

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

0.957 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

$$y = 30(21.3) - 159$$

$$y = \$480$$

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

$$450 = 30x - 159$$

$$20.3^{\circ}\text{C}$$

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]

$n = 15$
of data entries

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

$$\bar{x} = 22.1$$

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

23

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

23

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

$$56 - 3 = 53$$

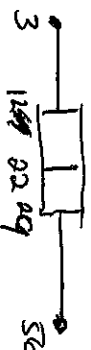
e. What is the interquartile range (IQR) for the number of text messages sent by the students?



$$29 - 12 = 17$$

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.

$$1.5 \times \frac{17}{25.5}$$



g. If the outlier is eliminated which statistic will change more, the mean or median? Explain.

SE is an outlier

Old New

Mean 22.1 19.6

Median 23 22

Mean changed more.

$$29 + 25.25 = 54.25$$

$$12.5 - 25.25 = -12.75$$

Review Questions for Unit 6

Solve problems 1–3 algebraically using either substitution or elimination.

1. Meryl Streep is the most nominated performer of all time with numerous nominations for Best Actress and Best Supporting Actress. Kathryn Hepburn has been nominated for Best Actress almost as many times as Meryl Streep. Meryl Streep has $\frac{7}{6}$ the number of Best Actress nominations that Kathryn Hepburn has. Together they have 26 nominations for Best Actress.

How many times has Meryl Streep & Kathryn Hepburn been nominated for Best Actress?

$$\begin{aligned}
 MS &= \frac{7}{6} \cdot KH \\
 MS + KH &= 26 \\
 6 \left(\frac{7}{6} KH + KH = 26 \right) \\
 7KH + 6KH &= 156 \\
 13KH &= 156 \\
 KH &= 12 \quad MS = 14
 \end{aligned}$$

2. Each summer households that heat with oil need to decide if they should buy the oil they think they will need for the coming winter season or whether they should just pay for each delivery they get it in the fall, winter and early spring. (In the winter, oil prices usually go up quite a bit.)

In the summer of 2012, the Baldwins contacted two oil companies. Both required that a customer have a burner protection plan (pays for the annual furnace cleaning and service calls) if they plan to pre-buy oil. Meyer Oil Company charges \$287 for a burner protection plan and \$3.499 per gallon for pre-bought oil. Emerald Oil Company charges \$275 for a burner protection plan and \$3.519 per gallon for pre-bought oil.

- a. How many gallons of pre-bought oil would the Baldwin's need to purchase in order to have both plans cost the same amount of money?

$$\begin{aligned}
 287 + 3.499x &= 275 + 3.519x \\
 12 &= 0.02x \quad \cdot X = 600
 \end{aligned}$$

- b. In April 2013, the Baldwin's realized they had used all 815 gallons they had pre-purchased in July 2012. They had decided to go with the Meyer Oil Company. Had they made the correct decision that July? Explain.

3. Together a 20-ounce Pepsi and a 20-ounce Coke have 134 grams of sugar. A 20-ounce Coke has 4 fewer grams of sugar than a 20-ounce Pepsi. How many grams of sugar are in a 20-ounce Pepsi? How many grams of sugar are in a 20-ounce Coke?

$$P + C = 134$$

$$C = P - 4$$

$$P + P - 4 = 134$$

$$2P - 4 = 134$$

$$2P = 138$$

$$P = 69$$

4. Now return to problem 2 and solve it graphically (either by hand or using technology). When you graph, you should have 2 intersecting lines. What are the coordinates of the point of intersection? What is the significance of the x-coordinate of the intersection point in terms of the context of this problem? What is the meaning of the y-coordinate of the intersection point in this context?

Don't worry too much
about graphing these.
However, if you need
to graph them, these
are available graphs
at the end of
this packet.

Best Method: Graphing App/Tool

5. Now return to problem 3 and solve it graphically. Technology should be used here. Explain the meaning of the x- and y- coordinates of the intersection point in the context of this problem.

Review Questions for Unit 7

1. Identify which table could represent a linear function, which table and exponential function, and which table neither. Explain your reasoning.

a.

x	y
0	20
3	13
6	6
9	-1

Linear
Constant Rate of Change $-\frac{7}{3}$

b.

x	y
0	12
2	12
4	12
6	12

Neither
Not a Constant Change

c.

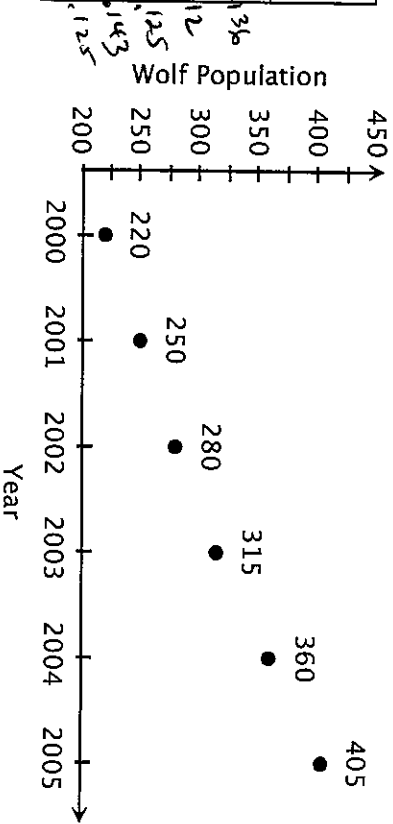
x	y
0	40
1	20
2	10
3	5

Exponential
 $y = 40(\frac{1}{2})^x$

2. In the last century western gray wolves were placed on the endangered species list. But after a few years the population began to grow again. Biologists believe that the population fits an exponential model of the form $P = ab^t$ where P is the population of wolves and t is the number of years since 2000.

- a. Use the data in the table below (which gives the wolf population in the state of Michigan) and the graph to estimate values of the parameters a and b . You may use a graphing calculator if you choose.

Year	Wolf Population
2000	220
2001	250
2002	280
2003	315
2004	360
2005	405



$y = 220(1.13)^x$

- b. Use your model to predict the wolf population in the year 2010.

146.8
 147
 10

3. Lamar's uncle gave him \$500 and told him to save it to buy a car when he is old enough to drive. He put the money in a savings account that pays 4% interest compounded annually. He wanted to know how much interest he would earn after 3 years. So he found the value by calculating $500 \cdot (0.04)^3 = 0.032$. He was amazed that he would earn only slightly more than 3 cents! What went wrong? Explain his error and calculate the amount of interest correctly.

He should have done
 $500(1 + 0.04)^3 = 562.43$

4. From approximately 1947 to 1977, General Electric Company (GE) discharged PCBs from its capacitor manufacturing plants at Hudson Falls and Fort Edward into the Hudson River. It was only many years later that the Environmental Protection Agency (EPA) reached an agreement with GE to start cleaning up the river. In the meantime, the EPA monitored fish in the river to determine the level of PCBs. The concentration (in mg/kg) of PCBs in brown bullheads was found to be modeled by the function $y = 62 \cdot 0.927^x$ where x is the number of years since 1980.

- a. What does 62 represent in the context of this problem?

Beginning Amount of PCBs (in mg/kg)

$$1 - r = 0.927$$

- b. What does 0.927 represent in the context of this problem?

It represents that the decay rate is 7.3%.

$$\frac{-1}{-r = -0.073}$$

- c. By approximately what percent did the concentration of PCBs decay each year?

7.3%

$r = 0.073$
which is 7.3%

- d. What was the concentration of PCBs in 2002 when the cleanup began?

$$62(0.927)^{22} = 11.7 \quad x=22$$

11.7 mg/kg

- e. If they had never started cleaning up the river, what would the concentration of PCBs be in 2013?

$$62(0.927)^{33}$$

5.08 mg/kg

5. The value of a government bond, in dollars, is given by the function $y = 1000 \cdot 1.06^x$ where x is the number of years the bond has been held.

- a. How much was the bond originally worth? \$1,000

- b. What is the annual rate of interest? 6%

$$1.06 = 1 + r$$

$$r = 0.06 = 6\%$$

- c. Approximately how many years will it take the original investment to double in value?

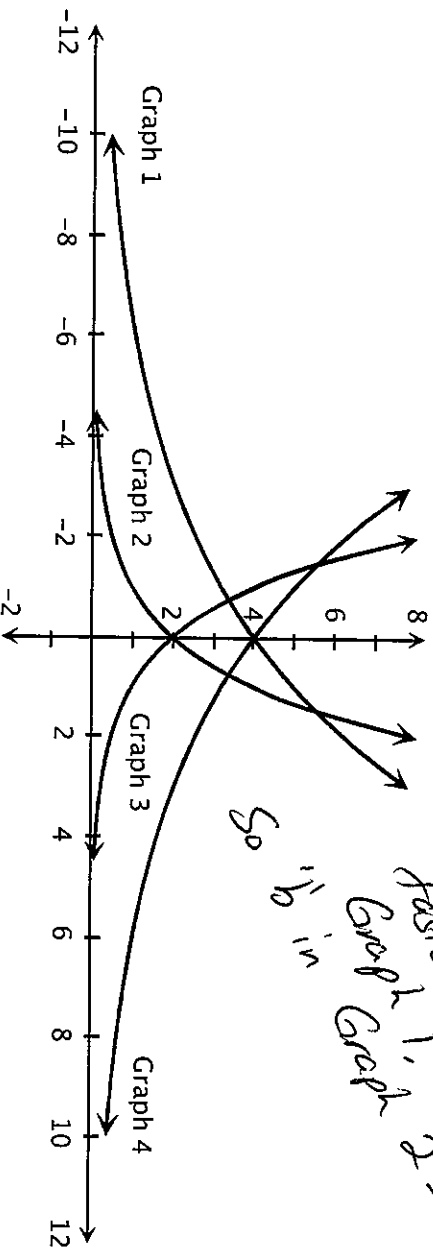
12 years (2012, 20)

6. A business discovered that their kitchen has been infested with fruit flies! The owner keeps a record of the number of flies and finds they are growing exponentially, doubling every week. Here are the data he has collected.

Number of weeks since flies were discovered	Number of fruit flies in the kitchen
0	10
1	20
2	40
3	80

The owner wonders how many flies there will be after 3.5 weeks. His daughter Melissa, who is studying algebra in school, tells him, "Just take the number of flies in week 3 and multiply by the square root of 2." Is Melissa correct? Explain.

7. Identifying Graphs



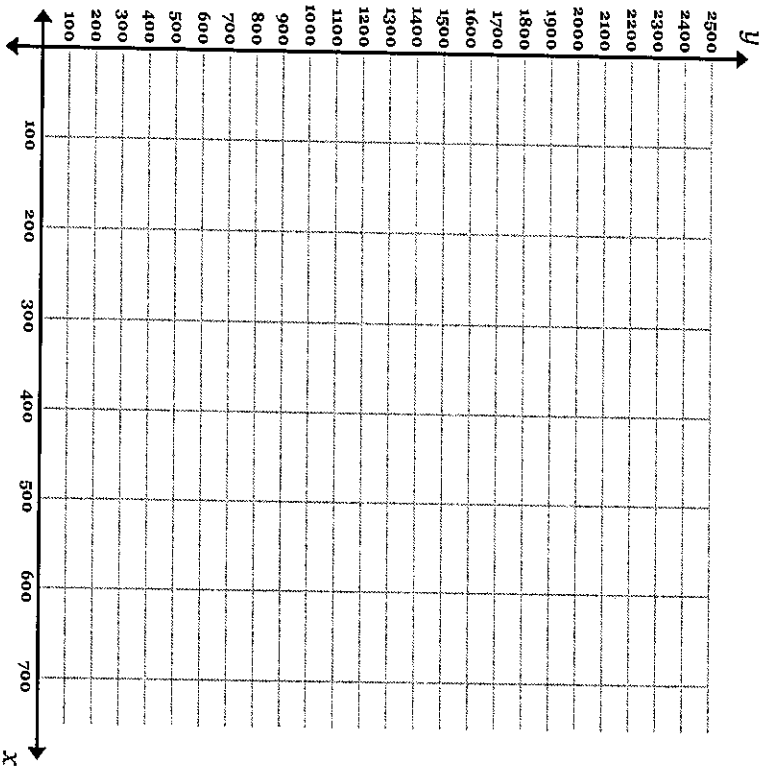
In the graph above, each curve represents a function of the form $y = a \cdot b^x$. The parameter a takes on one of these values: 2 or 4. The parameter b takes on one of these values: 0.5, 0.8, 1.25, or 2.

For each graph, identify the values of a and b :

- Graph #1 $a =$ 4 $b =$ 1.25
- Graph #2 $a =$ 2 $b =$ 2
- Graph #3 $a =$ 2 $b =$ 0.5
- Graph #4 $a =$ 4 $b =$ 0.8

Handwritten notes and arrows: 'Beginning value' points to the y-intercept of Graph 1. 'Growth rate' points to the slope of Graph 1. 'Graphs ($b > 1$)' and 'Decay ($b < 1$)' are written at the bottom with arrows pointing to the respective groups of graphs.

Graph for Unit 6 Question #2



Graph for Unit 6 Question #3

