

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 @ 150 & Subtract 12 from the previous term.

- b. Write an explicit rule for this pattern:

$$a_n = 150 - 12n$$

- c. Is this an arithmetic or geometric sequence?

Constant Decrease

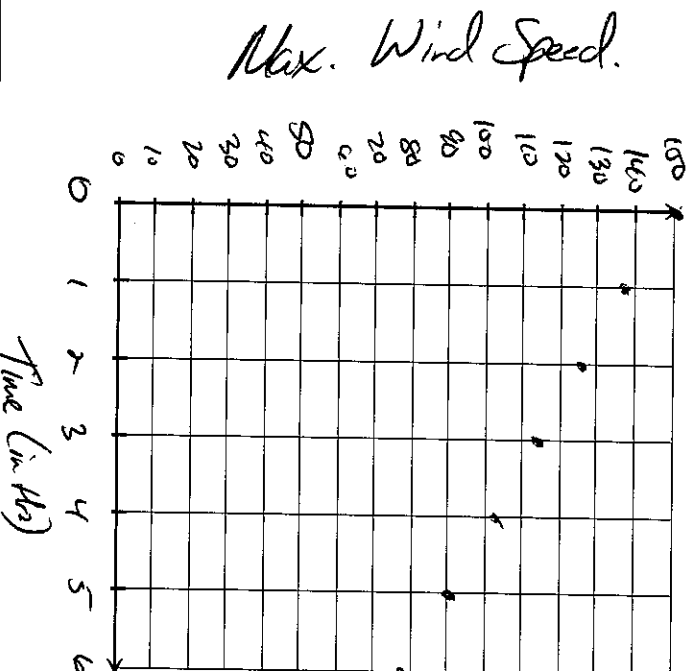
$$a_n = a_0 + dn$$

$$a_n = a_1 + d(n-1)$$

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

$$150 - 12(10) = 30$$

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



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.

Multiply the previous term by $1\frac{1}{2}$ (or 1.5)

$$g_n = g_{(n)}^{\wedge}$$

$$g_n = g_{(n-1)}^{\wedge}$$

- b. Write an explicit rule to describe this pattern.

$$g_n = 40(1\frac{1}{2})^{n-1}$$

- c. Is this an arithmetic or geometric sequence?

Construct Multiplier $1\frac{1}{2}$

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

$$g_5 = 40(1.5)^{5-1}$$

$$g_5 = 202.5$$

So 202 or 203.

Review Questions for Unit 2

1. Stephanie is a software developer who develops Apps (mobile device programs) for smart phones and tablet computers. Stephanie is very creative and very efficient so her services are in high demand. She is offered two new job opportunities and is considering which opportunity to select.

Opportunity 1 – She earns a fixed monthly salary of \$4000 and a payment of \$900 for each App she develops during the month.

Opportunity 2 – She earns a fixed monthly salary of \$6000 and a payment of \$450 for each App she develops during the month.

- Identify a variable for the number of Apps she develops each month.
- Write an expression for Opportunity 1.
- Write an expression for Opportunity 2.
- Write an equation to find the number of Apps Stephanie would develop to earn the same amount with both opportunities.
- Solve the equation in (d). Round your answer to the nearest 0.01.
- Interpret your answer in the context of this problem.

2. a. Solve the equation $3(x - 6) = 6x + 24$. Show all of your work and explain which property of equality you use in each step.

$$\begin{array}{r}
 3x - 18 + 6x + 24 \\
 \hline
 -3x \quad -18 + 6x + 24 \\
 -18 + 6x + 24 \\
 \hline
 3x + 24 \\
 -14 = x
 \end{array}$$

$-42 = 3x$
 $-14 = x$
 $3(-14) = 6(-14) + 24$
 $-60 = -60$ ✓

- b. Identify two factors on the left side of the equation in 2(a).

$$3 + x - 6$$

- c. Identify a coefficient on the right side of the equation in 2(a).

$$6$$

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.

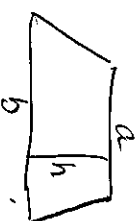
$2 + \frac{1}{6}$

$6x \left[\frac{2}{3}x + \frac{13}{6} = \frac{1}{2}x \right]$

$4x + 13 = 3x$
 $-4x \quad -4x$
 $13 = -x$
 $x = -13$

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.

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

- a. Solve the equation for b .

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

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

in²

✓ THE ANSWER IS INCHES!
 FOR MUCH!

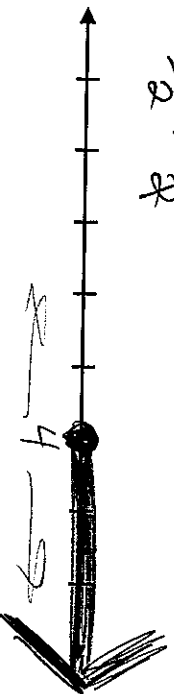
5. Solve for x and graph the solution on the number line.

$2x + 5 \leq (6x) - 3 \leq (2x)$
 $2(10) + 5 \leq 6(10) - 3 - 2(10)$

$2x + 5 \leq 4x - 3$
 $-2x \quad -2x$
 $5 \leq 2x - 3$
 $+3 \quad +3$
 $8 \leq 2x$
 $\frac{8}{2} \leq \frac{2x}{2}$

$25 \leq 37$

$4 \leq x$ which means
 $x \geq 4$

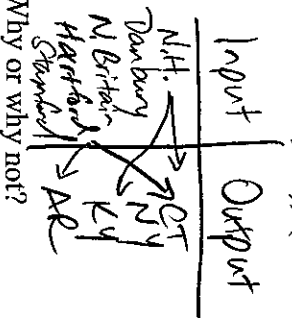


Review Questions for Unit 3

1. Consider the following relationship represented as a set of ordered pairs.

{ (New Haven, CT), (Danbury, CT), (New Britain, CT), (Hartford, CT), (Stamford, NY), (New Haven, KY), (Hartford, AR) }

a. Represent the relation using a table.



b. Is this relation a function? No Why or why not?

c. What is the domain?

$D: \{ \text{New Haven, Danbury, ...} \}$

d. What is the range?

$R: \{ \text{CT, NY, KY, AR} \}$

2. Consider the relationship between the New England states and the number of letters in the name of each state as shown in the table.

a. Represent this relation using mapping diagram.

State	Number of letters
Maine	5
New Hampshire	12
Vermont	7
Connecticut	11
Massachusetts	13
Rhode Island	11

b. Represent this relation using a set of ordered pairs.

$(ME, 5), (NH, 12), (VT, 7), (CT, 11), (MA, 13), (RI, 11)$

c. Is this relation a function? Yes Why or why not? Each input has one output

d. What is the domain? $D = \{ ME, NH, VT, CT, MA, RI \}$

e. What is the range? $R = \{ 5, 7, 11, 12, 13 \}$

Increasing Order, No Repeats

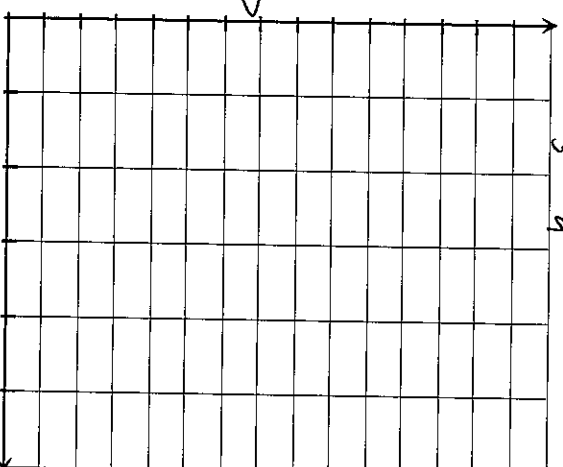
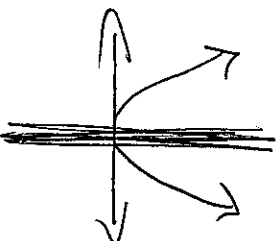
3. Consider the relationship between a real number and its square.

a. Express this relation using an equation.

X	Y
0	0
1	1
2	4
3	9

$y = x^2$

b. Graph this relation using an equation. Label and scale the axes.



c. Is this relation a function? _____
Why or why not?

d. What is the domain?

x can be all real #'s

e. What is the range?

$y \geq 0$

4. A compact disc is read at 44.1 kHz (kilohertz). This means that a CD player scans 44,100 samples of sound per second on a CD to produce the sound you hear. The function $S(t) = 44.1t$ describes the number of samples of sound, $S(t)$, in thousands, that are scanned in t seconds.

a. How many samples of sound are scanned after 30 seconds?

$$S(30) = 44.1(30)$$

$$S(30) = 1323 \text{ (thousands)}$$

b. How many samples of sound are scanned after 2 minutes?

$$S(120) = 44.1(120)$$

$$S(120) = 5292 \text{ (thousands)}$$

c. How long would it take the CD player to scan 1,764,000 samples of sound?

$$1764 = 44.1t \quad t = 40$$

d. Would negative numbers be in the domain of this function? No Explain.

No, Negative time doesn't make sense.

e. Find t so that $S(t) = 882$ and explain what this means in the context of this problem.

$$\frac{882 = 44.1t}{44.1} \quad \frac{44.1t}{44.1}$$

$$t = 20$$

5. According to an FBI Fact sheet, IAFIS (Integrated Automated Fingerprint Identification System) searches fingerprints of over 74 million subjects in the National Criminal History Record File. In 2012, IAFIS processed 58 million fingerprint submissions. Express IDAFIS software can compare 85 million fingerprints per second. The capability of fingerprint software varies in each state. Suppose a state has a fingerprint identification system that compares 90,000 fingerprints per second.

The function $F(s) = 90s$ describes the number of fingerprints (in thousands) that can be compared in s seconds.

- a. How many fingerprints can be compared in 15 seconds?

$$F(s) = 90(s) = \overset{s}{1350} \quad F(15) = 1350$$

- b. How long would it take the fingerprint identification system to compare 1,500,000 fingerprints?

$$1500 = 90s \quad s = 16.\bar{6}$$

- c. Find $F(9)$ and explain what it means in the context of this problem.

$$F(9) = 90(9) = 8100$$

IAFIS can compare 810,000 fingerprints.

- d. Find s so that $F(s) = 1920$ and explain what it means in the context of this problem.

$$1920 = \frac{90s}{90} \quad s = 21\bar{3}$$

In 21.3 seconds, IAFIS can compare 1,920,000 fingerprints.

- e. Suppose we need to compare all 74 million fingerprints in the National Criminal History File. How long would it take to process this request? Express your answer in minutes and round to the nearest 0.1 minute.

$$74,000,000$$

$$\frac{74000000}{90} = \frac{90s}{90}$$

$$822.2 \text{ sec}$$

$$\text{or } 13.7 \text{ minutes}$$

$$13 \text{ minutes } 42 \text{ sec}$$

Review Questions for Unit 4

1. Determine which of these tables could represent a linear function. Explain your reasoning. (There may be more than one correct answer)

a.

x	y
-3	-4
0	-1
3	1
6	2
9	2

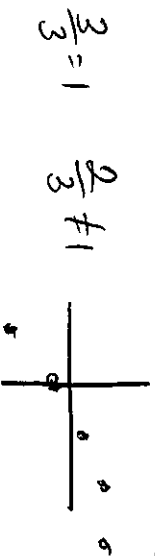
+3 < < < < <
> +3 > +2

b.

x	y
-5	10
0	8
1	6
2	4
3	2

c.

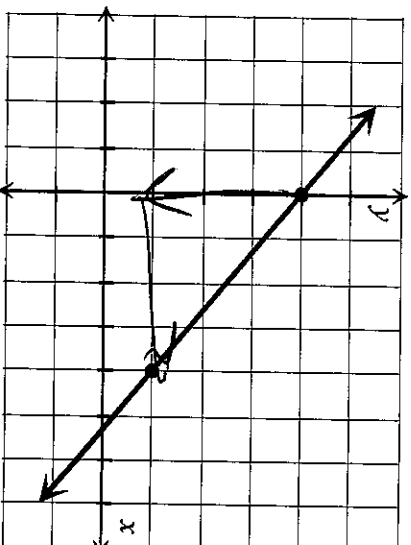
x	y
-4	15
-2	9
0	3
1	0
2	-3



2. Find the slope of the line from the graph.

$$M = \frac{y_2 - y_1}{x_2 - x_1}$$

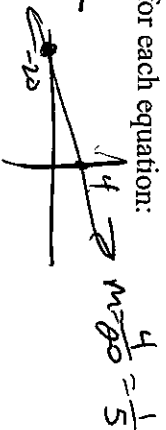
$$M = \frac{-3}{4}$$



3. Determine the slope and y-intercept for each equation:

a. $-x + 5y = 20$

X	y
0	4
-20	0



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

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

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

$$y = 4x + 17$$

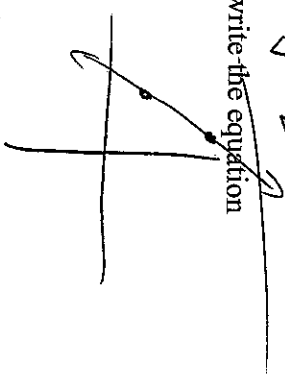
4. Find the equation of the line that is parallel to $2x + 4y = 9$ and goes through $(6, -2)$.

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

$$y = 2x - 8 \quad m = -\frac{1}{2} \quad -2x \quad -y = -2x + 8 \quad y = -\frac{1}{2}(x - 3) + 5$$

6. 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.

$$y = \frac{5}{2}(x + 3) + 4 \quad \frac{4-9}{-3-1} = \frac{-5}{-2} = \frac{5}{2}$$



7. A florist is planning to spend \$400 on table decorations for a wedding. She plans to use roses and orchids. Rose centerpieces cost \$20. Orchid centerpieces cost \$15.

Let x represent the number of rose centerpieces and let y represent the number of orchid centerpieces.

- a. Write an equation in standard form showing how the \$400 can be spent.

$$20x + 15y = 400$$

- b. Rewrite the equation in slope-intercept form.

$$15y = \frac{-20x + 400}{15} \quad y = -\frac{4}{3}x + 26\frac{2}{3}$$

8. The Aqua Fun Company determined that when it priced a new pool toy at \$4 each it sold $(\$4, 20,000)$ 20,000 toys per day during the summer. When it increased the price to \$6 each, the sales dropped to 15,000 toys per day. Use ordered pairs of the form (sale price, number of pool toys sold) to answer the following questions.

- a. Assume that the relationship between the price and the number of pool toys sold is linear and write an equation that describes the relationship.

$$y = -2500(x - 4) + 20000 \quad \text{or} \quad y = -2500x + 30,000 \quad m = \frac{15000 - 20000}{6 - 4}$$

- b. What are the daily sales of pool toys if they are priced at \$4.50 each?

$$y = -2500(4.5) + 30,000 = 18,750$$

$$m = \frac{-5000}{2} = -2500$$

- c. Identify and interpret the slope in the context of the problem.

For every \$1 increase, the best sales is 2500.

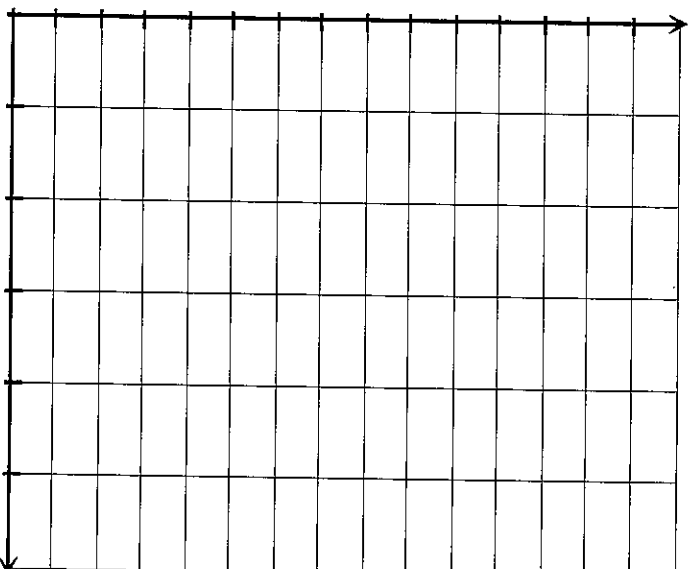
- d. Identify and interpret the y -intercept in the context of the problem.

$(0, 30,000)$ If they give them away, they'll "sell" 30,000.

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



$$y = ax + b$$

slope a y -intercept b

- a. What is the independent variable in the problem? *Temp*
- 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

$$y = 30x - 159$$

- d. What is the slope of the trend line? What does the slope represent in the context of the problem?
30 $\frac{\text{rise}}{\text{run}}$ $\frac{\Delta y}{\Delta x}$ *that's \$30 increase for every 1° increase*
- e. What is the y-intercept of the trend line? What does the y-intercept represent in the context of the problem?
-159 *at 0°, -159*