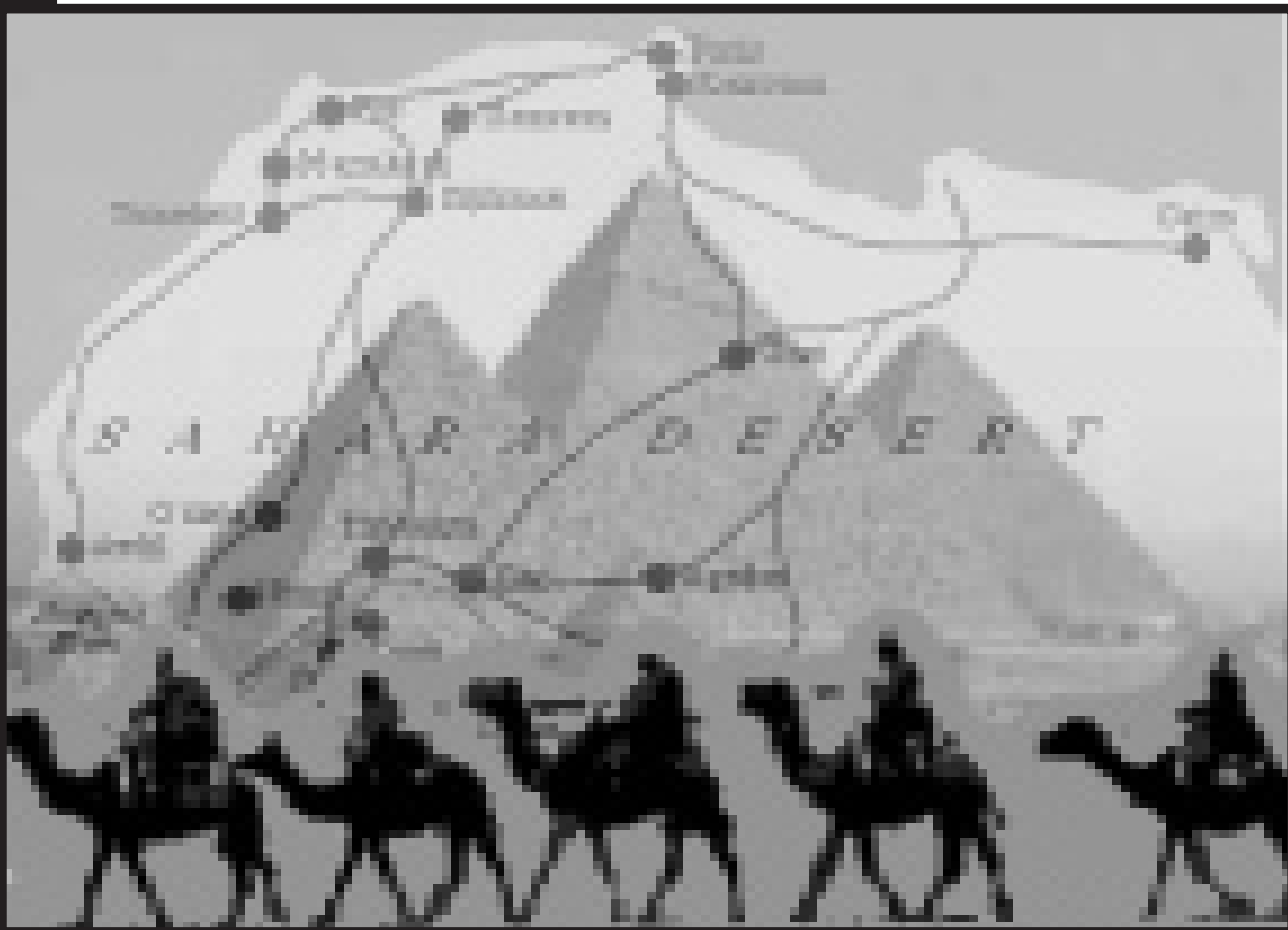


# SANDKOFA

## Routes of Survival



## FRESHMAN MATH TEXT

• El Puente Academy, 2003 •

A project of the Integrated Arts Team (Hector Calderon, Peter Coffee, Joe Matunis,  
Ali Menino, Jonathan Osler, Carlos Rosello, Beth Wehner).

# Introduction



In 300 A.D., Berber Nomads in Northern Africa discovered that using camels instead of horses allowed them to travel long distances in a short time. As people began using camels, trading quickly increased.

Many of the traders crossed back and forth across the Sahara Desert, and most stopped in the Kingdom of Ghana which had become large and wealthy because of all the taxes collected on traded goods.

The two most commonly traded items were gold and salt. Gold came from the raging Niger and Senegal rivers, whereas most of the salt came from deposits in the Sahara Desert. In addition to gold and salt, people also traded cloth, weapons, and manufactured

goods.

Some of the traders came from far away lands. They would sail into the Mediterranean Sea, and then travel south to Ghana to trade. Other traders came from Eastern African cities along the Nile River like Cairo, Egypt.

Many traders also travelled from Ghana to other African cities to sell their gold and salt. But even with





# The Family

There were many different types of families that traded along the routes from Ghana to Cairo. Some were small families and others were very large. Some of the traders were polygamists, which meant they had more than one wife. Most people got married when they were very young. Sometimes when married men met an older woman whose husband had died, they would marry the widow in order to protect her and support her children. In this way, some of the traders ended up having very large families.

When the traders went out on a long journey, they often went with other men and their sons, leaving the women behind. But sometimes entire families would go, travelling together by camel across the giant Sahara Desert.

Your group is going to be responsible for the planning and travel of several family units in the camel caravan. A **family unit** is a trader's entire family, including all of his wives and children. In this activity you will decide on the composition of each of your family units.





Here are some general guidelines:

- Anyone more than 14 years old is considered an *adult*.
- A *young child* is anyone less than 6 years old.
- An *older child* is anyone from the age of 6 through the age of 14.
- A camel can accommodate at most 3 people.

The information below and on the following pages describes the two types of family units that travelled together on the trade route from Ghana to Cairo. As a group you should create three or four families (depending on the size of your group.) Make sure to include at least one of each type of family described. Make up a complete list of all the people in each family. Give each person a name, an age, and a gender, and record the information about your families on the spreadsheets. Use the names from the list on page 7.

### The Small Family

Some families were very small. In a **small family**...

- There are more adults than children
- There is at least 1 child
- There is only one married couple
- There is one pair of adult siblings
- The number of people in the family is less than 8

### The Large Family

Some families were very large. In a **large family**...

- The number of children is greater than the number of adults
- Three generations of family members are present
- At least 2 married couples are in the group
- The men can each have up to 4 wives
- There are more young children than older children
- There are at most 25 people in the family

# North African Names

## Males

Mohammed

Abu Bakr

Mustafah

Elijah

Ikezue

Maduka

Mobutu

Adisa

Okonkwo

Boutras

Ishmael

Fernando

Javier

Nwoye

Unoka

Issac

Daneel

Ikemefuna

Ali

Ibrahim

Mansa

Jabril

Obierika

Okoye

Faisal

Moses

Okafo

## Females

Sara

Fatima

Alabina

Tabish

Ekwefi

Anasi

Marta

Joshuah

Gaudi

Noor

Ezinma

Ojiugo

Mary

Sade (Shadé)

Susan

Prita

Chielo

Obiageli





## Camel Caravan Totals

Family Name	# of People	# of Adult Males	# of Adult Females	Total # of Adults	# of Young Children	# of Older Children	Total # of Children
<b>Total for Camel Caravan</b>							



# POW      The Cornbale Problem

## The Situation

In Egypt there were many wealthy families who had made their money by owning slaves and forcing people to work against their will. You are a rebel who decides to steal food from some of these rich people, and give it to poor families in your town. One night you sneak into the food hut for the richest family in the land to steal some corn, but there is a problem: There are 4 bales of corn. For some reason, instead of being weighed individually, they were weighed in all possible combinations of two: bales 1 and 2, bales 1 and 3, bales 1 and 4, bales 2 and 3, and so on.

The weights of each of these combinations were written down and arranged in numerical order, without keeping track of which weight matched which pair of bales. The different weights were 66, 70, 75, 76, 81, and 85.

## Your Task

Your initial task is to find how much each bale weighs. In particular, you should determine if there is more than one possible set of weights, and explain how you know.

Once you are done looking for solutions, look back over the problem to see if there were easier or more efficient ways to find the weights.



## Write-Up

- 1. *Problem Statement*** - Write the problem clearly in your own words. Your Problem Statement should be clear enough so that someone unfamiliar with the problem could understand what it is that you are being asked to do.
- 2. *Process*** - Describe how you went about solving this problem in as much detail as possible. Write in paragraph form and use the following questions to help you: When did you start working on the problem? What did you do first, what did you do next, etc? What problems did you run into and how did you solve them? Did you get stuck at some point, and what did you do about it? Did you have any insights that were the key to solving the problem? Who did you talk to when you were working on this, and what advice did he/she give you?
- 3. *Solution*** - What are the weights of the different bales? Show how the weights you got are the only possible solution to this problem.
- 4. *Extensions*** - Make up your own problem that is related to this problem, and be creative. Try to solve it if you can.
- 5. *Evaluations*** - Was this POW hard or easy for you. Explain. What do you think you learned from doing this POW? How well do you think you did on this POW? What do you think you have to do next time to have a better POW? Did you enjoy working on this POW?

# Homework

## Turbans For Families

The traders and their families making the long journey from Ghana to Cairo spent many hours in the hot Sahara desert. Many people wore turbans to help keep the sun off. However turbans were also a religious symbol, and many young men were only allowed to wear



a turban after they made their first long journey or were circumcised when they turned 13.

For this activity, assume that all of the *adults* and *older children* wore turbans.

**1.** What is the minimum number of turbans that might be needed for a small family? A large family?

**2.** What would be the maximum number of turbans that might be needed for a camel caravan consisting of one large family and one small family?

*(Hint: Begin by finding the most people that could be in small and large families).*

# Avoiding Deadly Sandstorms

## The Setting

When travelling through the desert, sudden sandstorms could be deadly. Traders were also worried about sandstorms because they caused the caravans to get lost, and could easily blind the camels. Some roads through the desert were known to have fewer sandstorms, but they were much longer; others road were more direct, but they often had more sandstorms.

## Your Problem

Over the years, traders kept records of the number of sandstorms they encountered on their routes. Below is a chart that shows how many sandstorms happened on different roads over several different months. Using the information, you should determine which road is the *safest* to take. (Of course, safety is not the only factor in choosing the best road.)

1. If you were choosing which road to take for your Ghana - Cairo journey, which road would you pick? Why?

Zaria	Agades	Ghat
# of storms	# of storms	# of storms
24	18	42
3	15	9
21	13	11
5	14	10
23	14	12
		13

# Homework

## Modes, Medians, and Means

Determine the Mode, Median, and Mean for each of the roads. Please show your work.

### 1) Zaria

**24, 3, 21, 5, 23**

Mode \_\_\_\_\_ Median \_\_\_\_\_ Mean \_\_\_\_\_

Which is the most useful average to use? Why?

### 2) Agades

**18, 16, 13, 14, 19**

Mode \_\_\_\_\_ Median \_\_\_\_\_ Mean \_\_\_\_\_

Which is the most useful average to use? Why?

### 3) Ghat

**42, 9, 11, 10, 12, 13**

Mode \_\_\_\_\_ Median \_\_\_\_\_ Mean \_\_\_\_\_

Which is the most useful average to use? Why?

# Planning for the Long Journey

Your group will be planning the trip from Ghana to Cairo for the families you created. The first leg of the journey takes you from Ghana to Djenne, which is about 200 miles away.

Camel caravans were able to travel about 20 miles each day during this part of the journey.

In this activity, you will be choosing supplies for the first part of the journey.

## Making Decisions

The Ghana-Cairo Pricelist on the next page gives you the cost for certain items that you may wish to purchase before leaving. Instead of paying in dollars, you will pay in Ounces of Salt.

You have:

- 275 Oz. for each minimal family
- 450 Oz. for each large family

Decide how much of each of these items you want to buy for each of the families, and mark your purchases on the spreadsheets provided.

*This is a photo of an ancient Djenne castle*



The following information will help you determine how much supplies to buy.

- A bag of food can be shared by 2 adults for 10 days.
- A bag of food can be shared by 4 children for 10 days.
- You need 1 camel for every 3 people in your caravan
- You need 10 feet of rope for each camel in the caravan
- One 9 oz bag of tobacco will feed 5 camels for the entire trip

## Ghana-Cairo Price List

Item	Cost
Maize	2 oz/bag
Tea	4 oz/bag
Sugar	8 oz/bag
Dried Fruit	20 oz/bag
Rope	3 oz/foot
Spices	15 oz/bag
Meat	50 oz/bag
Tobacco	9 oz/bag

\*\* If you'd like, you can buy  $\frac{1}{2}$  of a bag of food







# Homework

## Family Constraints

The Mustafa family contains three people, of different generations. The total of the ages of the three family members is 90.

1. Find reasonable ages for each of the Mustafa's.

2. One student solving this problem wrote:

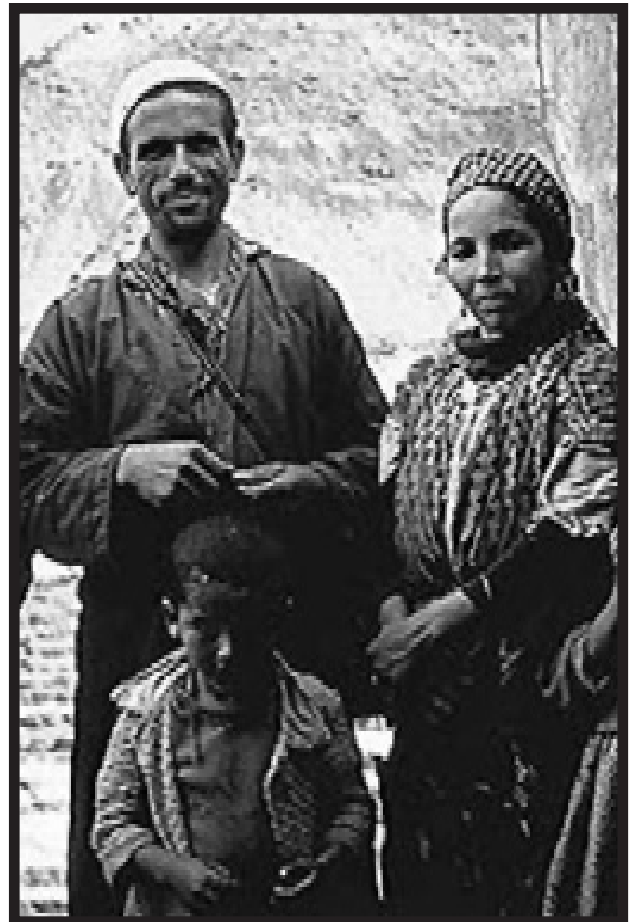
$$C + (C + 20) + (C + 40) = 90$$

What does  $C$  represent?

What does  $C + 20$  represent?

What does  $C + 40$  represent?

3. What set of ages do you think the student came up with?



# Homework

Evaluate the following arithmetic expressions:

1)  $3 + 4 \cdot 20 + 6 \cdot 4 + 2 \cdot 5$

2)  $4 + 3 \cdot 1.5 + 5 \cdot 2.5$

3)  $6(3+2) + 25(2 + 1)$

4)  $(3 + 8 + 4)(14 + 6)$

5) The Martinez family has three children: two girls and one boy. Each of the girls has 2 pairs of sneakers and 1 pair of boots. Each of the boys has 1 pair of sneakers and 2 pairs of boots. If the Martinez's paid \$25 for each pair of sneakers and \$50 for each pair of boots, how much money did they spend?

# Sandals

Walking hundreds of miles through the Sahara Desert, as the traders and their families did, people went through many pairs of laces for their sandals. In this assignment you will determine how much sandal lace you will need. Assume each pair of sandals needs its own laces.

Here is some information you should use:

- Each man uses 3 pairs of sandals.
- Each woman uses 2 pairs of sandals.
- Each child uses 1 pair of sandals.
- Laces for adult sandals are 32 inches long.
- Laces for children's sandals are 24 inches long.



## Problems

1. How many inches of laces does a woman need?
2. How many inches of laces does a man need?
3. Find the total length of laces needed for your specific family. Please show your work.

**HW****Algebraic Expressions**

1. Each woman in a caravan needs one dress and it takes 10 yards of fabric to make a dress. Write an algebraic expression for the number of yards of fabric needed for a caravan.
2. A camel caravan has 20 feet of spare rope. They decide to buy another 4 feet of rope for each camel in the caravan. Write an algebraic expression for the total feet of rope the caravan has after they purchased new rope.
3. Ibrahim's family has 5 more members than Boutras's family and Adisa's family has 6 more members than Boutras's family. If Boutras's family has  $B$  people in it, write an algebraic expression for the total number of people in a caravan of these three families.

Substitute for the variables and evaluate the algebraic expressions below:

1.  $4C - 4 + 3C$

For  $C = 6$

For  $C = -3$

For  $C = 2$

2.  $4(W + 10D)$

For  $W = 20$  and  $D = 5$

# Laced Travelers

In class yesterday you used certain information find out how much lace each man, woman, and child needed for their sandals on the trip across the Sahara.

In this assignment, you are told how much they need. You should use the amounts given below to answer the questions at the end.

- Laces cost 2 oz. of salt per yard.
- The Ibrahim camel caravan consisted of 6 families.
- Each family had 7 people in it: 1 man, 2 women, and 4 children.
- Each man needed 5 yards of laces for his sandals.
- Each woman needed 4 yards of laces for her sandals.
- Each child needed 3 yards of laces for their sandals.

## Problems

For problems 1-3 solve and write an arithmetic expression.

1. How many yards of laces did the Ibrahim camel caravan need?
2. How many ounces of salt would it cost to buy enough lace for everyone in the caravan described above?
3. According to the above information, how many ounces of salt would it cost to buy enough laces for everyone in your caravan?
4. Write an algebraic expression that could be used to find the cost of laces for any caravan.



# To Timbuktu By Equation

When travelling across the desert, it was easy to get lost without the help of Bedouin Guides who knew their way from city to city. Even travelling the short distance from the Kingdom of Ghana to Timbuktu was hard without a Bedouin guide.

- Salim and Ali were brothers who were Bedouin Guides. The fee for taking a caravan to Timbuktu was 25 Oz. of Salt per camel.
- Hassan was their father, and he charged them 10 Oz. of Salt for each trip they took because they were borrowing his camels.

The brothers could calculate their profit by using the following equation:

$$\text{Profit} = \frac{25 C - 10}{2}$$

In this equation, C is the number of camels and T is the number of trips they make.

1. Explain why this formula makes sense.
2. How much profit each of the brothers would make if they took 3 trips and each trip had 5 camels in it?



# Homework

## Buying Gumballs

Hector is going to Africa to teach for a year. He knows that the students at Kantara High School love gum, so he has decided to bring all of the students gumballs. Below is some information you will need to help him figure out how much money he will have to spend.

- Red Gumballs cost 10 cents each.
- Blue Gumballs cost 20 cents each.
- There are 7 classes at Kantara High School.
- Each class has an average of 17 people in it: 9 girls and 8 boys.
- Each girl wants 1 Blue Gumballs.
- Each boy wants 3 Red Gumballs.

### Problems

1. How much will it cost Hector to buy gumballs for every student at Kantara High School?
  
2. Write an algebraic expression that you could use to solve this problem. Identify the variables you use.



# Homework

Evaluate the following expressions using the information provided.

$$A = 6$$

$$B = 11$$

$$C = 3$$

**1.**  $3 \cdot A$

**2.**  $5 + A + B$

**3.**  $B - C$

**4.**  $(2 \cdot A) + (B \cdot C)$

**5.**  $C - A$

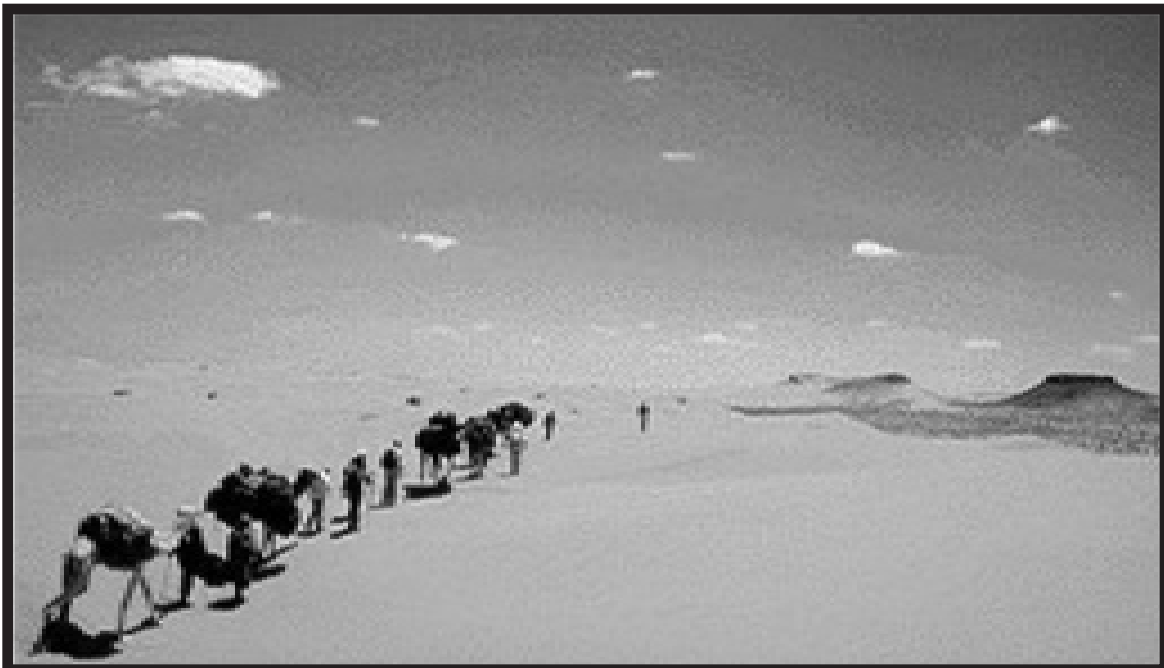
**6.**  $(C \cdot C \cdot C)$

7. A video game (V) costs \$.25, a game of pool (P) costs \$1, and a game of air hockey (A) costs \$2. Imagine that Ricardo plays 2 video games, 1 game of pool, and 3 games of air hockey. Write an expression using the letters V, P, and A to determine how much money he spent, and then solve your equation.

# Camel Expressions

The table below defines some symbols as variables to represent certain quantities. For example, C stands for the number of camels in a caravan. A specific numerical value is also provided for each variable.

Symbol	Meaning	Numerical Value
F	the number of <b>F</b> amilies in a caravan	4
M	the number of <b>M</b> en in a family	2
W	the number of <b>W</b> omen in a family	3
K	the number of <b>K</b> ids in a family	5
C	the number of <b>C</b> amels in a caravan	16
B	the number of <b>B</b> ags of water a person drinks in one day	2 bags / day
Y	the number of caravans that travel from Ghana to Cairo each <b>Y</b> ear.	100 caravans / year
H	the amount of <b>H</b> ay a camel eats in one day	1 bale / day



Using the letters it is possible to write many different algebraic expressions. For example, the expression  $MW$  tells us how much water the men in a family drink in one day.

## Your Task

Your task is to come up with as many meaningful algebraic expressions as you can using the symbols on page 25. For each expression, go through the steps below:

- Write the expression
- Explain what the expression means using words
- Give the numerical value of the expression based on the values given in the table.

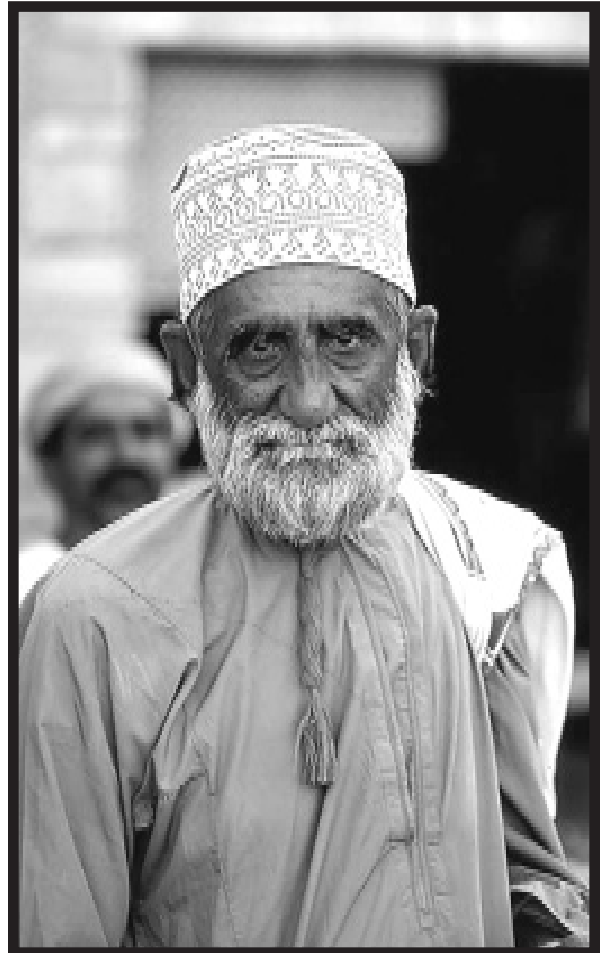


# Homework Camel Expressions at Home

In this assignment you will continue to work with algebraic expressions and summary phrases.

F	the number of <b>F</b> amilies in a caravan
M	the number of <b>M</b> en in a family
W	the number of <b>W</b> omen in a family
K	the number of <b>K</b> ids in a family
B	the number of <b>B</b> ags of water a person drinks in one day
Y	the number of caravans that travel from Ghana to Cairo each <b>Y</b> ear.
H	the amount of <b>H</b> ay a camel eats in one day
C	the number of <b>C</b> amels in a caravan

- Write a summary phrase for the expression  
 $W + M + K$
- Write a summary phrase for  $F \cdot K$
- Write an algebraic expression for the number of people in a caravan.
- Write an algebraic expression for the amount of food the camels in a caravan eat each day.
- Does the expression  $F \cdot H$  make sense?
- Write an expression of your own and explain it with a summary phrase.

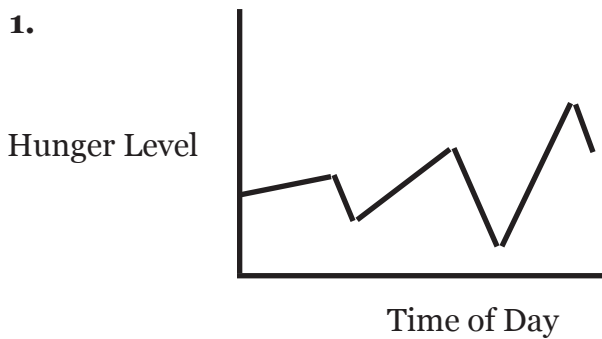


# Classwork

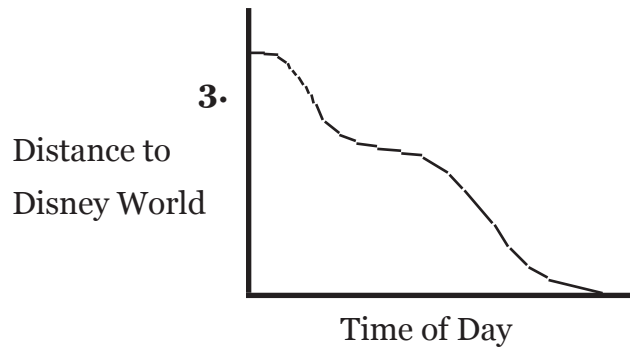
## Part I: Sketches to Situations

Each of the graph sketches below illustrates a relationship between two quantities. In each case describe a situation that is illustrated by the graph.

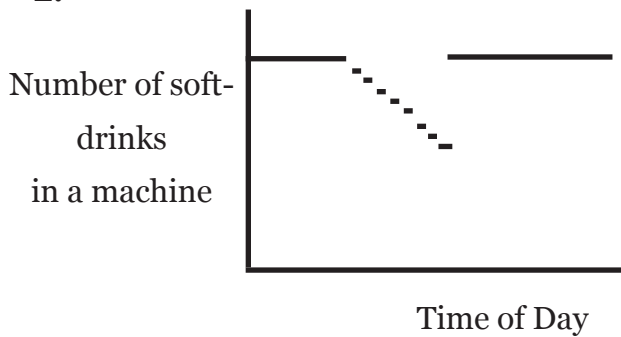
1.



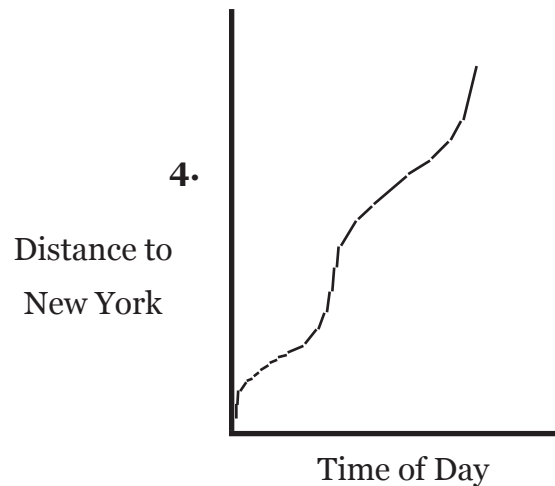
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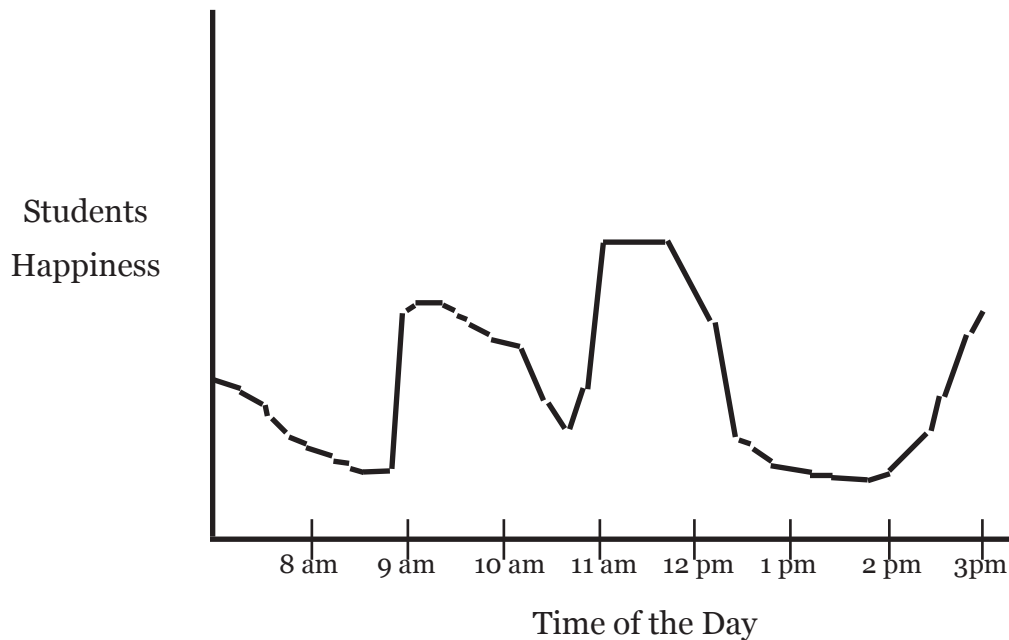
4.



# Homework

# Graph Sketches

1. Using the information provided below, please sketch a graph and explain the situation it is describing.



2. Using the axis provided, please label the axis, create a graph sketch, and then explain what situation it describes.





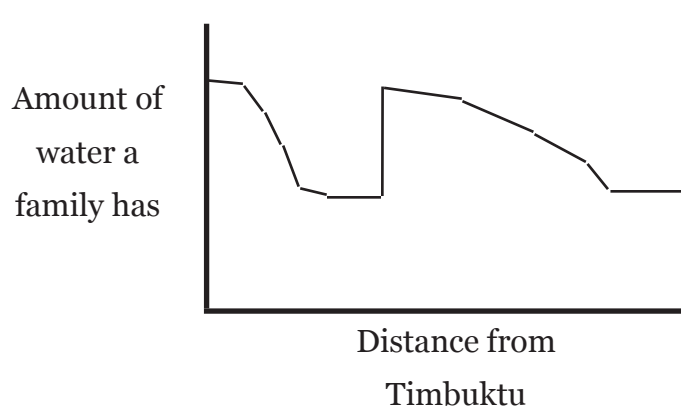
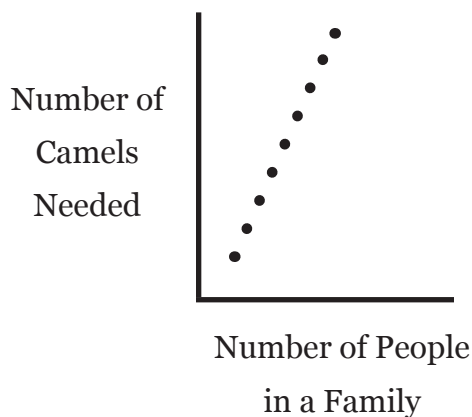
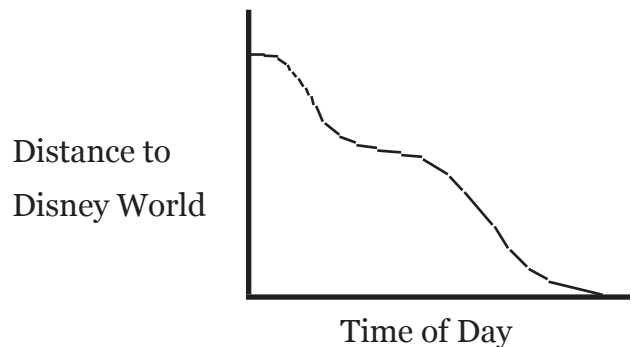
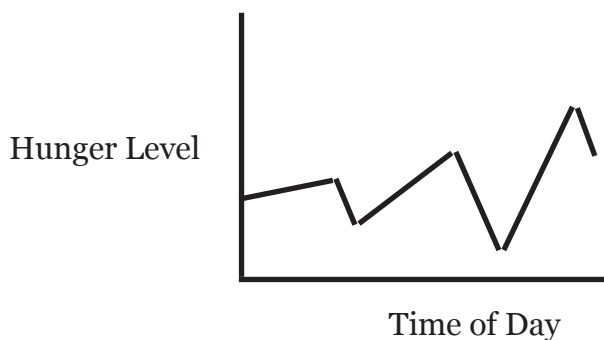
# In Need of Numbers

Graph sketches describe a situation, but the description would be more complete if the graph included numbers to help explain things. You can do this by putting a **scale** on each axis, and showing the value that each of the marks on the axis represent.

To scale an axis, you need to know the range of values you are trying to include on your graph. Once you know the lowest and highest numbers on your graph, you can determine what scale to use.

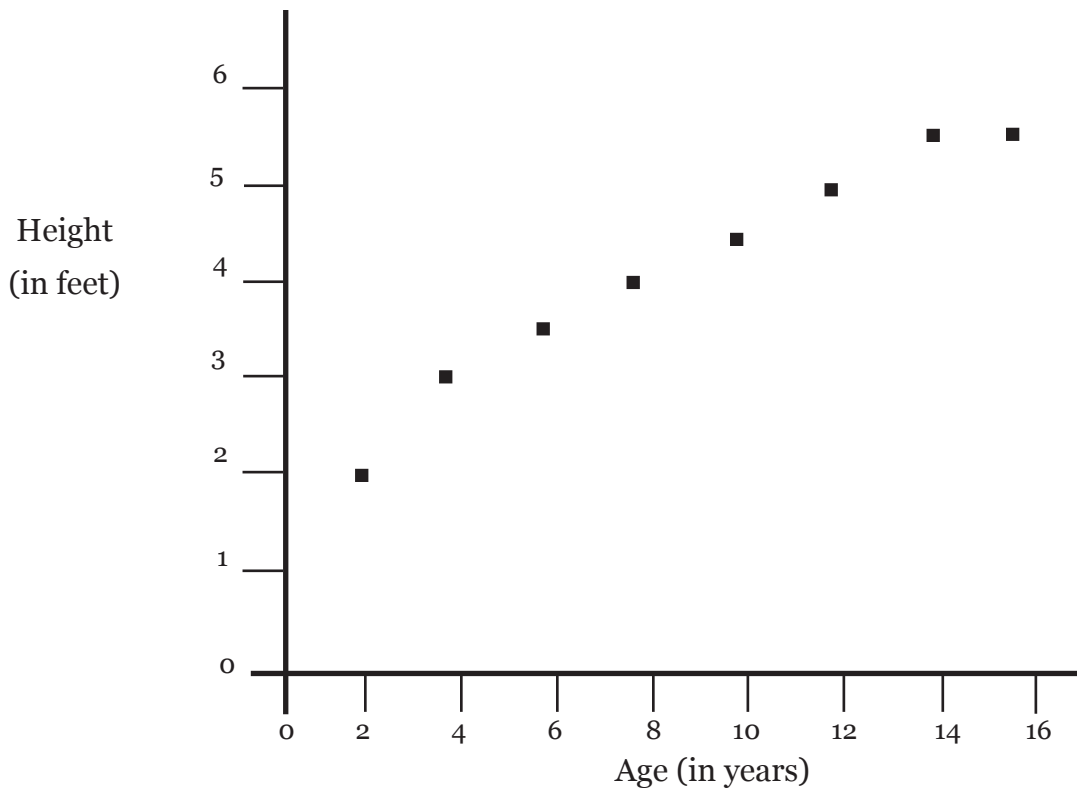
For each of the sketches below:

- Make a copy of the sketch onto graph paper
- On your graph paper, scale the axis with appropriate values
- Explain why the scale you used makes sense



# Homework The Issues Involved

The graph below shows Jose's height from the time he was born through the age of 16. Look at it and answer the following questions.



- 1) How tall was Jose when he was 2 years old?
- 2) How old was Jose when he was 3 feet tall?
- 3) How tall was Jose when he was 6 years old?
- 4) How many feet did Jose grow from the age of 4 to 12?

# Plotting Numbers

Traders going from Timbuktu to the city of Agades kept a record of how far they traveled each day. Below is a table of the distance that the Rahman family traveled each day. Create a graph by first labeling the axis and then plotting the information given in the table.

Day	Distance Traveled (in miles)
1	10
2	14
3	5
4	28
5	19
6	30
7	4
8	4
9	42

# Homework

# More Graphing

Please graph the following In/Out table.

In	Out
4	10
6	30
3	0
8	25
5	5
5	30
4	15
1	20
10	40

# Saving Tea

Hamid is saving tea for a long trip. He has 10 bags of tea saved already, and is able to save 2 more bags of tea each week.

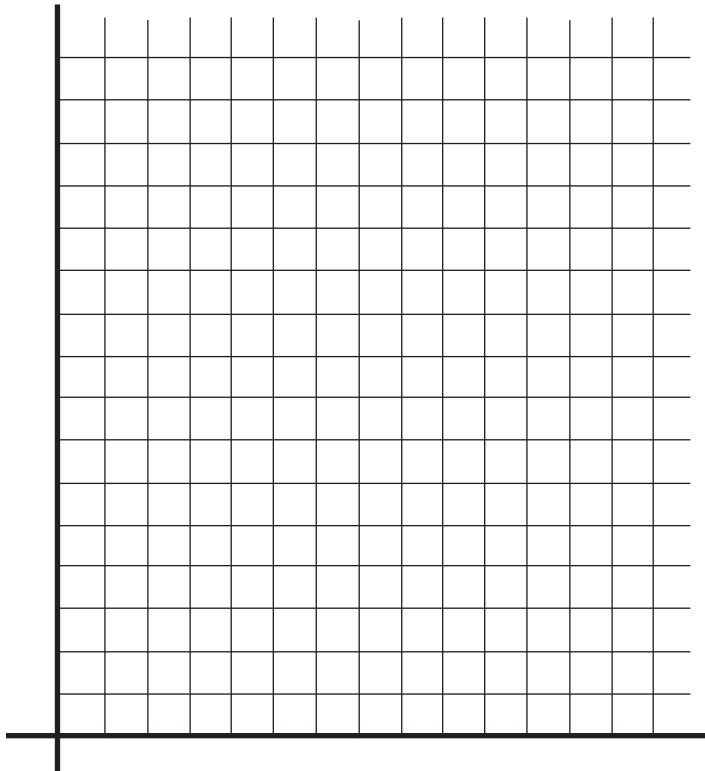
1. How much tea will he have after:
  - a. 2 weeks
  - b. 5 weeks
  - c. 10 weeks
2. Write an algebraic expression that will tell you how much tea Hamid will have in  $W$  weeks.
3. Make an In/Out table with the information above. Add at least two more pairs of numbers.
4. Use your In/Out table to make a graph of how much tea Hamid saves over time. Make your X-axis go to at least 15 weeks, and your Y-axis go to at least 45 bags of tea.

# Homework

Ali's caravan travels 10 miles each day.

1. How far will the caravan has travelled after:
  - a. 1 day
  - b. 2 days
  - c. 3 days
  - d. 4 days
2. Write an algebraic expression for how far the caravan has travelled after  $D$  days.
3. Make an In/Out table with the information above, and add at least 2 more pairs of numbers.
4. Use your In/Out table to make a graph of how far Ali's caravan travels over time. Have your X-axis go up to at least 10 days, and your Y-axis go up to at least 100 miles.

In	Out



# The Wealthy Camel Seller

Muhammad is a wealthy camel trader. He sells people camels in exchange for salt. He already has 250 Oz of salt saved up, and is making 25 Oz of salt each week.

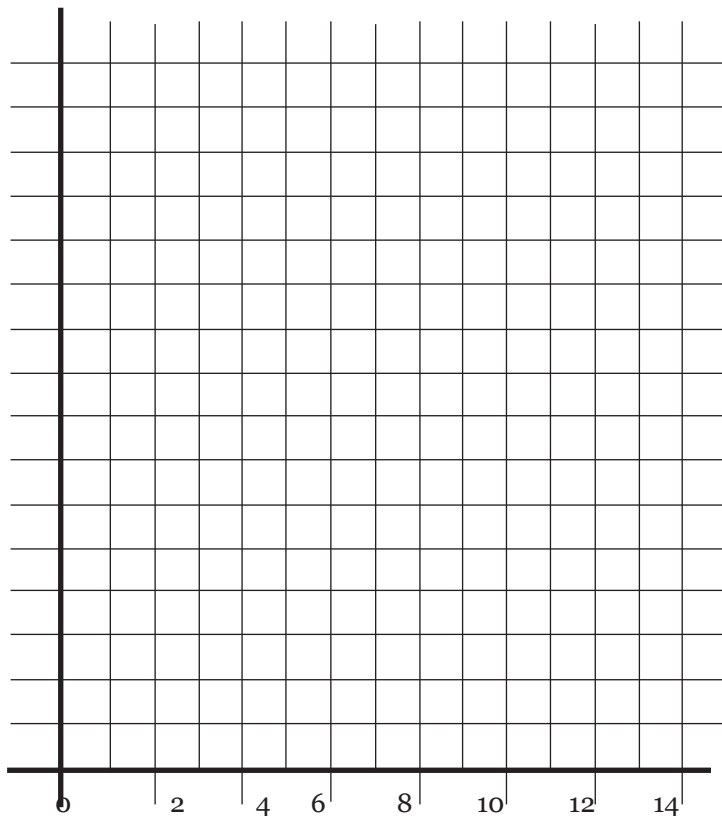
1. How much salt will he have after:
  - a. 4 weeks
  - b. 6 weeks
  - c. 10 weeks
2. Write an algebraic expression that will tell you how much salt Muhammad will have in  $W$  weeks.
3. Make an In/Out table with the information above. Add at least two more pairs of numbers.
4. Use your In/Out table to make a graph of how much salt Muhammad saves over time. Make your X-axis go to at least 15 weeks, and your Y-axis go to at least 700 Oz of salt.

# Homework

Below is an graph and an In/Out table. First make up a rule. Then using your rule, fill in the In/Out table. Once your In/Out table is done, use the information to make a graph. Don't forget to label the Y axis.

Rule \_\_\_\_\_

In	Out
0	
2	
4	
6	
8	
10	

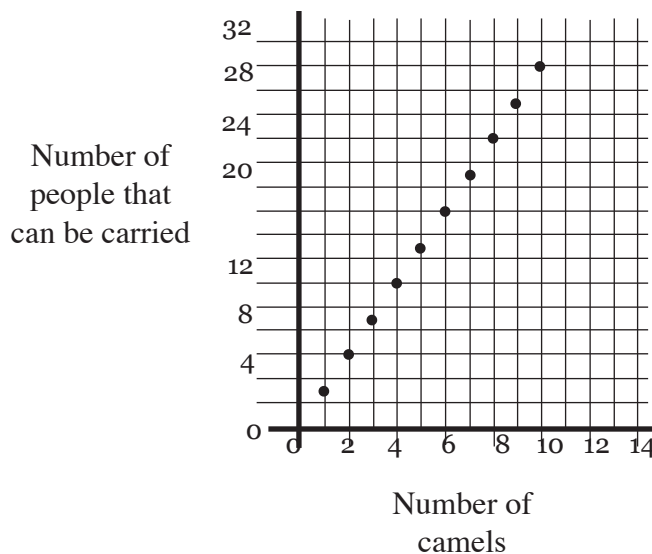




# Out Numbered

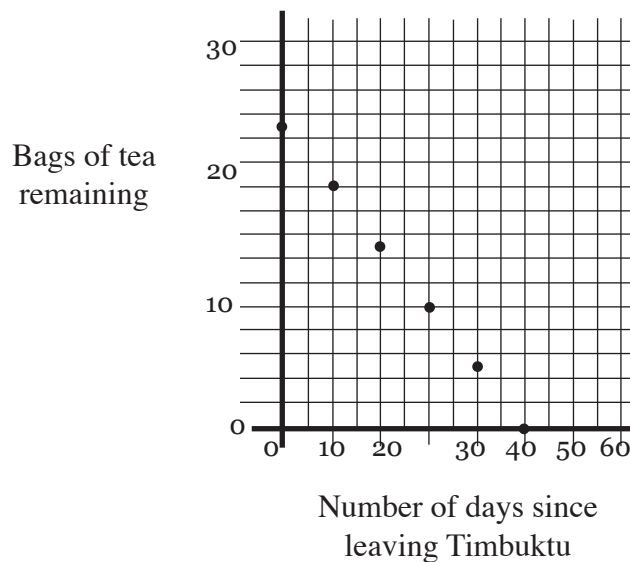
These scaled graphs are similar to the ones you have already seen. Base your answers to the questions on the scales shown in these graphs.

- This graph shows the number of people that can ride on a given number of camels.



- How many people can three camels carry?
  - How many people can five camels carry?
  - How many people can ten camels carry?
  - Make an In/Out table with the information for questions a-c.  
(In = number of camels, Out = Number of people that can be carried).
  - Find a rule for the number of people that  $x$  camels can carry.
- The next graph shows how much tea was left in terms of the number of days since leaving Timbuktu.

- a. How much tea was left 10 days after leaving?
- b. How much tea was left 15 days after leaving?
- c. How much tea was left 35 days after leaving?
- d. Make an In/Out table with the information for questions 2a - 2c.  
(In = number of days since leaving Timbuktu, Out = amount of tea left).
- e. Find a rule for the amount of tea left  $x$  days after leaving Timbuktu.



# Homework

For each of the rules below, find 6 points on the graph, make an In/Out table, and then draw the graph on the graph paper provided.

1.  $Out = 4 \cdot In - 4$

In	Out

2.  $Out = In$

In	Out

3.  $Out = 100 - 20 \cdot In$

In	Out

# Previous Travelers

Camel caravans that made the journey to Cairo were able to use information from previous caravans to decide on the appropriate amount of supplies to bring. Just before leaving Timbuktu, someone handed you a list describing the supplies they needed during the next stretch of your trip.

## Your Task

1. Make 3 different graphs, one for each of the supplies needed compared to the number of people in a caravan.
2. Do the following tasks for each of your graphs from Question 1
  - Make an In/Out table, and figure out the rule for it.
  - Use either the In/Out table or your graph to find the quantity of each item that your family would need. For each of the supplies, write down how much you bought for each family and if turned out to be enough.

Number of people	Bags of tea	Bags of salt	Bags of meat
5	3	20	55
7	5	28	75
8	6	32	85
10	8	40	105
11	9	44	115
14	12	56	145

# Homework

Below are two In/Out tables, each of which have their rule written above them.

1. Plot the points for each of the In/Out tables *on the same graph*
2. What are the coordinates where they will intersect?
- \* 3. BONUS QUESTION: How can you figure out where the lines will intersect without graphing them? (Hint: Use the rule for the In/Out tables).

$$\text{Out} = 2 \cdot \text{In} + 1$$

In	Out
1	3
2	5
3	7
5	11
8	17

$$\text{Out} = \text{In} + 5$$

In	Out
1	6
3	8
6	11
7	12
9	14

# The Perilous Shortcut

As more and more traders travelled from Ghana to Cairo, people discovered certain shortcuts. One such shortcut saved the caravans 50 miles and a week of travelling, but it crossed one of the hottest spots in the entire Sahara Desert. Taking this shortcut meant a grueling 15 days journey, with no opportunity to fill up on water.

Three caravans attempted to take this shortcut, and the table below shows how much water they had left after the first, second, fourth, and sixth days.

Caravan	Day 1	Day 2	Day 4	Day 6
Mustafa	55	51	43	35
Saliman	90	84	72	60
Bakar	34	32	28	24

- Graph the water supply data for all three caravans on the same graph. (You might want to use colored pencils to keep track of the different caravans). Make your X-axis go out to 20 days
- Determine the rule for each of these families the amount of water they have left in  $D$  days.
- Based on this information, which caravans will make it without running out of water? **Explain your reasoning.**

# Homework

Jose is moving and his mom told him he couldn't bring his television. So Jose called up his three friends Maya, Alejandro, and Tito, and told them that whoever got to his apartment first could have the television.

Maya lives 20 blocks away and can bike 3 blocks in a minute. Alejandro lives 15 blocks away, and can bike 2 blocks in a minute. Tito lives only 5 blocks away, but since he has no bike, he can only walk  $\frac{1}{2}$  of a block in a minute.

There are three rules that show how long it takes each of Jose's friends to get to his apartment. Remember, when you see a letter like  $X$  in a rule, it means the same thing as using the word *In*. So the rule  $Out = 2 \cdot In$  is the same thing as saying  $Out = 2 \cdot X$ . Here are the rules for Jose's friends:

$$\text{Maya: } 20 - 3 \cdot x$$

$$\text{Alejandro: } 15 - 2 \cdot x$$

$$\text{Tito: } 5 - \frac{1}{2} \cdot x$$

## Your Task

1. Create an In/Out table for each of Jose's friends comparing time and the number of blocks they are from Jose's apartment.
2. Graph all three of your In/Out tables on the same graph.
2. Who will arrive at Jose's apartment first and get the TV? How can you tell?

# Who Will Make It?

Before traders could get to Cairo, they had to cross the treacherous Nile River. The Jabril family is in Agades which is 330 miles away from the Nile, and are nervous because the river is supposed to flood in 30 days.

Three caravans kept track of their distances remaining from the Nile River, and the table below shows how far they were after four different days.

Caravan Name	Day 1	Day 4	Day 7	Day 11
Mustafa	350	294	252	196
Bakar	300	264	237	201
Medina	330	282	246	198

- Graph the data for all three families on the same graph. Use different color pencils for each family.
- Which caravans made it to the Nile before it flooded?
- When the first caravan made it to the Nile, how far back was the next caravan?
- BONUS QUESTION:** Can you find the rules for each of these families?



# Homework

Below are two two In/Out tables, each of which have their rule written above them.

1. Plot the points for each of the In/Out tables *on the same graph*
2. What are the coordinates where they will intersect?
- \* 3. BONUS QUESTION: How can you figure out where the lines will intersect without graphing them? (Hint: Use the rule for the In/Out tables).

$$\text{Out} = 250 - 12 \cdot \text{In}$$

In	Out
5	190
7	166
8	154
12	106
20	10

$$\text{Out} = 4 \cdot \text{In} + 10$$

In	Out
6	34
7	38
13	62
17	78
25	110

# Graphing Calculators

Anasi and Prita are sisters. They are both trying to save bags of salt before their family sets out on a journey across the desert.

Anasi has 7 bags of salt, and is able to save 3 more bags each week. Prita has 20 bags of salt, and is able to save 2 more bags each week.

Anasi		Prita	
In (weeks)	Out (salt)	In (weeks)	Out (salt)
0	7	1	20
1	10	2	22
4	19	3	24
5	22	6	30
6	25	7	32

1. Graph each of the In/Out tables on your calculator.
2. Using the calculator, find the rule for each of the sisters that shows how many bags of salt they have after  $X$  weeks.
3. Will Anasi and Prita ever have the same amount of salt? When? Will Anasi ever have more salt? When?

# Closing In On Cairo

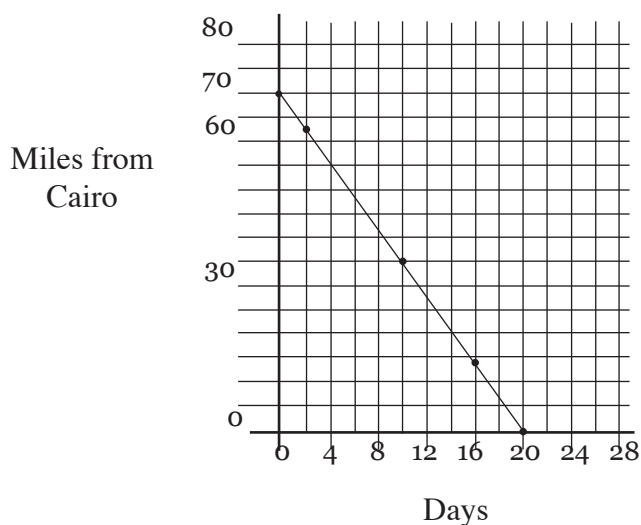
After travelling through the desert for thousands of miles, four families are now almost at the end of their journeys. The names of these families are the Tabish, Chielo, Jabril, and Elijah families.

The **Tabish** family is 100 miles away, and is travelling 5 miles a day.

The **Chielo** family is travelling according to the following In/Out table:

Day	Miles from Cairo
1	48
5	40
7	36
11	28

The graph below shows the **Jabril** family's progress:



The rule  $Y = 90 - 4X$  can be used to describe the **Elijah** family's progress (where  $X$  is the number of days and  $Y$  is the miles from Cairo).

## Your Task

Your job is to write a comprehensive report on the travels of each of these four families.

For each family, you should be able to describe in words where they started from and how fast they are travelling (like the Tabish family), create an In/Out table (like the Chielo family), graph their progress (like the Jabril family), and write a rule (like the Elijah family). If you want, you can graph all four families on the same set of axis.

Remember to show all of your work, and explain how you know your graphs, rules, In/Out tables, and narratives are correct.

You should also answer the following questions:

- How long will it take each family to arrive in Cairo?
- What family arrives in Cairo first? Second? Third? Last?

# Sandkofa Portfolio

## Putting Your Portfolio Together

Your Portfolio should have:

- **A Cover Page**
- **A Table of Contents**
- **A Cover Letter**
- **A Section for Required Assignments**
- **A Section for Selected Assignments**
- **A Reflection on Personal Growth**

### Cover Letter

There are four ways to describe a mathematical situation

- Story
- Graph
- In/Out Table
- Rule

Each of these ways are connected logically. Describe how the four are connected. In other words, how can you get a rule from an In/Out table? How can you get an In/Out table from a graph? How can you get a graph from a story? How can you get a story from a rule? You should use an example for each in order to illustrate what you are saying.

What are the benefits and disadvantages of each form? What information is easiest to obtain from a graph? From a rule? From a story? From an In/Out table?

### Required Assignments

- A POW of your Choice
- Closing In On Cairo

### Selected Assignments

For each of the following, write a paragraph or two on a separate sheet of paper, then follow it with the assignments you have chosen.

1) Why do mathematicians use letters to stand for numbers? Explain why letters are sometimes useful and pick one assignment that helped you to understand the use of variables. Explain why you chose that assignment.

2) Graphs can be very useful if they are done correctly, but a small mistake in a graph can lead you to the wrong answer. What kind of mistakes did you make when you first started graphing? What helped you learn how to correct those mistakes? Include an assignment that you did wrong at first and then explain either how you corrected it or what you would do to change it now.

### Reflection on Personal Growth

What kinds of skills did you need for this unit? Which of the skills were you good at? Which ones were difficult for you? What would you like to improve for next year? What have you liked about math this year? What have you disliked? What suggestions do you have for next year?

