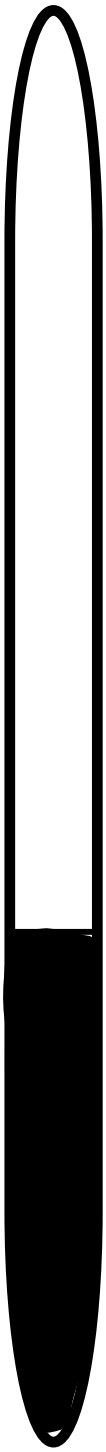
B&P I – Problem 1.1 Notes
"Reporting Our Progress"

GOAL
$300



Last year, Thurgood Marshall Middle School held fund-raising projects for each grade level. The eighth-grade class sold calendars, the seventh-grade class sold popcorn, and the sixth-grade class sold posters. The sixth-grade is planning to sell posters for ten days. They are keeping track by posting their progress on a large thermometer outside of the principals office. Their goal is to reach $300 by the end of ten days.

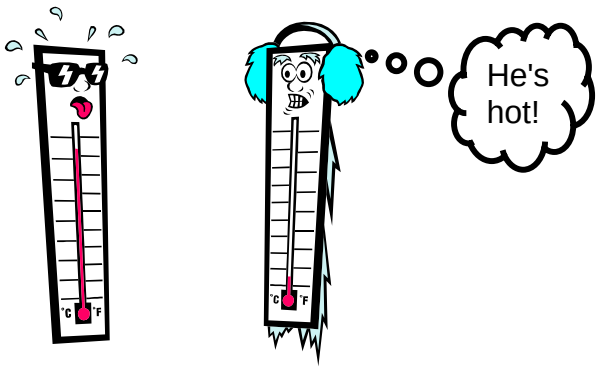
What do we know?

- The thermometer is registering 25% or ¼ of the goal.
- Students have raised about $75 of the $300.
- They still need to meet 75% or ¾ of the original goal.
- Students need to raise about $225 to reach the goal.
- The sixth-grade has reached ¼ of the goal in one-fifth of the time allotted.

Day 2

Follow-Up

To determine how the estimates for how much money had been raised after day two, there were several strategies that could have been used. You could measure the height of the thermometer and measure how much had been raised after day two and made a comparison. You could have estimated the amount raised and compared it to the amount of the goal by using fractions or percents.



B&P I – Problem 1.2 Notes
"Using Fraction Strips"

The thermometers on the back of this page show the progress of the sixth-grade poster sale after two, four, six, eight, and ten days. One way to determine the progress of the fund-raiser is to use strips of paper the same length as the distance from the bottom of the thermometer to the goal. By folding the strips into fractional parts, you can determine what part of the goal has been reached.

Make fraction strips to show the following:

- **halves**
- **thirds**
- **fourths**
- **fifths**
- **sixths**
- **eighths**
- **ninths**
- **tenths**
- **twelfths**

What do we know?

- On day 2, the students had reached one-fourth, two-eighths, or three-twelfths of their goal.
- On day 4, they had reached one-third, two-sixths, three-ninths, or four-twelfths of their goal.
- On day 6, they had reached three-fifths or six-tenths of their goal.
- On day 8, they had reached three-fourths, six-eighths, or nine-twelfths of their goal.
- On day 10, they had reached five-sixths or ten-twelfths of their goal.

Follow-Up

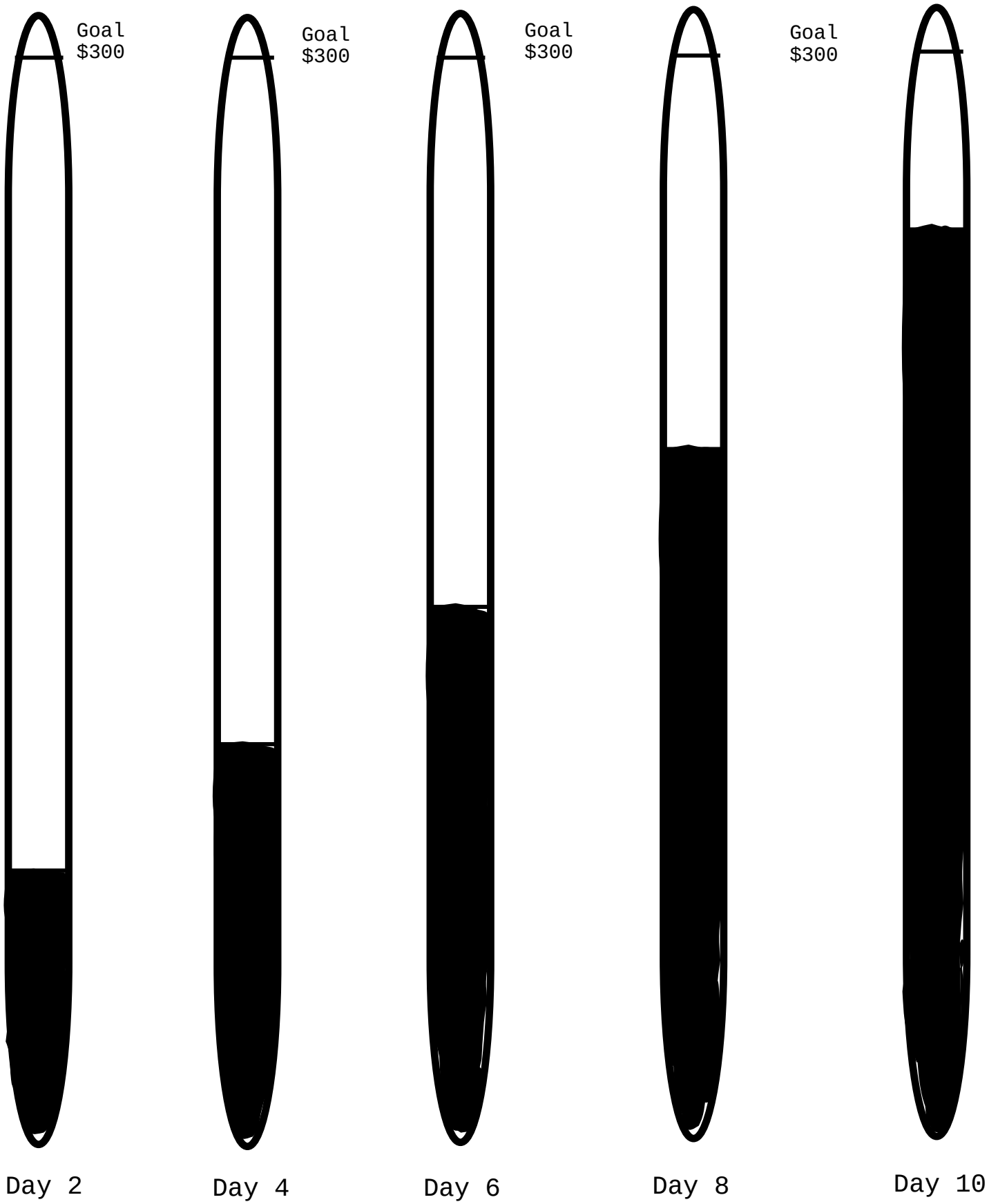
Which fraction strips were easy to fold and why?

The halves, fourths, and eighths were easy to fold because they simply required repeatedly folding in half.

Which fraction strips were difficult to fold and why?

The thirds, fifths, and ninths strips were hard to fold because they could not be made by simply folding strips in half.

Labsheet 1.2 Sixth-Grade Thermometers



B&P I – Problem 1.3 Notes
"Comparing Classes"

The thermometers on the back of this page show the progress of the sixth-grade, seventh-grade, and eighth-grade classes. Each class is a different size and therefore all of their goals are different. The sixth-grade goal is $300, seventh-grade has set a goal of $400, and the eighth-grade class has made a goal of $240.

Both the seventh and eighth-graders claim to be doing better than the sixth-grade class. Use the fraction strips that you have from Problem 1.2 to investigate the seventh and eighth-graders claims.

A. How much money did each grade raise?

6th grade raised about $250

7th grade raised about $300

8th grade raised about $220

B. What fraction of the goal did each grade reach?

6th grade is about five-sixths of the way

7th grade is about three-fourths of the way

8th grade is about eleven-twelfths of the way

C. What argument could the eighth-graders use to claim that their class did better than the sixth-grade?

The eighth-graders can say they are closer to their goal.

D. What argument could the seventh-graders use to claim that their class did better than sixth-grade?

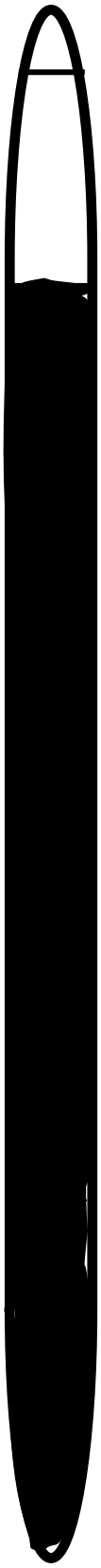
The seventh graders can say that they have raised more money.

.

Which of the three classes do you think did the best job?

Some might say that the eighth-grade is closer to their goal, even though they have raised less money than the other grades. Others might say the seventh-grade did the best job because, although they have reached a smaller fraction of their goal, they have raised more money.

Labsheet 1.3 Thermometers for all grades

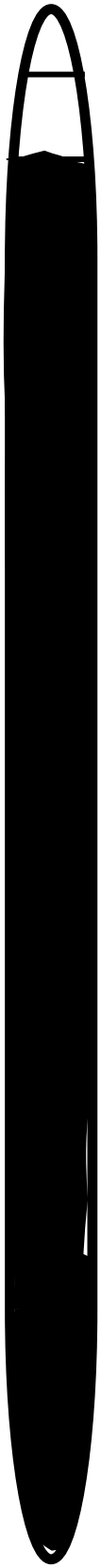


Goal
$300

Day 10
6th grade

Goal
$400

Day 10
7th grade



Goal
$240

Day 10
8th grade

B&P I – Problem 1.4 Notes
"Exceeding the Goal"

Now the teachers want in on the action. They have decided to raise money for the annual Year's End Festival. The teachers decided to sell paperback books for summer reading and they set a goal of $360.

The thermometers on the back of this page show the teachers' progress at the end of the second, sixth, and tenth days.

A. **The teachers used shorter thermometers than the students did to report their progress. Can you still use your fractions trips to measure these thermometers?**

Since the distance to the goal for the teachers' thermometer is not the length of the fraction strips used to measure the students' thermometers, these strips cannot be used in the same way to reason about the teachers' thermometers.

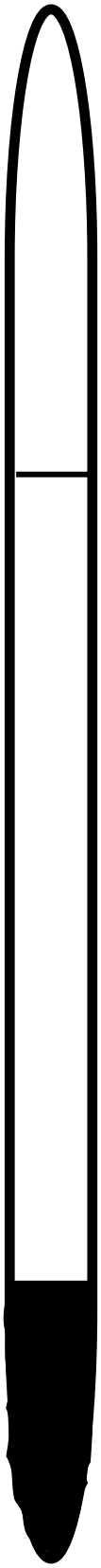
B. **What fraction of their goal did the teachers reach at the end of each of the days?**

At the end of day 2, the teachers were one-fourth of the way to their goal. At the end of day 6, the teachers had reached their goal. At the end of day 10, the teachers had reached five-fourths, or one and one-fourth of their goal.

C. **How many dollars did the teachers raise by the end of each of these days?**

The teachers raised $90 at the end of day 2, $360 at the end of day 6, and $450 at the end of day 10.

Labsheet 1.4 Teacher's Thermometers

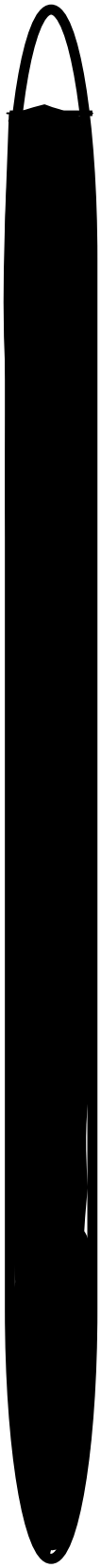


Goal
$360

Day 2

Goal
$360

Day 6



Goal
$360

Day 10

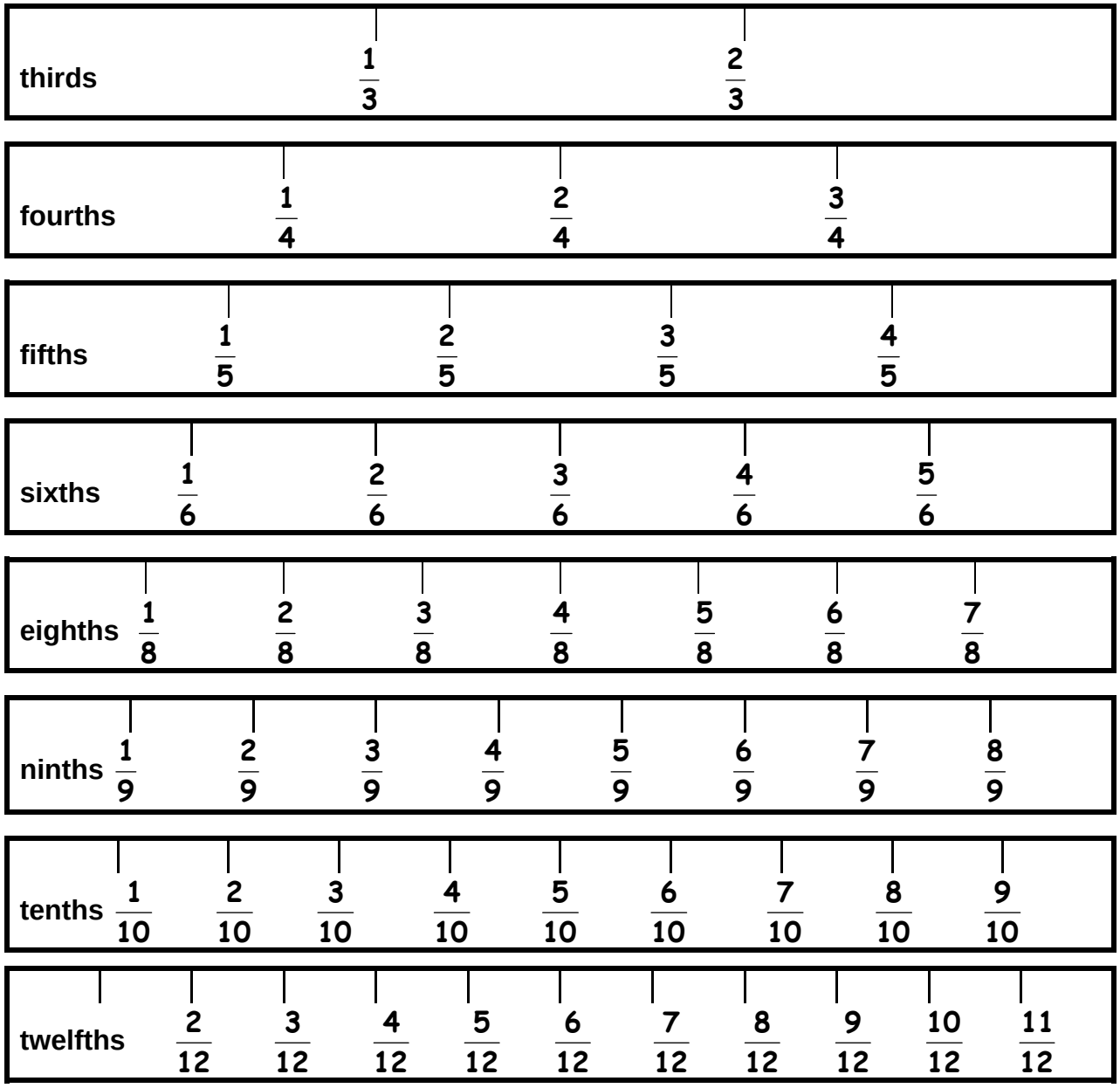
B&P I – Problem 1.5 Notes
"Using Symbolic Form"

Definitions:

***numerator* - the number above the fraction bar that represents the part.**
***denominator* - the number below the fraction bar that represents the whole.**

Fractions can be written in symbolic form, using two whole numbers separated **by a bar.** ***For example: one half can be written as*** $\frac{1}{2}$ ***and two thirds can be written as*** $\frac{2}{3}$.

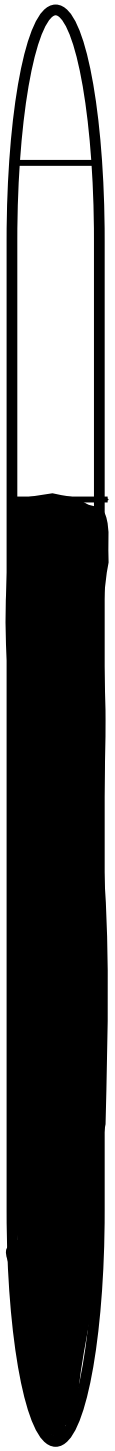
On Labsheet 1.5, there are nine fraction strips of the same length. Each strip is divided into a different number of equal-length parts. Label each of the marks on the strips with the fraction names in symbolic form. The label for each mark should represent the fraction of the strip on the left of the mark. Your answers should look like the ones below.



B&P I – Problem 2.1 Notes
"Comparing Notes"

Definitions:
none

At the end of the fourth day of their fund-raising campaign, the teachers had raised $270 of the $360 they needed to reach their goal. Three of the teachers got into a debate about how they would report their progress.



- Ms. Mendoza wanted to announce that the teachers had made it three-fourths of the way to their goal.
- Mr. Park said that six-eighths was a better description.
- Ms. Christos suggested that two-thirds was really the simplest way to describe the teachers' progress.

A. Which of the three teachers do you agree with?

Ms. Mendoza and Mr. Park are correct, since three-fourths of $360 and six-eighths of $360 are both equal to $270.

Ms. Christos is incorrect, since two-thirds of $360 is $240.

B. How could the teacher you agreed with in part A prove his or her case?

Ms. Mendoza could say that if you divided $360 into four equal parts, each part would be $90 and three of these parts would be $270.

Mr. Park could say that if you divide $360 into eight equal parts, each part would be $45 and six of these parts would be $270.

B&P I – Problem 2.2 Notes
"Finding Equivalent Fractions"

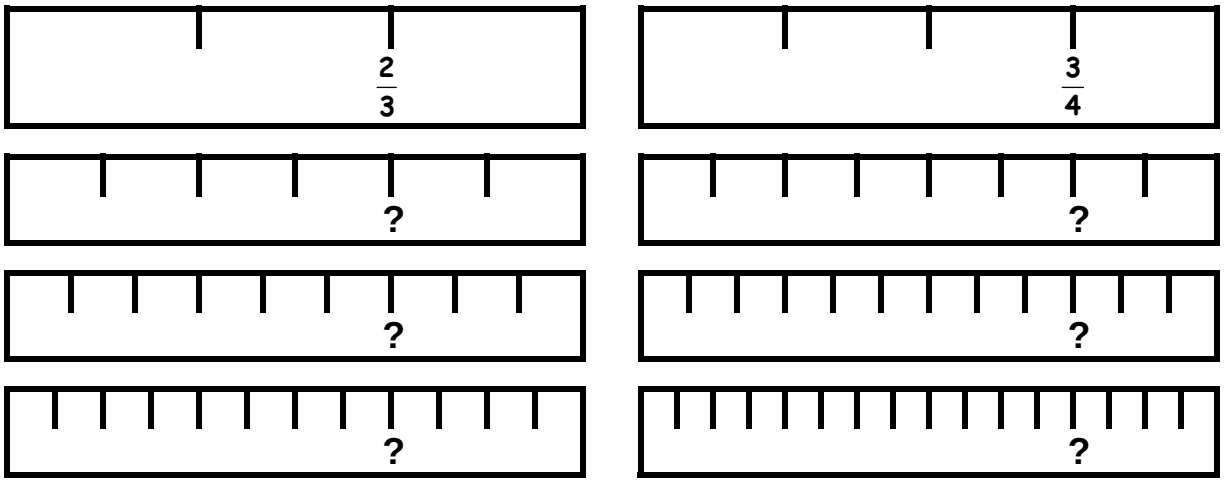
Definitions:

equivalent fractions *- two fractions that name the same quantity*

When you were using your fraction strips, you saw that some quantities could be described by several different fractions. In fact, any quantity can be described by an infinite number of different fractions!

For example: $\frac{1}{2}$ **can also be written as** $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, **or** $\frac{5}{10}$

The fraction strips on the left below show $\frac{2}{3}$ **and three fractions equivalent to** $\frac{2}{3}$**. The strips on the right show** $\frac{3}{4}$ **and three fractions equivalent to** $\frac{3}{4}$**. Study the two sets of strips. Look for patterns that will help you find other equivalent fractions.**



A. The three fractions that are shown are equivalent to $\frac{2}{3}$ are $\frac{4}{6}$, $\frac{6}{9}$, and $\frac{8}{12}$.

Three more equivalent fractions are $\frac{10}{15}$, $\frac{12}{18}$, and $\frac{14}{21}$.

B. The three fractions that are shown are equivalent to $\frac{3}{4}$ are $\frac{6}{8}$, $\frac{9}{12}$, and $\frac{12}{16}$.

Three more equivalent fractions are $\frac{15}{20}$, $\frac{18}{24}$, and $\frac{21}{28}$.

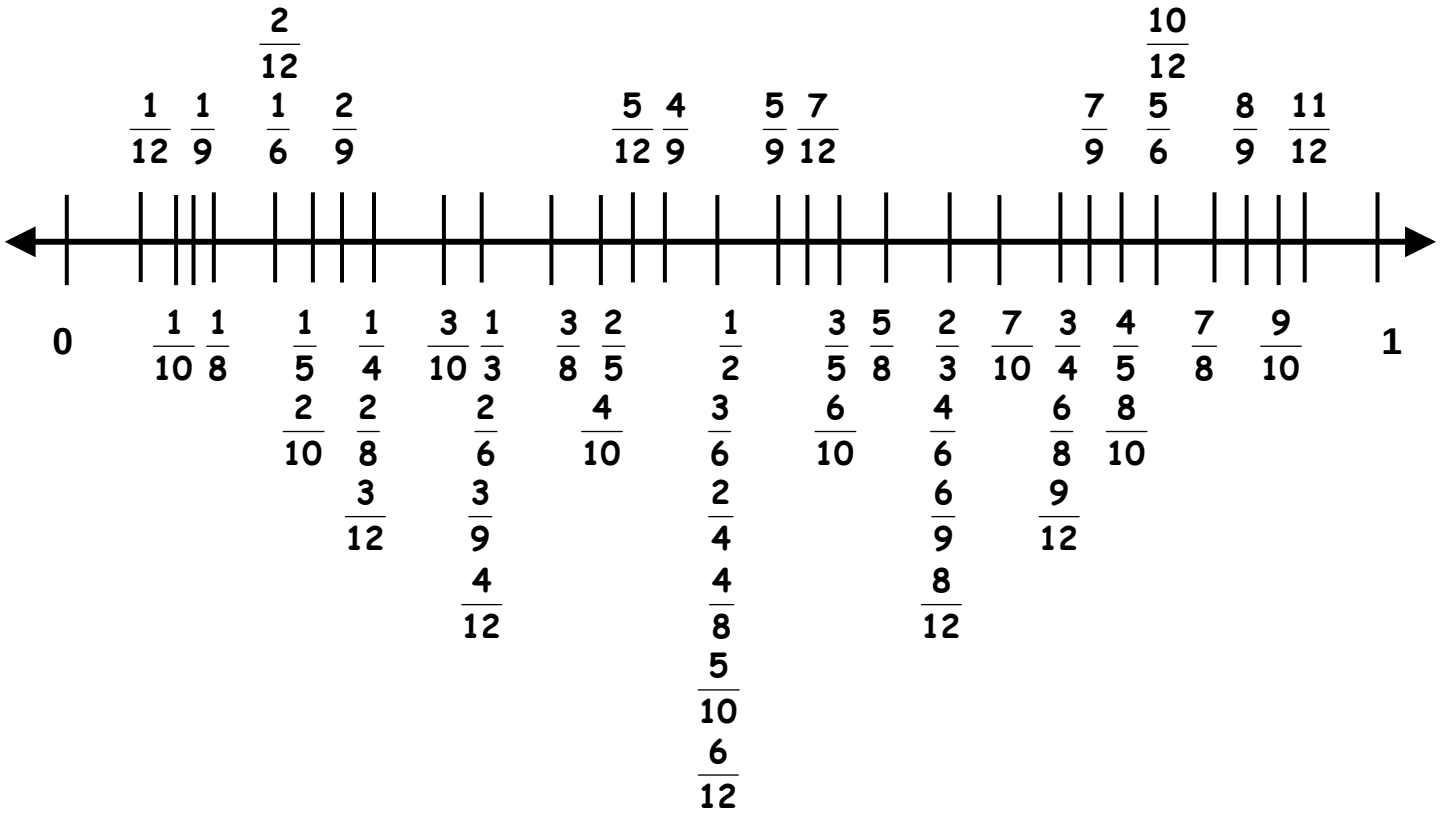
Patterns:

You can find equivalent fractions by multiplying the numerator and the denominator by the same number!

B&P I – Problem 2.3 Notes
"Making a Number Line"

Definitions:
none

Sometimes it is helpful to have all of your fraction strip values on one number line. You can copy the fractions from all of your fraction strips onto a single number line by simply starting with a line labeled 0 at the left end and 1 at the right end. When you finish, it should look like the one below.



Do you notice any patterns?

B&P I – Problem 2.4 Notes
"Comparing Fractions to Benchmarks"

Definitions:
benchmarks* - *used on a number line as a point of reference

In math, sometimes we want to quickly estimate the size of a fraction. This can be done by comparing a fraction to a benchmark such as 0, ½, or 1. First you decide whether a fraction is *between* 0 and ½, *between* ½ and 1, or *greater* than 1. Then you can decide whether the fraction is *closest* to 0, ½, or 1.

A. By looking at the following fractions, try to decide if it is between 0 and ½ or between ½ and 1.

$\frac{1}{5}$ $\frac{2}{3}$ $\frac{8}{10}$ $\frac{3}{12}$ $\frac{3}{5}$ $\frac{5}{6}$ $\frac{5}{8}$ $\frac{4}{5}$ $\frac{3}{8}$ $\frac{3}{4}$ $\frac{2}{9}$ $\frac{7}{12}$ $\frac{1}{3}$

Between 0 & ½: $\frac{1}{5}$ $\frac{3}{12}$ $\frac{3}{8}$ $\frac{2}{9}$ $\frac{1}{3}$

Between ½ & 1: $\frac{2}{3}$ $\frac{8}{10}$ $\frac{3}{5}$ $\frac{5}{6}$ $\frac{5}{8}$ $\frac{4}{5}$ $\frac{3}{4}$ $\frac{7}{12}$

B.

Closest to 0	$\frac{1}{5}$	$\frac{2}{9}$				
Halfway between 0 and ½	$\frac{3}{12}$					
Closest to ½	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{7}{12}$
Halfway between ½ and 1	$\frac{3}{4}$					
Closest to 1	$\frac{8}{10}$	$\frac{5}{6}$	$\frac{4}{5}$			

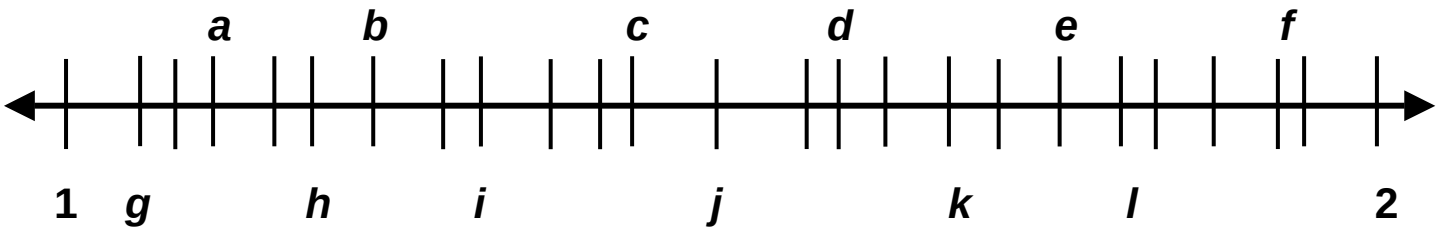
D. The fractions arranged on order from smallest to largest are:

$\frac{1}{5}$ $\frac{2}{9}$ $\frac{3}{12}$ $\frac{1}{3}$ $\frac{3}{8}$ $\frac{7}{12}$ $\frac{3}{5}$ $\frac{5}{8}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{8}{10} = \frac{4}{5}$ $\frac{5}{6}$

B&P I – Problem 2.5 Notes
"Fractions Greater Than One"

The whole-number points on a number line follow one another in a simple, regular pattern. But between every pair of whole numbers are many other points that may be labeled with fractions.

The portion of the number line shown below has marks for halves, thirds, fourths, fifths, sixths, eighths, ninths, tenths, and twelfths. These marks are different from the marks you identified in Problem 2.3, because they indicate fractions that are between 1 and 2 instead of between 0 and 1.



A. The following is a list of the values of each point on the number line.

a. $1\frac{5}{8}$ and $\frac{9}{8}$

b. $1\frac{1}{4}, 1\frac{2}{8}, 1\frac{3}{12}, \frac{5}{4}, \frac{10}{8}$, and $\frac{15}{12}$

c. $1\frac{5}{12}$ and $\frac{17}{12}$

d. $1\frac{3}{5}, 1\frac{6}{10}, \frac{8}{5}$, and $\frac{16}{10}$

e. $1\frac{3}{4}, 1\frac{6}{8}, 1\frac{9}{12}, \frac{7}{4}, \frac{14}{8}$, and $\frac{21}{12}$

f. $1\frac{9}{10}$ and $\frac{19}{10}$

g. $1\frac{1}{12}$ and $\frac{13}{12}$

h. $1\frac{1}{5}, 1\frac{2}{10}, \frac{6}{5}$, and $\frac{12}{10}$

i. $1\frac{1}{3}, 1\frac{2}{6}, 1\frac{3}{9}, 1\frac{4}{12}, \frac{4}{3}, \frac{8}{6}, \frac{12}{9}$, and $\frac{16}{12}$

j. $1\frac{1}{2}, 1\frac{2}{4}, 1\frac{3}{6}, 1\frac{4}{8}, 1\frac{5}{10}, 1\frac{6}{12}, \frac{3}{2}, \frac{6}{4}, \frac{12}{8}, \frac{15}{10}$ and $\frac{18}{12}$

k. $1\frac{2}{3}, 1\frac{4}{6}, 1\frac{6}{9}, 1\frac{8}{12}, \frac{5}{3}, \frac{10}{6}, \frac{15}{9}$, and $\frac{20}{12}$

l. $1\frac{4}{5}, 1\frac{8}{10}, \frac{9}{5}$, and $\frac{18}{10}$

B. Mark and label a point fitting each of the descriptions below. Do not use points that have already been marked.

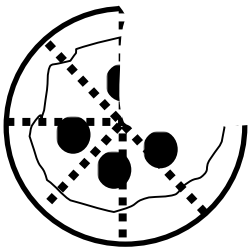
1. **a point close to, but larger than 1** $(1\frac{1}{16})$
2. **a point close to, but smaller than 1 ½** $(1\frac{7}{16})$
3. **a point close to, but larger than 1 ½** $(1\frac{9}{16})$
4. **a point close to, but smaller than 2** $(1\frac{15}{16})$

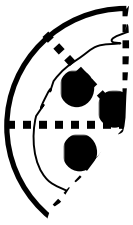
B&P I – Problem 3.1 Notes
"Area Models for Fractions"

In the first two investigations, you used fraction strips to think of a fraction as a part of the whole. Now we will use area models to think of fractions as parts of a region.

For example, if a pizza is cut into eight slices of the same size, and you eat two of the slices, then you have eaten two-eighths of the pizza. If you eat five of the slices, you have eaten five eighths of the pizza.

$\frac{2}{8}$ eaten





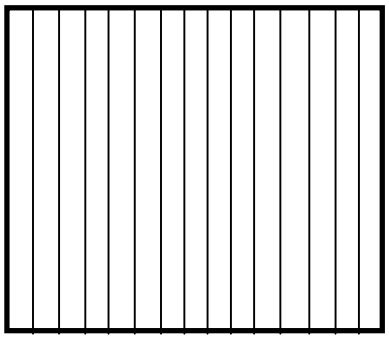
$\frac{5}{8}$ eaten

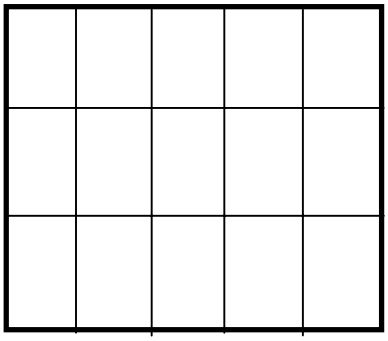
If you divide a square pan of brownies into equal-size brownies and then eat two brownies, what part of the batch have you eaten?

To answer this question you need to know the total number of brownies in each batch.

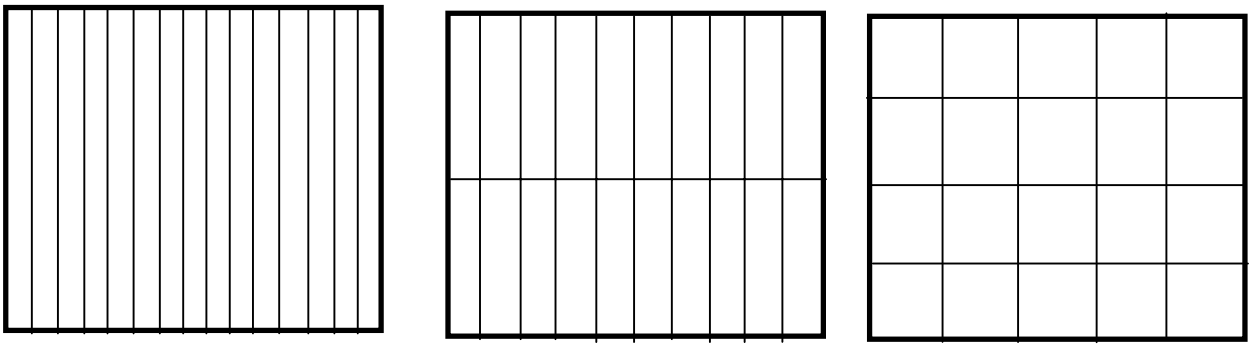
Use the squares on Labsheet 3.1 as models for pans of brownies. Show the cuts you make to divide a pan of brownies into:

A. 15 equal-size large brownies

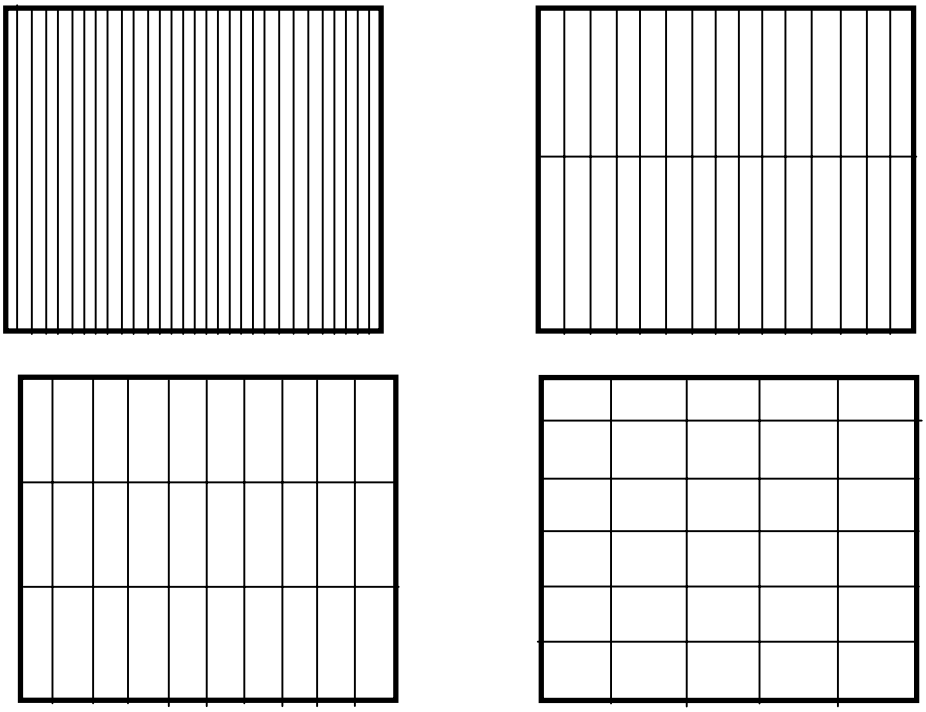




B. 20 equal-size medium brownies



C. 30 equal-size small brownies



Follow-Up

1. A. What fraction of the whole pan is one small brownie?

If a pan of brownies is divided into 30 equal-size pieces, then one of these pieces is $\frac{1}{30}$ *of the whole pan.*

B. One medium brownie?

If a pan of brownies is divided into 20 equal-size pieces, then one of these pieces is $\frac{1}{20}$ *of the whole pan.*

C. One large brownie?

If a pan of brownies is divided into 15 equal-size pieces, then one of these pieces is $\frac{1}{15}$ *of the whole pan.*

B&P I – Problem 3.2 Notes
"Baking Brownies"

Samantha, Romero, and Harold are making brownies for 240 campers from their school. They will be using the following recipe.

Chunky Brownies with a Crust

- $1\frac{1}{4}$ flour
- $\frac{1}{4}$ cup sugar
- $\frac{1}{2}$ cup cold butter or margarine
- 1 14-oz. can sweetened condensed milk
- $\frac{1}{4}$ cup unsweetened cocoa
- 1 egg
- 1 teaspoon vanilla
- $\frac{1}{2}$ teaspoon baking powder
- 1 7-oz. bar milk chocolate (broken into small pieces)
- $\frac{3}{4}$ cup chopped nuts (optional)

Preheat the oven to 350 degrees. In a medium bowl, combine 1 cup of flour and the sugar. Cut in the margarine or butter until crumbly. Press the mixture firmly into the bottom of a 10-by-10-inch baking pan. Bake 15 minutes. Meanwhile, in a large mixing bowl, beat the sweetened condensed milk, the cocoa, the egg, the remaining flour, the vanilla, and the baking powder. Stir in the nuts and chocolate chunks. Spread over the prepared crust. Bake 20 minutes. Cool. Sprinkle with confectioner's sugar if desired. Store tightly covered at room temperature. Makes 15 large, 20 medium or 30 small brownies.

A. Do you think Samantha, Romero, and Harold should make small, medium, or large brownies?

Things to consider before making the decision would be:

- ★ *how much money is available to buy ingredients?*
- ★ *will you have help making the brownies?*
- ★ *how long will it take to make the brownies?*

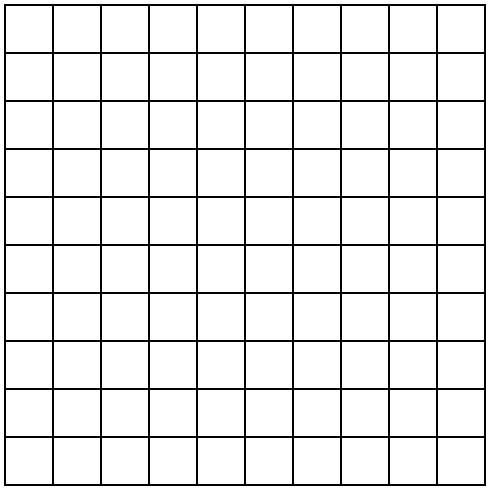
B. If they make brownies of the size you chose in part A, how much of each ingredient will they need to make enough to serve brownies to each person at camp?

	Small (30)	Medium (20)	Large (15)
Batches for 240	**8 batches**	**12 batches**	**16 batches**
cups flour	**10**	**15**	**20**
cups sugar	**2**	**3**	**4**
cups butter	**4**	**6**	**8**
cups milk	**8**	**12**	**16**
cups cocoa	**2**	**3**	**4**
eggs	**8**	**12**	**16**
tsp. vanilla	**8**	**12**	**16**
tsp. baking powder	**4**	**6**	**8**
# 7-oz. choc. bars	**8**	**12**	**16**
cups nuts	**6**	**9**	**12**

B&P I – Problem 4.1 Notes
"Designing a Garden"

Remember that decimals are a convenient way to express fractions with denominators such as 10, 100, 1000, or 10,000.

In this problem, Justin's family has a plot in a community garden and must decide what vegetables to plant. A community garden is a garden that is shared by several people. Justin's plot is a 100 square-meter plot. That means that it is a square with a width of 10 meters and a height of 10 meters.



Look at Labsheet 4.1 and make a suitable plan for Justin's garden. Be sure to include the following information:

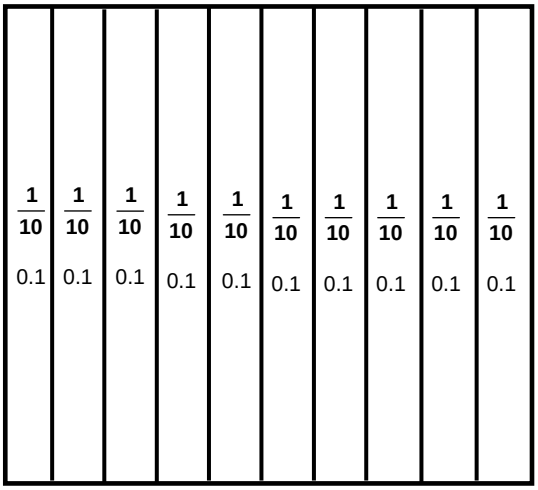
- **Justin's father wants to be sure potatoes, beans, corn, and tomatoes are planted. He wants twice as much of the garden to be planted in corn as potatoes. He wants three times a much land planted in potatoes as tomatoes.**
- **Justin's sister wants cucumbers in the garden.**
- **Justin's brother wants carrots in the garden.**
- **Justin's mother wants eggplant in the garden.**
- **Justin wants radishes in the garden.**

Your answers may look different than those of your classmates. The location and amount of each vegetable may be different on each grid. There should be twice as many corn squares as potato squares and there should be three times as many potato squares as tomato squares.

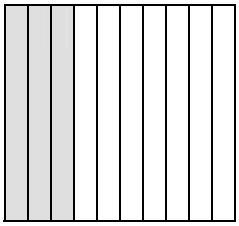
B&P I – Problem 4.2 Notes
"Making Smaller Parts"

Definitions:
<u>decimals</u> - a convenient way to express fractions with denominators such as 10, 100, 1000, or 10,000

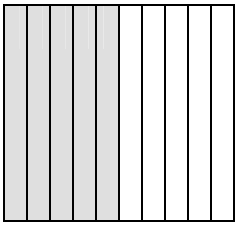
A tenths grid is divided into ten equal parts. It resembles the tenths fraction strip you have been using, only it is a square.



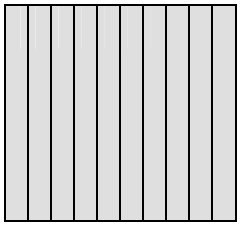
Here are some examples of fractions represented on tenths grids. Fraction names and decimal names for the shaded part are given below each drawing.



$\frac{3}{10}$ or 0.3

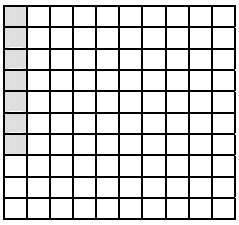


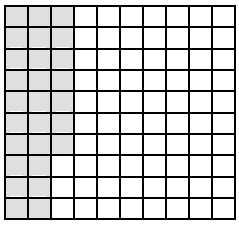
$\frac{5}{10}$ or 0.5

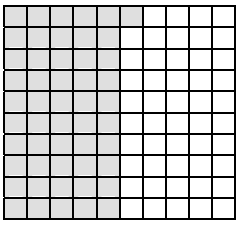


$\frac{10}{10}$ or 1.0

Fractions can also be represented on a hundredths grid. We can write fractional parts of the 100 as decimal numbers.







Fraction	$\frac{7}{100}$	$\frac{27}{100}$	$\frac{51}{100}$
Decimal	0.07	0.27	0.51
Meaning	7 out of 100	27 out of 100	51 out of 100

Refer to Problem 4.1 and write each of the fractional parts of Justin's garden as a decimal.

Follow-Up

1. A. **If you sub-divide a hundredths grid so that each square of the grid were divided into ten equal parts, how many parts would the new grid have?** *1000 parts*

B. **What is a fraction and decimal name for the smallest part of this new grid?** $\frac{1}{1000}$ *or 0.001*

C. **How would you shade an area of this new grid to show** $\frac{1}{10}$**?**

You would still shade in $\frac{1}{10}$ *of the grid, but now the tenth would be subdivided into 100 parts.*

D. **What fraction or decimal names could you call this shaded area?**

Possible answers: $\frac{100}{1000}$*, 0.100, 0.10, 0.1*

E. **What would you call this new grid, which has every square of a hundredths grid divided into ten equal parts?**

A thousandths grid.

2. A. **You can write** $\frac{9}{100}$ **as the decimal 0.09. How could you write** $\frac{9}{1000}$ **as a decimal?** *0.009*

B. **How could you write** $\frac{469}{1000}$ **as a decimal?** *0.469*

3. A. **What would you need to do to the new grid you discovered in question 1 to make a grid that shows ten thousandths?**

Subdivided each of the thousand sections into 10 parts, which would give 10,000 squares.

B. **How could you write** $\frac{9}{10{,}000}$ **as a decimal?** *0.0009*

C. **How could you write** $\frac{469}{10{,}000}$ **as a decimal?** *0.0469*

B&P I – Problem 4.3 Notes
"Using Decimal Benchmarks"

In Investigation 2, we used benchmarks to estimate fractions. Now we will use benchmarks to estimate and compare decimals.

A. Rename each of these fraction benchmarks as a decimal.

Fraction benchmarks	Decimal	Fraction benchmarks	Decimal
1. **0**	*0*	4. $\frac{3}{4}$	*0.75*
2. $\frac{1}{4}$	*0.25*	5. **1**	*1*
3. $\frac{1}{2}$	*0.5*		

B. Order each of the sets of numbers from smallest to largest.

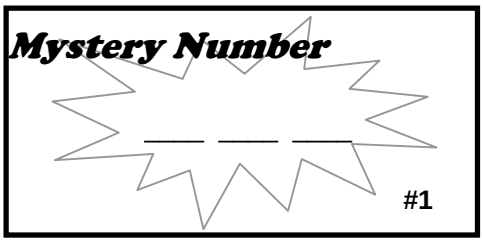
Original set	Arranged from smallest to largest
1. **0.23, 0.28, 0.25**	*0.23, 0.25, 0.28*
2. **2.054, 20.54, 2.54**	*2.054, 2.54, 20.54*
3. **0.78, 0.708, 0.078**	*0.078, 0.708, 0.78*

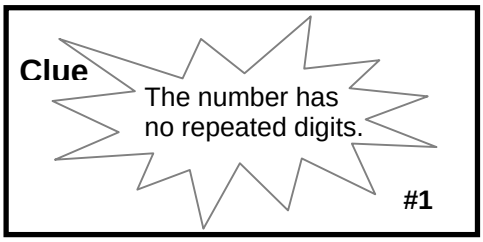
C. Complete the table.

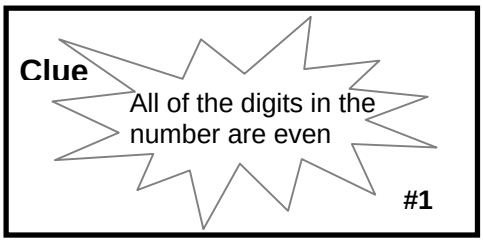
Number	Name in words	Nearest decimal benchmark	Nearest fraction benchmark	Reasoning
0.23	*twenty-three hundredths*	*0.25*	$\frac{1}{4}$	$\frac{23}{100}$ *is very close to* $\frac{25}{100}$ *or* $\frac{1}{4}$.
0.28	*twenty-eight hundredths*	*0.25*	$\frac{1}{4}$	$\frac{28}{100}$ *is very close to* $\frac{25}{100}$ *or* $\frac{1}{4}$.
0.25	*twenty-five hundredths*	*0.25*	$\frac{1}{4}$	$\frac{25}{100}$ *equals* $\frac{1}{4}$.
0.78	*seventy-eight hundredths*	*0.75*	$\frac{3}{4}$	$\frac{78}{100}$ *is very close to* $\frac{75}{100}$ *or* $\frac{3}{4}$.
0.708	*seven hundred eight thousandths*	*0.75*	$\frac{3}{4}$	$\frac{71}{100}$ *is very close to* $\frac{75}{100}$ *or* $\frac{3}{4}$.
0.078	*seventy-eight thousandths*	*0*	*0*	$\frac{8}{100}$ *is very close to 0.*

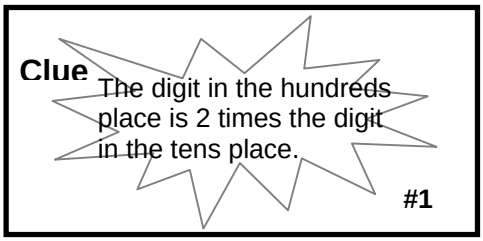
B&P I – Problem 4.4 Notes
"Distinguishing Digits"

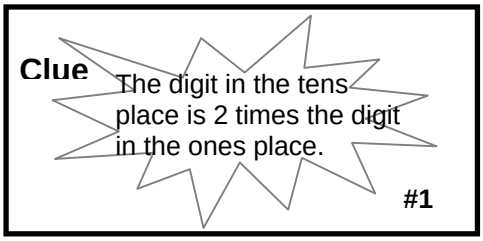
Distinguishing Digits is a collection of number puzzles. In each puzzle, you use clues to help find a Mystery Number. Use the clue cards for Problems 1 and 2 to help you find the answer to the Mystery Number.

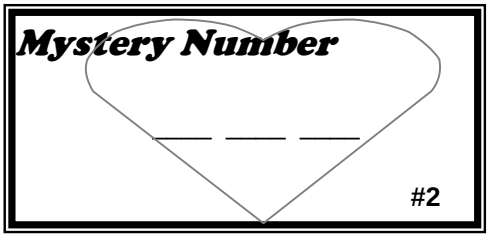


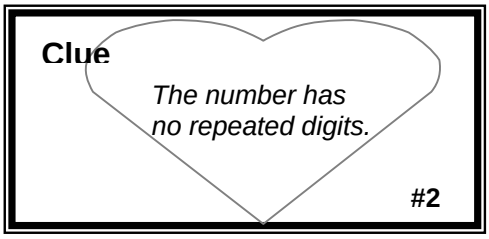


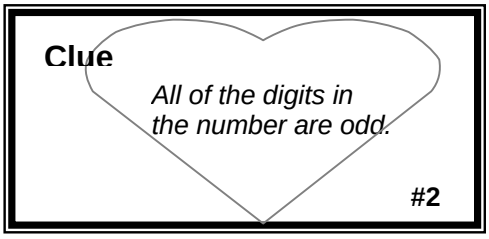


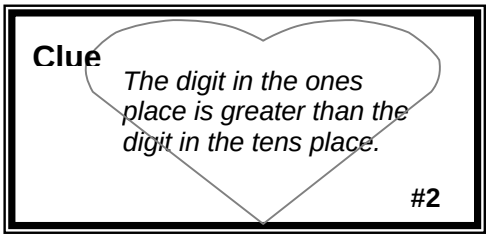


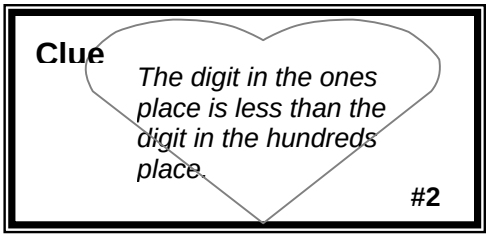


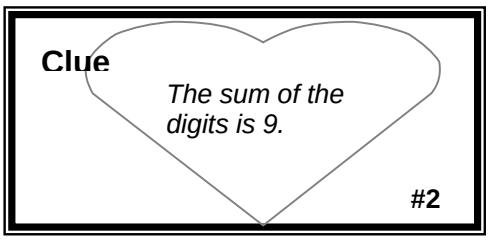












Answers: Problem 1 (842) and Problem 2 (513)

B&P I – Problem 5.1 Notes
"Choosing the Best"

Definitions:
none

The Portland Middle School Basketball team is playing the Coldwater Colts. The game is tied 58 to 58. In her excitement, the Coldwater coach steps onto the court just as the buzzer sounds, and a technical foul is called.

The Portland coach has to choose one of her players to shoot the free throw. If the payer makes the free throw, Portland will win.

The coach has three players to choose from to shoot the free throw. In their pre-game warm-ups

- **Angela made 17 out of 25 free throws**
- **Emily made 15 out of 20 free throws**
- **Carma made 7 out of 10 free throws**

Which player should the Portland coach select to shoot the free throw?

Angela made $\frac{17}{25}$ *free throws, which is the same as* $\frac{68}{100}$.

Emily made $\frac{15}{20}$ *free throws, which is the same as* $\frac{75}{100}$.

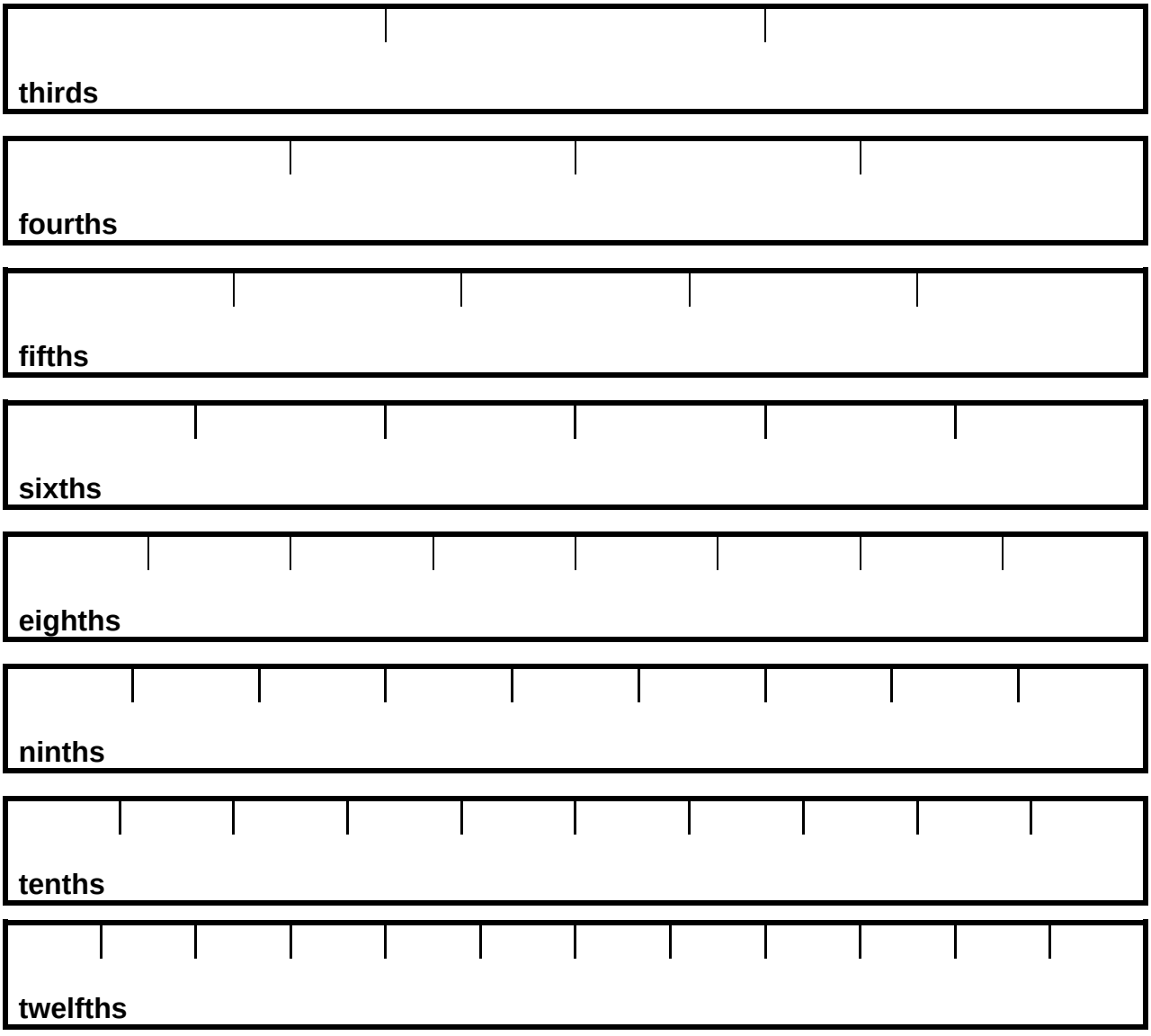
Carma made $\frac{7}{10}$ *free throws, which is the same as* $\frac{70}{100}$.

Based on this information, the coach should probably put Emily in the game since she is the most successful free throw shooter.

B&P I – Problem 5.2 Notes
"Writing Fractions as Decimals"

On Labsheet 5.2 are fraction strips with which you are already familiar. Below these strips is a hundredths strip, which is a tenths strip that has each segment divided into ten parts. Use the fraction strips to help you estimate each of the fractions represented on the halves, thirds, fourths, fifths, sixths, eighths, ninths, tenths, and twelfths fraction strip as decimals.

You might think about doing this by comparing the marks on each fraction strip to the marks on the hundredths strip. Label each mark on the halves, thirds, fourths, fifths, sixths, eighths, ninths, tenths, and twelfth fraction strips with an approximate decimal representation.



Answers are located on the back of this page.

Follow-Up

1. **Did you find any patterns that helped you to predict what some of the fractions would be as decimals?** *The halves, fifths, and tenths strips are easy because the marks on these strips match exactly the marks on the hundredths strip.*

2. **How did your knowledge of equivalent fractions help you to find decimal names for some of your factions?** *It is easy to find equivalent fractions with denominators of 100 for halves, fourths, and tenths. Since* $\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}$ *and* $\frac{6}{12}$ *are all equivalent to* $\frac{1}{2}$, *they all have the decimal form 0.5.*

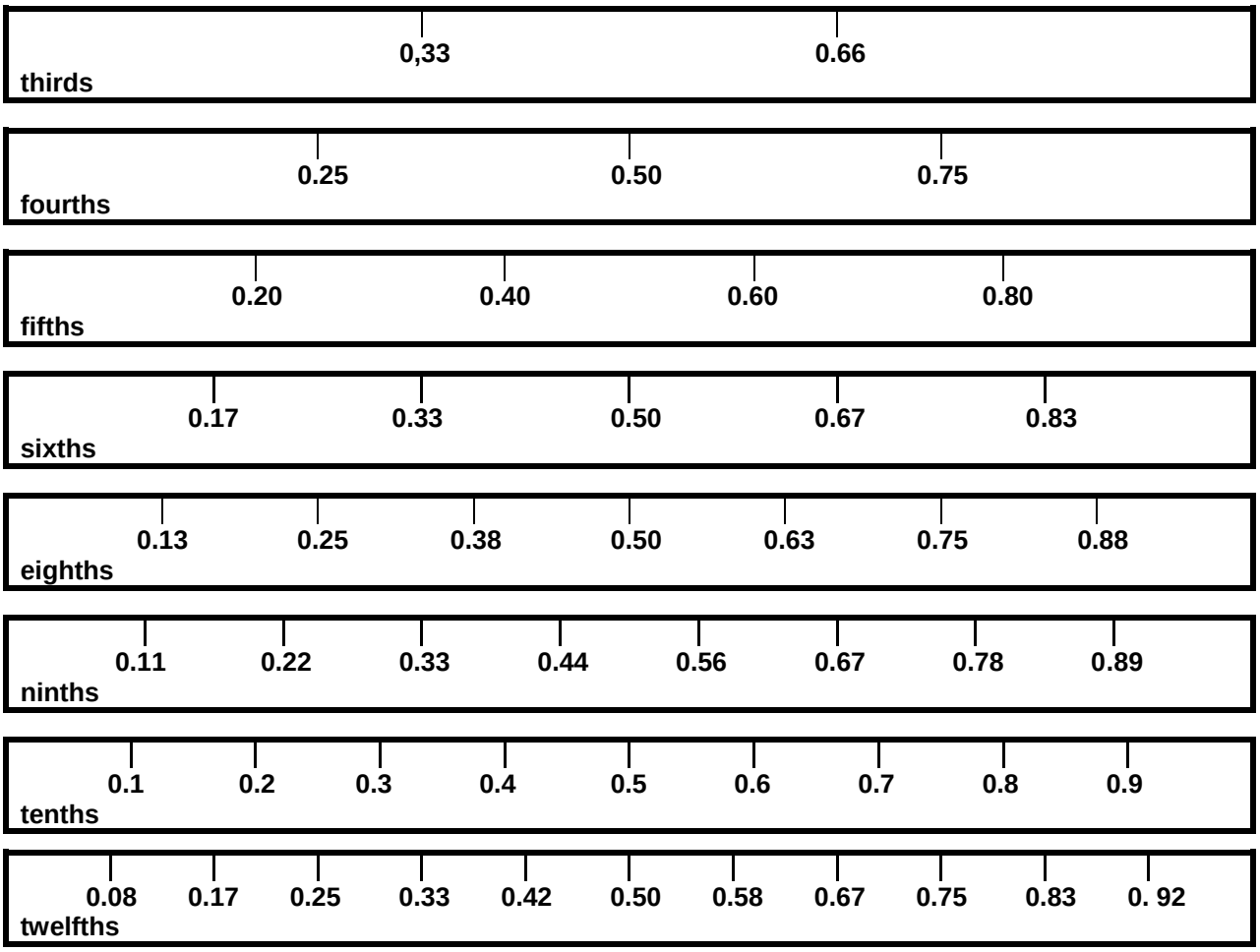
3. **In a-d, find an approximate fraction for the decimal.**

a. **0.17** $\frac{1}{6}$ *or* $\frac{2}{12}$

b. **0.29** $\frac{3}{10}$

c. **0.609** $\frac{3}{5}$ *or* $\frac{6}{10}$

d. **0.92** $\frac{11}{12}$



B&P I – Problem 5.3 Notes
"Moving From Fractions to Decimals"

Students have collected items for a hurricane relief program sponsored by their school. The students had 24 boxes for packing the food they collected. They wanted to share the supplies equally among the families who would receive the boxes. They had small plastic bags and plastic containers to use to repack the items for the individual boxes.

A. How much of each item should the students include in each box?

Items collected	*Amount of item in each box*
48 tins of cocoa mix	*48÷24=2 tins per box*
72 boxes of powdered milk	*72÷24=3 boxes per box*
264 boxes of juice	*264÷24=11 boxes per box*
120 boxes of granola bars	*120÷24=5 boxes per box*
36 pounds of wheat crackers	*36÷24=1.5 pounds per box*
18 pounds of peanut butter	*18÷24=0.75 pound per box*
12 pounds of cheddar cheese	*12÷24=0.5 pound per box*
6 pounds of Swiss cheese	*6÷24=0.25 pound per box*
3 pounds of hot pepper cheese	*3÷24=0.125 pound per box*
7 pounds of peanuts	*7÷24 is about 0.29 pound per box*
5 pounds of popcorn kernels	*5÷24 is about 0.21 pound per box*
475 apples	*475÷24 is about 19 apples per box (19 left over)*
195 oranges	*195÷24 is about 8 oranges per box (3 left over)*

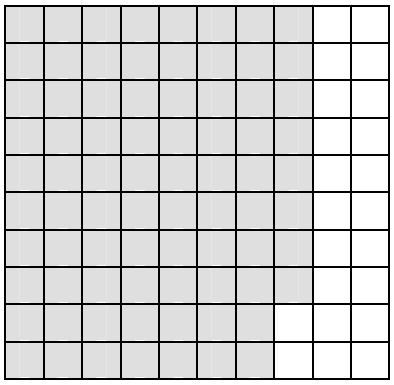
B. What operation did you use to find your answers? Why did this operation work? *You are dividing the total quantity for each item among the 24 boxes.*

C. How can your calculator help you decide how to distribute the food items? *You can use a calculator to divide the total quantity for each item by 24.*

B&P I – Problem 6.1 Notes
"It's Raining Cats"

Definitions:
percent* - *percent means "out of 100"

Another useful way to express a fraction with a denominator of 100 is to use a percent. For example, suppose 78 out of 100 middle-school students say they like to swim. You already know how to represent the portion who like to swim with a fraction ($\frac{78}{100}$), a decimal (0.78) and a hundredths grid. You could also write is as 78%.



Use the information on pages 69-71 and Labsheet 6.1 to answer the questions for Problem 6.1.

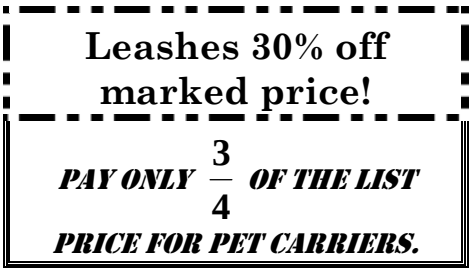
Begin by marking all the cats that are female on one chart and all the cats that are kittens on another chart. A kitten is defined as 8 months old or younger. Since the ages are given in decimals, we need to figure out what 8 months would be as a decimal. There are 12 months in a year, so 8÷12 is about 0.67. When you are finished, answer the following questions.

	Fraction	*Decimal*	*Percent*
A. How many are cats are female?	$\frac{54}{100}$	*0.54*	*54%*
B. How many cats are male?	$\frac{46}{100}$	*0.46*	*46%*
D. How many are kittens?	$\frac{17}{100}$	*0.17*	*17%*
E. How many are adults?	$\frac{83}{100}$	*0.83*	*83%*

C. What do you notice about the combined percentage of female and male cats?
54% and 46% add to 100%. Since no cat can be both male and female, the percents must add to a whole.

F. What do you notice about the combined percentage of kittens and adult cats?
17% and 83% add to 100%. No cat can be both a kitten and an adult, so the percents must add to the whole.

B&P I – Problem 6.2 Notes
"Dealing with Discounts"



All year long you can count on a $12\frac{1}{2}\%$ discount on pet treats!

A. **What percent discount is being offered for leashes?** *30%*

Write the percent as a fraction. $\frac{30}{100}$

What would be the cost of a $10.00 leash after the discount? *$7.00*

B. **What fraction of the original price will you be saving?** $\frac{1}{4}$

Write the fraction as a percent. *25%*

What would be the cost of a $10.00 pet carrier after the discount? *$7.50*

C. **How much of a dollar are you saving on pet food?** *40 cents*

Write the savings as a percent. *40%*

Write the savings as a fraction. $\frac{40}{100}$

How much of a dollar are you paying for pet food? *60 cents*

Write the cost as a percent. *60%*

Write the cost as a fraction. $\frac{60}{100}$

What would be the cost of a $10.00 worth of pet food after the discount? *$6.00*

D. **Write the percent of discount on pet treats.** *12.5%*

What would the discount be as a decimal? *0.125*

What would be the cost of $10.00 of pet treats after the discount? *$8.75*

Follow-Up

1. **How can you change a percent to a fraction?**

   Make the number in front of the percent sign the numerator, and make the denominator 100.

2. **How can you change a percent to a decimal?**

   If the percent is a two-digit number, drop the percent sign and put a decimal point in front of the first digit. If the percent is a one digit number, like 5%, drop the percent sign, but make sure you write your number so that as a decimal is means "5 out of 100" - here you would have to write 0.05.

3. **How can you change a decimal to a fraction?**

   Make the decimal number the numerator of the fraction, and make the denominator whatever place value the last digit of the decimal is in. For 0.32, the numerator would be 32, and the denominator would be 100 because the 2 is in the hundredths place.

4. **How can you change a decimal to a percent?**

   With a two-digit decimal, just write the number and a percent sign. For 0.31, you just write 31%. For a decimal like 0.2, write an equivalent decimal with a denominator of 100 - 0.20 - then write it as a percent, 20%.

5. **How can you change a fraction to a decimal?**

   If the denominator is a factor of 10 or 100, just write an equivalent fraction with a denominator of 10 or 100. Whatever the new numerator is will be the decimal preceded by a decimal point. If the fraction has a denominator like 8 or 3, you can divide the denominator into the numerator, which will give you the decimal equivalent.

6. **How can you change a fraction to a percent?**

   Changing a fraction to a percent is easier if you first change it to a decimal.

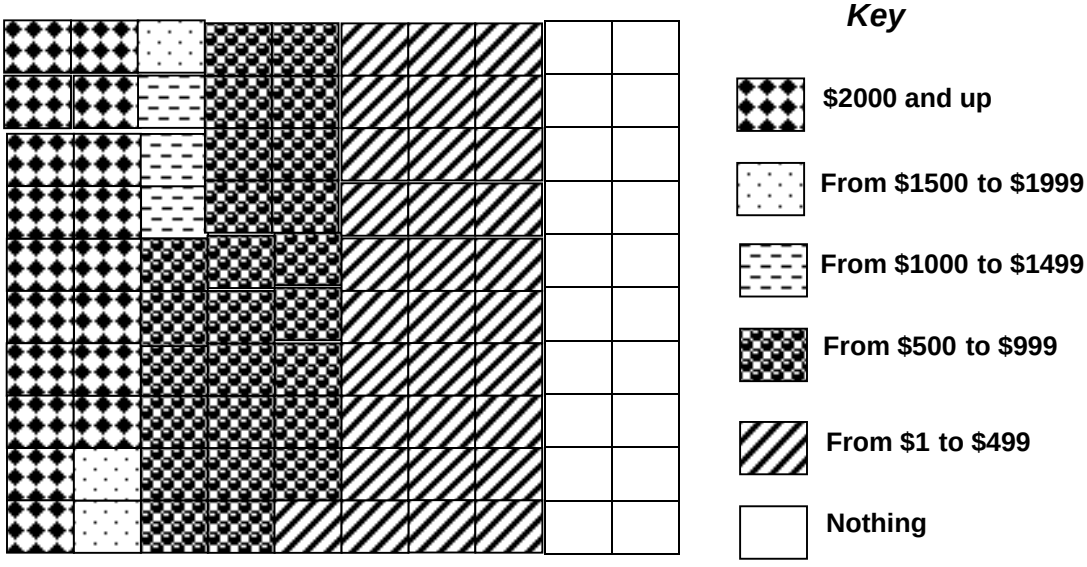
B&P I – Problem 6.3 Notes
"Changing Forms"

A group of cat owners were asked this question:

How much ransom would you be willing to pay if your pet was kidnapped?

The table shows how the owners responded.

	Percent	*Decimal*	*Fraction*
$2000 and up	**18%**	*0.18*	$\frac{18}{100}$
From $1500 to $1999	*3%*	**0.03**	$\frac{3}{100}$
From $1000 to $1499	*3%*	*0.03*	$\frac{\mathbf{3}}{\mathbf{100}}$
From $500 to $999	**25%**	*0.25*	$\frac{25}{100}$
From $1 to $499	*31%*	**0.31**	$\frac{31}{100}$
Nothing	*20%*	*0.2*	$\frac{\mathbf{1}}{\mathbf{5}}$



1. **What percent of cat owners would pay less than $1000 ransom to get their pets back?**
   76%
2. **What percent of cat owners would pay less than $2000 ransom to get their pets back?**
   82%

B&P I – Problem 6.4 Notes
"It's Raining Cats and Dogs"

In a recent survey, 150 dog owners and 200 cat owners were asked what type of food their pets liked. Here are the results of the survey.

Preference	*Out of 150 dog owners*	*Out of 200 cat owners*
Human food only	**75**	**36**
Pet food only	**45**	**116**
Human and pet food	**30**	**48**

Consider the following results.

	Fraction	*Decimal*	*Percent*
favored dog food is *human food only*	$\frac{75}{150} = \frac{1}{2}$	0.5	50%
favored cat food is *pet food only*	$\frac{116}{200} = \frac{58}{100} = \frac{29}{50}$	0.58	58%
human food only or pet food only (dogs)	$\frac{120}{150} = \frac{4}{5}$	0.8	80%
human food only or pet food only (cats)	$\frac{152}{200} = \frac{76}{100} = \frac{19}{25}$	0.76	76%

Follow – Up

Preference	*Out of 100* **DOG** *owners*	*Out of 400* **CAT** *owners*	*Out of 50* **CAT** *owners*
Human food only	**50**	**72**	**9**
Pet food only	**30**	**232**	**29**
Human and pet food	**20**	**96**	**12**