Review Questions for Unit 1

1. Hurricanes are powerful storms that can cause widespread damage to large areas. Hurricanes typically retain strength or gain strength when they travel over water and lose strength when they travel over land. The following data show the maximum wind speed of a hurricane six hours after it hits land.

Hours after Hitting Land	0	1	2	3	4	5	6
Maximum Wind Speed (mph)	150	138	126	114	102	90	78

a. Write a recursive rule for this pattern:

Start with 150 and subtract 12

b. Write an explicit rule for this pattern:

$y = 150 - 12x$ or $y = -12x + 150$

c. Is this an arithmetic or geometric sequence?
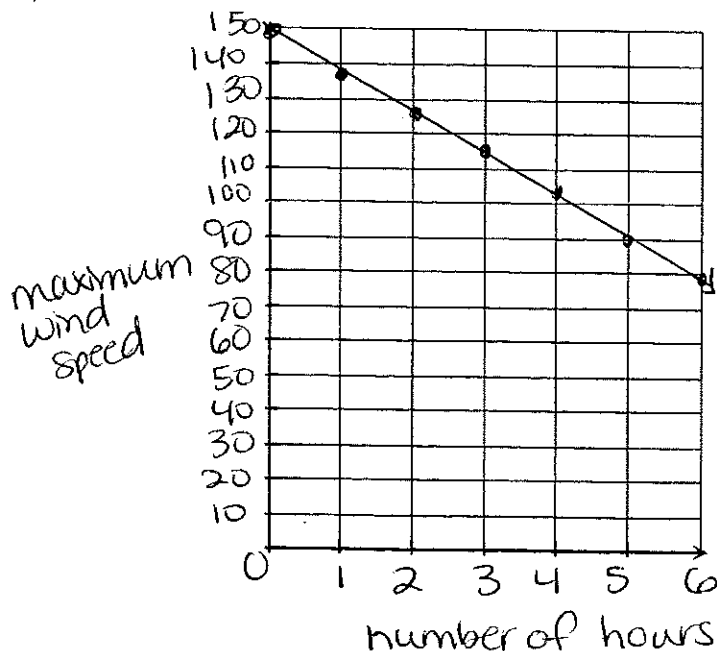
Arithmetic — constant rate of change

d. If this pattern continues, what will the maximum wind speed of the hurricane be 10 hours after it hits land?

$y = 150 - 12(10)$
$y = 150 - 120$ $y = 30 mph$

e. Use the data to make a graph. Label and scale the axes.

maximum wind speed

number of hours

2. A manufacturer of designer watches decides to build new warehouses to produce a larger quantity of watches. Due to new technology and more efficient use of resources, the manufacturer finds that operating more warehouses leads to a significant increase in watch production. The table below shows the relationship between the number of warehouses in use and the quantity of watches produced each month

Warehouses	1	2	3	4
Watches Produced each Month	40	60	90	135

a. Write a recursive rule to describe this pattern.

Start with 40 and multiply by $\frac{3}{2}$ or 1.5

b. Write an explicit rule to describe this pattern.

$y = 40(1.5)^{x-1}$ or $y = 40\left(\frac{3}{2}\right)^{x-1}$

c. Is this an arithmetic or geometric sequence?

Geometric — rate of change is not constant, but multiplied by a constant rate

d. If this pattern continues, how many watches per month will the company produce if it operates 5 warehouses?

$y = 40(1.5)^{5-1}$

$y = 40(5.0625)$

$y = 202.5$

approx. 202 watches

or $135(1.5)$ which would be the next value on the table.

Review Questions for Unit 2

1. Solve each equation for the unknown value.

a) $4c + 8c = -55 + 3c$

$$12c = -55 + 3c$$
$$\underline{-3c \qquad\qquad -3c}$$
$$\frac{9c}{9} = \frac{-55}{9}$$
$$c \approx -6.1 \text{ or } \frac{-55}{9}$$

b) $4f - 24 + 4f = -8 - 3$

$$8f - 24 = -11$$
$$\underline{+24 \qquad +24}$$
$$\frac{8f}{8} = \frac{13}{8}$$
$$f = \frac{13}{8} \approx 1.625$$

c) $5w - 7 = 2w + 1$

$$\underline{-2w \qquad -2w}$$
$$3w - 7 = 1$$
$$\underline{+7 \quad +7}$$
$$\frac{3w}{3} = \frac{8}{3}$$
$$w = \frac{8}{3} \approx 2.67$$

d) $x + 6x + 49 = 2(5x + 59)$

$$7x + 49 = 10x + 118$$
$$\underline{-7x \qquad\quad -7x}$$
$$49 = 3x + 118$$
$$\underline{-118 \qquad\qquad -118}$$
$$\frac{-69}{3} = \frac{3x}{3}$$
$$-23 = x$$

e) $3(11 + 6y) - 8y = -3$

$$33 + 18y - 8y = -3$$
$$33 + 10y = -3$$
$$\underline{-33 \qquad\qquad -33}$$
$$\frac{10y}{10} = \frac{-36}{10}$$
$$y = -3.6 \text{ or } \frac{-18}{5}$$

f) $8w - 5(5w - 8) = 13 + 5w$

$$8w - 25w + 40 = 13 + 5w$$
$$-17w + 40 = 13 + 5w$$
$$\underline{+17w \qquad\qquad +17w}$$
$$40 = 13 + 22w$$
$$\underline{-13 \quad -13}$$
$$\frac{27}{22} = \frac{22w}{22}$$
$$1.23 \approx \frac{27}{22} = w$$

g) $6\left(\frac{1}{6}x + 4 = \frac{5}{6}\right)$

$$x + 24 = 5$$
$$\underline{-24 \quad -24}$$
$$x = -19$$

h) $2\left(\frac{12 + x}{2} = 8\right)$

$$12 + x = 16$$
$$\underline{-12 \qquad -12}$$
$$x = 4$$

3. Solve the equation $\frac{2}{3}x + 2\frac{1}{6} = \frac{1}{2}x$ and check your solution. Do not change the common fractions to decimals.

$$2\frac{1}{6} = \frac{13}{6}$$

$$6\left(\frac{2}{3}x + \frac{13}{6} = \frac{1}{2}x\right)$$

$$4x + 13 = 3x$$
$$\underline{-4x \qquad\qquad -4x}$$
$$\frac{13}{-1} = \frac{-x}{-1} \qquad\qquad x = 13$$

4. The area of a trapezoid is given by the formula:

$$A = \frac{1}{2}(a+b)h.$$

A is the area of the trapezoid, *a* and *b* are the bases of the trapezoid, and *h* is the altitude (height) of the trapezoid.

✱ a. Solve the equation for *b*.

$$\frac{2A}{h} - a = b$$

b. If *a*, *b* and *h* are all measured in inches, what units would *A* be measured in?

$$inches^2$$

5. Solve for *x* and graph the solution on the number line.
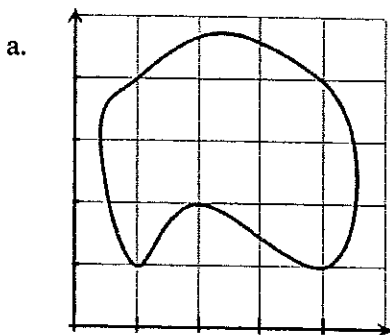
$$2x + 5 \le 6x - 3 - 2x$$

$$2x + 5 \le 4x - 3$$
$$\underline{-2x \qquad\qquad -2x}$$
$$5 \le 2x - 3$$
$$\underline{+3 \qquad\qquad +3}$$
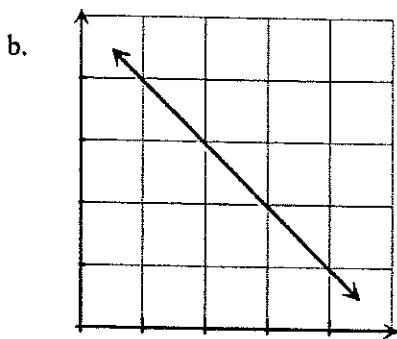$$\frac{8}{2} \le \frac{2x}{2} \qquad 4 \le x$$

Review Questions for Unit 3

1. Determine whether the graph represents a function by using the **vertical line test**.

a.

b.

Function? No

(fails the vertical line test)

Function? Yes

2. Identify whether or not the relation is a function. Write the domain and range.

$\{(2, 4), (5, 7), (-1, 3), (2, 3)\}$ Not a function

domain $\{2, 5, -1\}$ (x values)

range $\{4, 7, 3\}$ (y values)

3. given $f(x) = 3x + 5$

find: $f(-4) = \underline{-7}$

$f(-4) = 3(-4) + 5$
$= -12 + 5$
$= -7$

4. given: $f(x) = 4x + 3(x + 1) - 2x + 5$

find: $f(6) = \underline{38}$

$f(6) = 4(6) + 3(6 + 1) - 2(6) + 5$
$= 24 + 18 + 3 - 12 + 5$
$= 38$

Review Questions for Unit 4

Writing Equations of Linear Functions

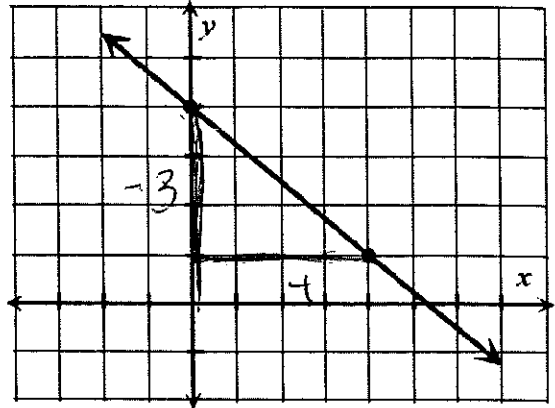Slope-Intercept Form: $y = mx + b$ Point-Slope Form $y - y_1 = m(x - x_1)$

Standard: $Ax + By = C$

1.

Find the slope of the line from the graph.

$$\frac{\text{rise}}{\text{run}} = \frac{-3}{4}$$

2.

Determine the slope and y-intercept for each equation:

a. $-x + 5y = 20$

$\quad \underline{+x \qquad +x}$

$\quad 5y = x + 20$

$\dfrac{5y}{5} = \dfrac{x + 20}{5}$

$y = \frac{1}{5}x + 4$

slope $= \frac{1}{5}$ y-intercept $= (0, 4)$

b. $y + 3 = 4(x + 5)$

$\quad y + 3 = 4x + 20$

$\quad \underline{-3 \qquad\quad -3}$

$\quad y = 4x + 17$

slope $= 4$ y-intercept $= (0, 17)$

3. Find the equation of the line that is parallel to $2x + 4y = 9$ and goes through $(6, -2)$.   slope $= \frac{-1}{2}$

point slope form $y + 2 = \frac{-1}{2}(x - 6)$

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

$\underline{-2x \qquad -2x}$

$\dfrac{4y}{4} = \dfrac{-2x + 9}{4}$

$y = -\frac{1}{2}x + \frac{9}{4}$

• parallel lines -
  same slope

4. Find the equation of the line that is perpendicular to $2x - y = 8$ and goes through $(3, 5)$.

point slope form

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

$y = -\frac{1}{2}x + 6.5$

$\underline{-2x \qquad -2x}$

$-y = -2x + 8$

$y = 2x - 8$

slope $= 2$

• perpendicular lines
  (have opposite reciprocal slopes)

**5.** Find the slope of the line that contains the points $(-1, 9)$ and $(-3, 4)$. Then write the equation of the line in slope-intercept form.

slope $\dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{9 - 4}{-1 + 3} = \dfrac{5}{2}$

2.) Graph each equation on the coordinate grid provided.

a) $y = \dfrac{2}{3}x - 3$

b) $y = \dfrac{-3}{4}x + 5$

c) $y - 2 = \dfrac{1}{2}(x - 3)$ $(3, 2)$

slope $= \dfrac{1}{2}$

d) $y + 2 = -(x - 4)$ $(4, -2)$

slope $= \dfrac{-1}{1}$

e) $2x - 4y = 8$
$ -2x -2x$
$\dfrac{-4y}{-4} = \dfrac{-2x + 8}{-4}$
$y = \dfrac{1}{2}x - 2$

f) $3x + y = 6$
$-3x -3x$
$y = -3x + 6$

Review Questions for Unit 5

1. A local ice cream shop keeps track of how much ice cream they sell versus the temperature on that day. The following table shows the temperature and ice cream sales for 12 days. Make scatterplot of the data and then draw a trend line that you feel best fits the data points. Label and scale the axes appropriately.

Temperature (°C)	Ice Cream Sales ($)
14.2	215
16.4	325
11.9	185
15.2	332
18.5	406
22.1	522
19.4	412
25.1	614
23.4	544
18.1	421
22.6	445
17.2	408
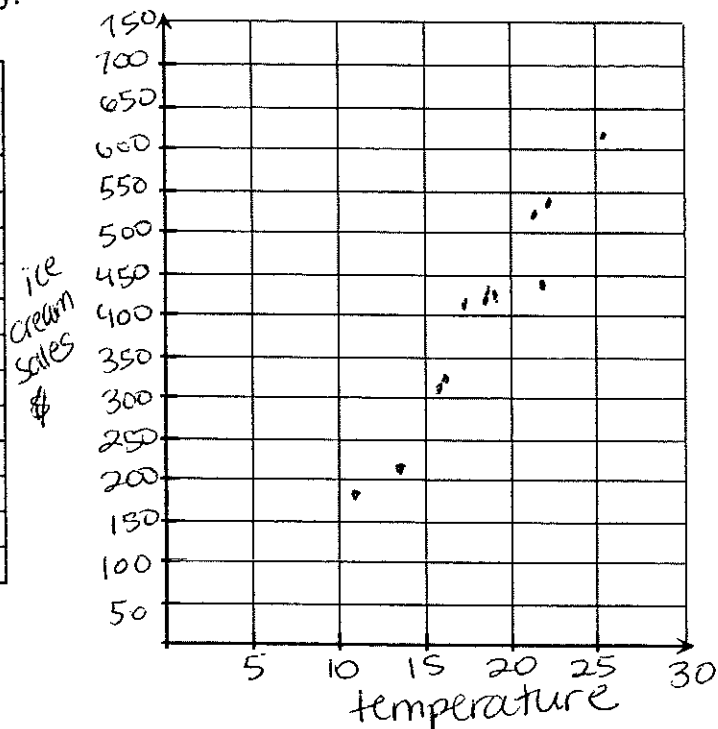
a. What is the independent variable in the problem?

temperature (°c)

b. What is the dependent variable in the problem?

ice cream sales

c. Find an equation for the trend line. You may use the regression feature on your calculator if you choose. Round the parameters to the nearest 0.1

$$y = 30.1x - 159.5 \quad (regression)$$

d. What is the slope of the trend line? What does the slope represent in the context of the problem?

slope = 30.1   ice cream sales increase by $30.10 for each 1°C increase in temperature

e. What is the y-intercept of the trend line? What does the y-intercept represent in the context of the problem?

y-intercept = ⁻159.5   when temperature is 0°C, the ice cream sales are ⁻$159.50 (this does not make sense)

f.   Describe the strength and direction of the correlation in the scatterplot.

   $r = 0.9575$ strong positive

g.   Use your equation to predict the total ice cream sales when the temperature is 21.3 °C. Is this an example of interpolation or extrapolation? Explain.

   $y = 30.1 (21.3) - 159.5$ $y = 481.63$
   $= 641.13 - 159.5$ (interpolation)

h.   Use your equation to determine the temperature if the sales were $450.

   $450 = 30.1 (x) - 159.5$
   $+159.5 \qquad\qquad +159.5$
   $609.5 = 30.1 x$ $20.25 °C$
   $\overline{30.1} \qquad \overline{30.1}$
   $20.25 = x$

2.   The following data represent the number of text messages sent in one day by a group of students:

   [3, 5, 7, 12, 13, 14, 21, 23, 23, 23, 23, 29, 39, 40, 56]

a.   To the nearest 0.1 what is the mean number of text messages sent by the students?

   mean = 22.1

b.   What is the mode number of text messages sent by the students?

   mode = 23

c.   What is the median number of text messages sent by the students?

   median = 23

d.   What is the range in the number of text messages sent by the students?

   range = 56 - 3 = 53

e.   What is the interquartile range (IQR) for the number of text messages sent by the students?

   IQR = 29 - 12 = 17

f.   Which number text messages appears to be an outlier? Use the 1.5*IQR rule to check to see if there are any outliers.

   $1.5(17) = 25.5$ $29 + 25.5 = 54.5$
   (IQR) $12 - 25.5 = ^-13.5$

   56 is an outlier

g.   If the outlier is eliminated which statistic will change more, the mean or median? Explain.
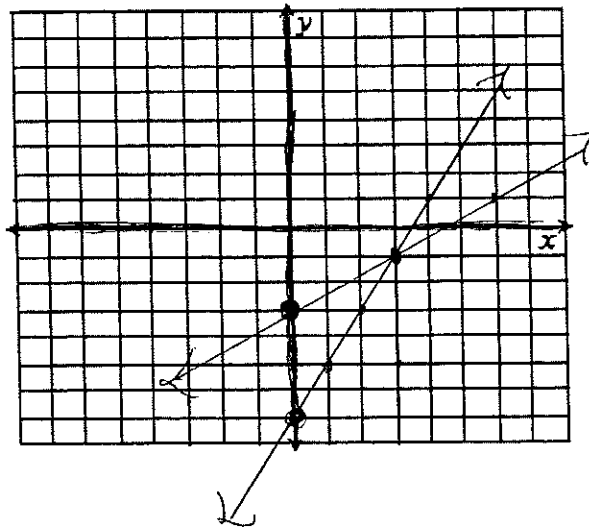
   mean - affected by extremely high or low values

Review Questions for Unit 6

1. Solve the system by graphing

$$y = 2x - 7$$

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

$(3, -1)$

2. Solve the system of equations.

a.

$$-3 \left(x + 2y = 9 \right) \quad (0, 9/2)$$

$$3x + 4y = 18$$

$$-3x - 6y = -27$$
$$\underline{3x + 4y = 18}$$
$$\frac{-2y}{-2} = \frac{-9}{-2}$$

$$y = 9/2$$

$$x + 2y = 9$$
$$x + 2\left(\frac{9}{2}\right) = 9$$
$$\underline{x + 9 = 9}$$
$$\underline{\quad -9 \quad -9}$$

$$x = 0$$

b.

$$x = 3y + 9 \quad (-3, -4)$$
$$6x - 5y = 2$$

$$6(3y + 9) - 5y = 2$$
$$18y + 54 - 5y = 2$$
$$13y + 54 = 2$$
$$\underline{-54 \quad -54}$$
$$\frac{13y}{13} = \frac{-52}{13}$$
$$y = -4$$

$$x = 3(-4) + 9$$
$$x = -12 + 9$$
$$x = -3$$

c.

$$3\left(5x + 4y = -30 \right) \quad (-6, 0)$$
$$-5\left(3x - 9y = -18 \right)$$

$$15x + 12y = -90$$
$$\underline{-15x + 45y = 90}$$
$$\frac{57y}{} = 0$$
$$y = 0$$

$$5x + 4y = -30$$
$$5x + 4(0) = -30$$
$$5x + 0 = -30$$
$$\frac{5x}{5} = \frac{-30}{5}$$
$$x = -6$$

3. You are planning a party for your friends. You need to buy enough cupcakes and drinks for your guests. You have invited 20 people. You determined that cupcakes cost $0.40 and drinks cost $0.80 each. You have $12.00 to spend on the cupcakes and drinks. How many cupcakes and how many drinks should you buy?

10 cupcakes $c = \#$ cupcakes
10 drinks $d = \#$ drinks

$$c + d = 20$$
$$0.40c + 0.80d = 12.00$$