the corresponding *x*-coordinate.

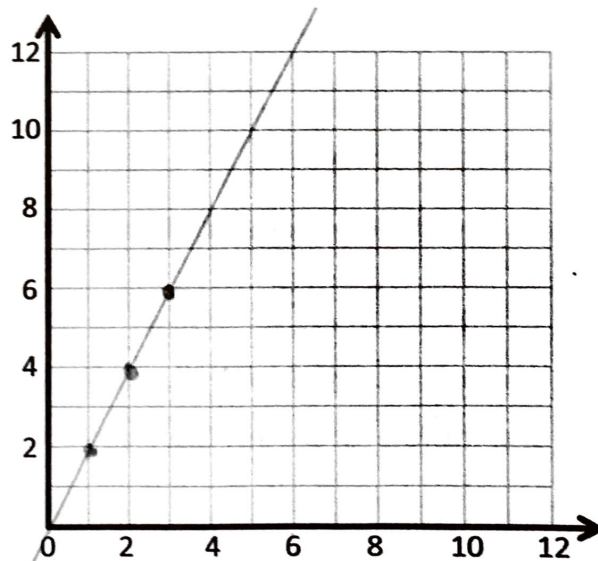| x	y	(x, y)
6	4	(0, 4)
1	5	(1, 5)
2	6	(2, 6)

a. Plot each point on the coordinate plane.

b. Use a straightedge to construct a line connecting these points.

c. Give the coordinates of 2 other points that fall on this line with *x*-coordinates greater than 18.

(3 , 5) and (4 , 7)

2. Complete this table such that each *y*-coordinate is 2 times as much as its corresponding *x*-coordinate.

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

a. Plot each point on the coordinate plane.

b. Use a straightedge 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.

(4 , 8) and (5 , 10)

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Lesson 8: Generate a number pattern from a given rule, and plot the points.

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

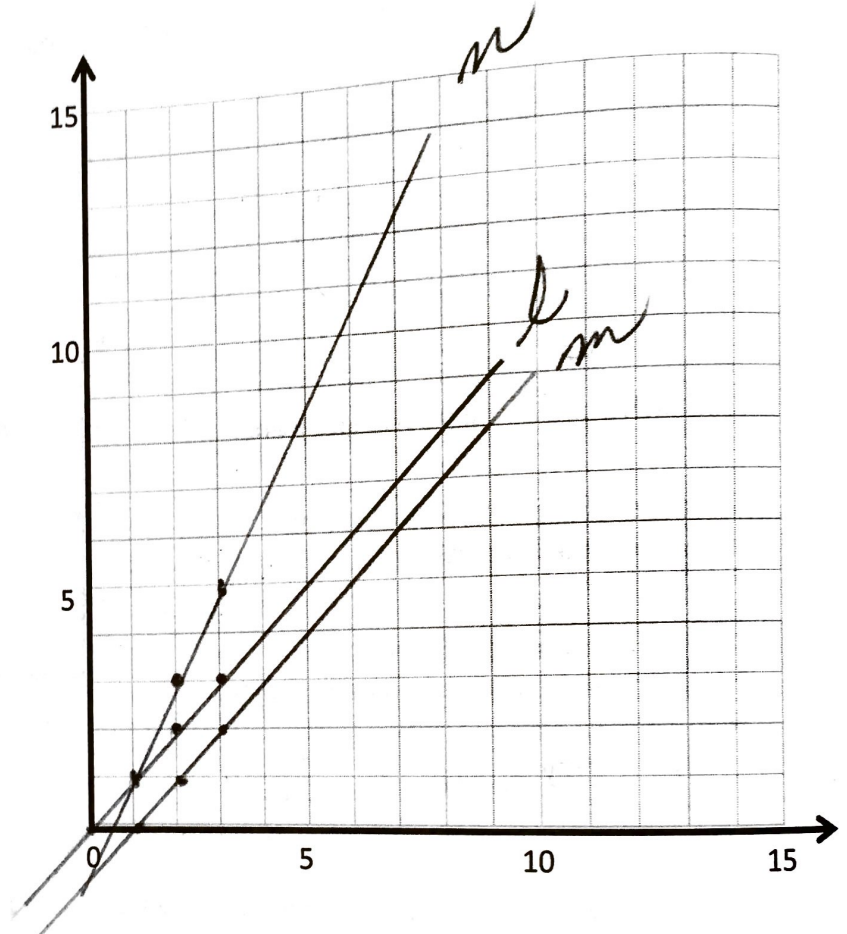   a. Graph these lines on the plane.

   line ℓ: x is equal to y

	x	y	(x, y)
A	1	1	(1,1)
B	2	2	(2,2)
C	3	3	(3,3)

   line m: y is 1 less than x

	x	y	(x, y)
G	1	0	(1,0)
H	2	1	(2,1)
I	3	2	(3,2)

   line n: y is 1 less than twice x

	x	y	(x, y)
S	1	1	(1,1)
T	2	3	(2,3)
U	3	5	(3,5)

   b. Do any of these lines intersect? If yes, identify which ones, and give the coordinates of their intersection.

   ℓ and n intersect on (1,1)

   c. Are any of these lines parallel? If yes, identify which ones.

   ℓ and m are parallel

   d. Give the rule for another line that would be parallel to the lines you listed in Problem 3(c).

   (2,0) (3,1) (4,2)
   y is 2 less than x

EUREKA

Name _____   Date _____
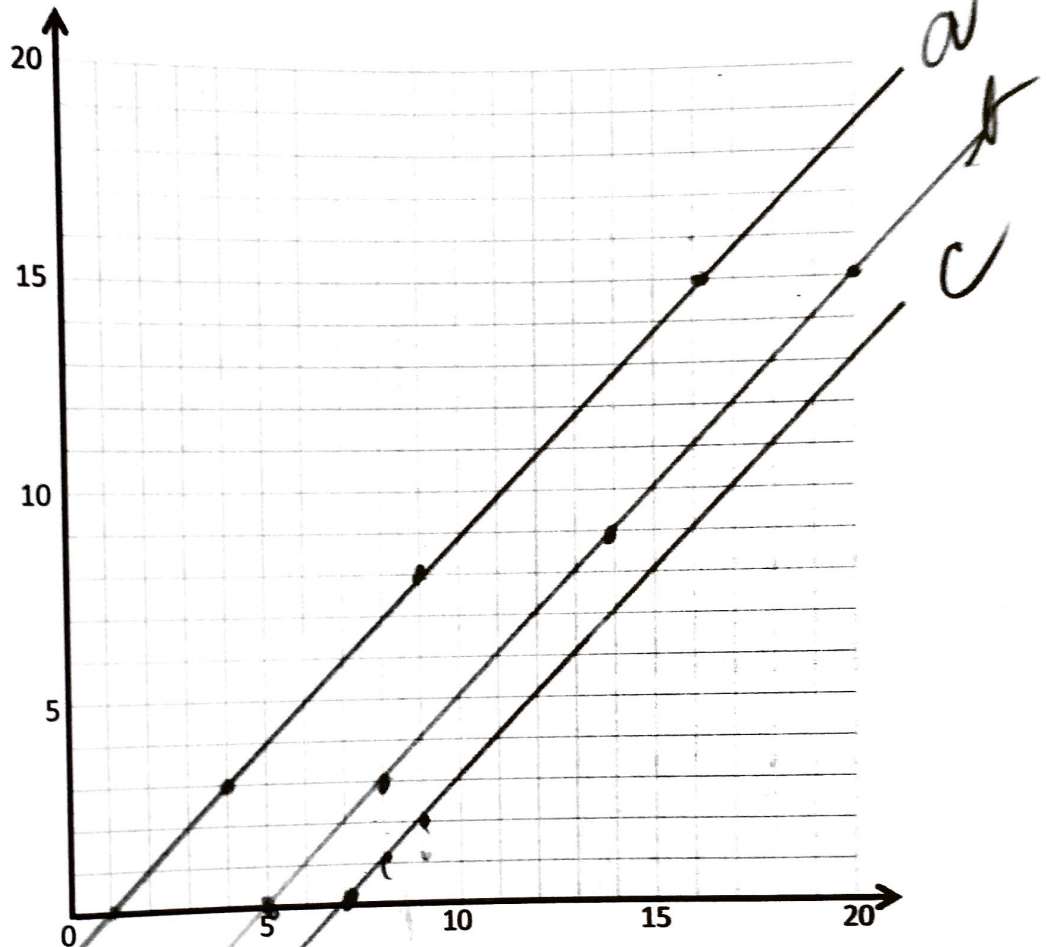
1. Complete the table for the given rules.

Line a

Rule: y is 1 less than x

x	y	(x, y)
1	0	(1, 0)
4	3	(4, 3)
9	8	(9, 8)
16	15	(16, 15)

Line b

Rule: y is 5 less than x

x	y	(x, y)
5	0	(5, 0)
8	3	(8, 3)
14	9	(14, 9)
20	15	(20, 15)

a. Construct each line on the coordinate plane.

b. Compare and contrast these lines.

a and b are parallel, and x is more than y
In a y is only 1 less than x, while
in b y is 5 less than x

c. Based on the patterns you see, predict what line c, whose rule is y is 7 less than x, would look like.
Draw your prediction on the plane above.

(7, 0) (8, 1) (9, 2)
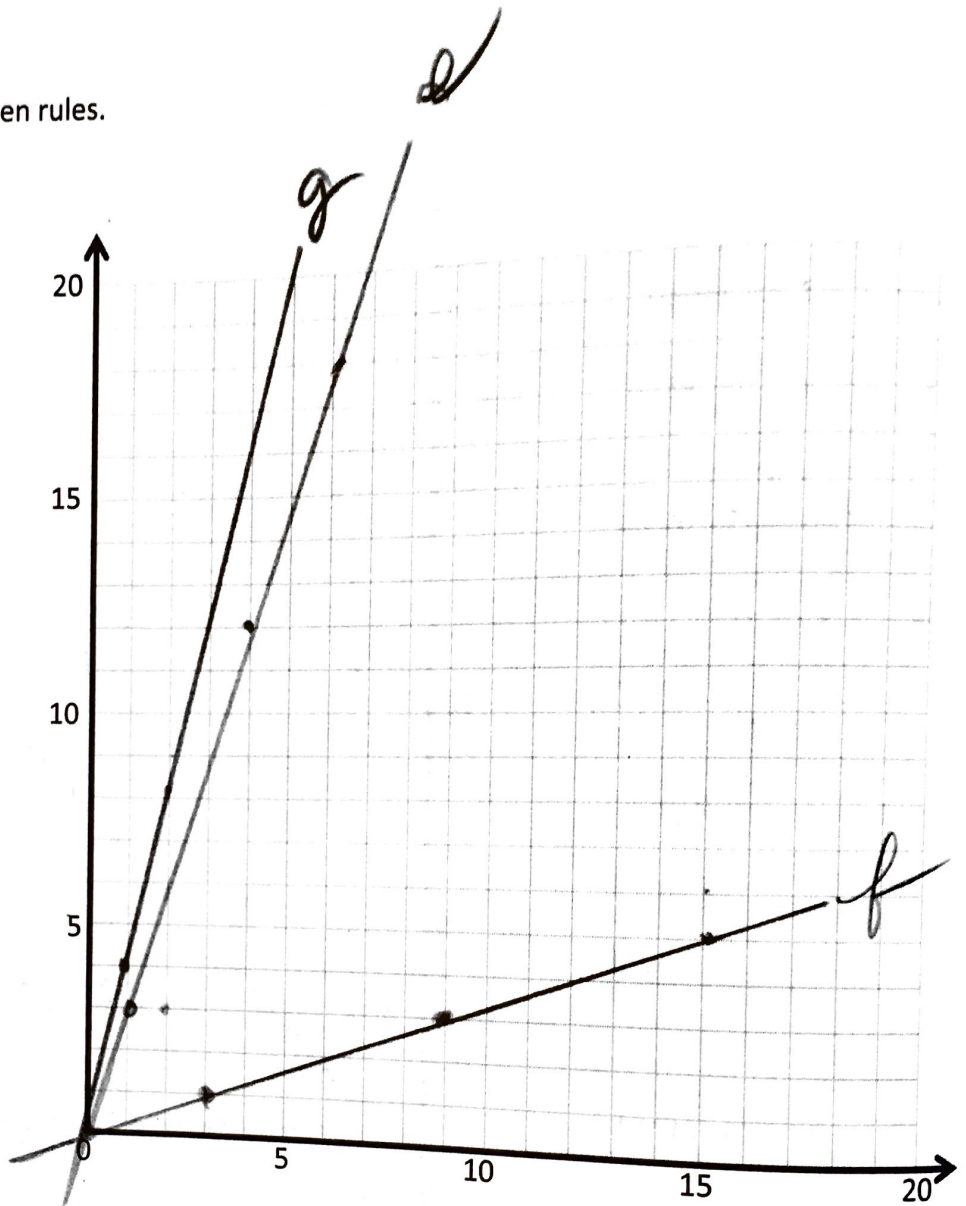
2. Complete the table for the given rules.

Line e

Rule: y is 3 times as much as x

x	y	(x, y)
0	6	(0, 0)
1	3	(1, 3)
4	12	(4, 12)
6	18	(6, 18)

Line f

Rule: y is a third as much as x

x	y	(x, y)
0	0	(0, 0)
3	1	(3, 1)
9	3	(9, 3)
15	5	(15, 5)

a. Construct each line on the coordinate plane.

b. Compare and contrast these lines.

e and f have the same origin

e and f intersect

c. Based on the patterns you see, predict what line g, whose rule is y is 4 times as much as x, and line h, whose rule is y is one-fourth as much as x, would look like. Draw your prediction in the plane above.

(0,0) (1,4) (2,8)

Lesson 9: Generate two number patterns from given rules, plot the points, and analyze the patterns.

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Name _____

Date _____

1. Use the coordinate plane 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 coordinate pairs on line d.

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

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.
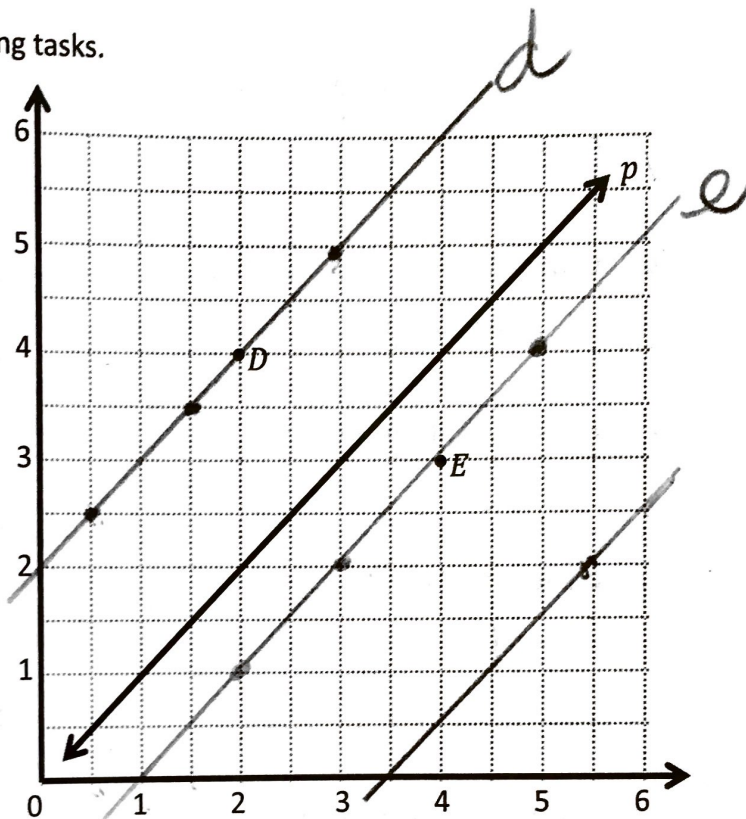
f. Name 3 points on line e.

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

g. Identify a rule to describe line e.

y is one less than x

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

d and e are parallel to p
d is above p and e is below e

2. Write a rule for a fourth line that would be parallel to those above and that would contain the point $(5\frac{1}{2}, 2)$. Explain how you know.

the lines and patterns generated by addition rules

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.

    $$(2,4) \ (3,6) \ (5,10)$$

    d. Identify a rule to describe line v.

    y is twice as much as 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 half of x

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

    v and w have the same origin as p v is steeper than p; p is steeper than w

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

    These lines intercept

Lesson 10: Compare the lines and patterns generated by addition rules and multiplication rules.

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