PRENTICE HALL

# MATHEMATICS

COURSE 1

## Activity Lab

## All-In-One Workbook

Name _____ Class _____ Date _____

# Activity Lab 1-1

## Understanding Whole Numbers

**Materials needed:** 10 sheets of paper for each group, each with a single digit, 0–9, written on it

**Work in groups of eight, divided into two teams of four.**

1. Each player receives a sheet of paper with a single digit written on it.
2. With your 3 teammates, make the greatest number possible with your digits. Compare your number with the other team's number. Which number is greater? The team with the greater number will be called Team A. The other team is Team Z.
3. Next, try to make the least number possible with your team. Compare your new number to the other team's number. Which number is less?
4. Describe a situation where one of the two teams could make both the least number and the greatest number.

_____

_____

5. Now use the same digits to make numbers such that Team Z's number is larger than Team A's number.
6. Assemble with all of your classmates at the front of the classroom. As a class, make the largest number you can.
7. Now make the smallest number that you can. You must include all digits.
8. Did you notice a relationship between the class's smallest number and the class's largest number? If so, describe this relationship.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 1-2

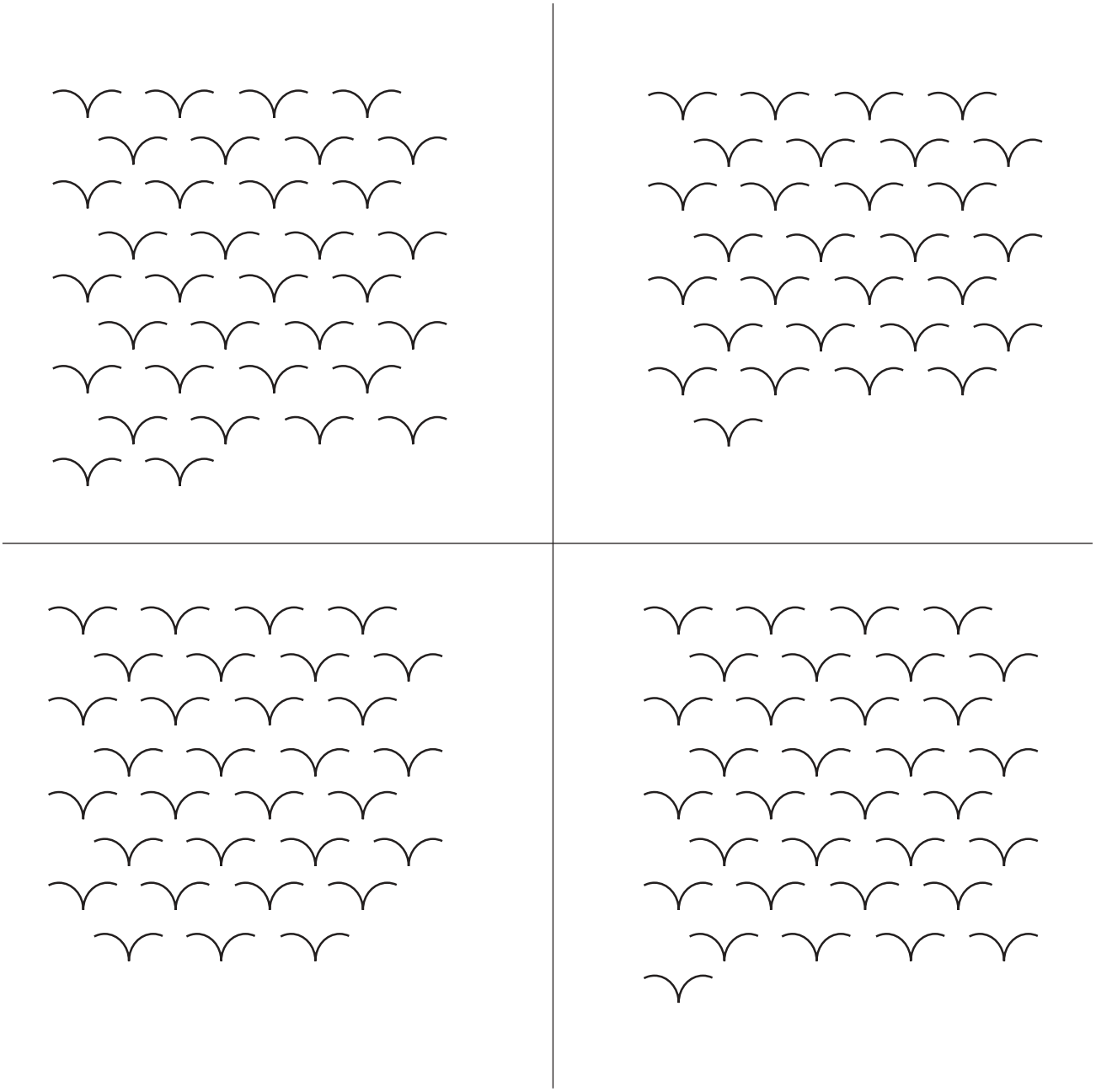
**Estimating With Whole Numbers**

## *Visual Thinking*

Estimate how many birds are in this picture without counting all of them.
Explain how you made your estimate.

_____

_____



Name _____ Class _____ Date _____

# Activity Lab 1-3

**Properties of Numbers**

**Materials needed:** blank 3 × 5 index cards, number cubes

**Work in teams of three.**

1. Each player rolls the number cube. The highest roller is Player 1, the next highest roller is Player 2, and the player with the smallest number is Player 3.
2. Player 1 starts the game by writing an addition problem using one number from each of the number banks in Problem A on an index card. Be careful not to let the other players see the problem!
3. When Players 2 and 3 are ready, Player 1 shows them the addition problem. Players 2 and 3 try to solve the problem as quickly as possible. When a player has an answer, he or she writes it down on an index card and places the card face-down in the center of the group. The player whose index card is on the bottom of the two completed cards has answered first.
4. Player 1 carefully adds the numbers in the math problem and checks the other players' answers. An incorrect answer gets 0 points. A correct answer gets 2 points, and the player who answered first gets 1 additional point if his or her answer is correct.
5. Next, Players 2 and 3 each roll the number cube and add the rolled number to their score.
6. Now change players and addition problems. Player 2 writes an addition problem using Problem B and Players 1 and 3 race to answer the problem. Continue in this fashion until all players have written a question with all of the problems. The player with the highest score at the end wins.

**Problem A.**

| | | |
|---|---|---|
| 23 13<br>13<br>33 | + | 7 57<br>27<br>37 67 |
| + | | 1 2 3<br>4 5 6<br>7 8 9 |

**Problem B.**

| | | |
|---|---|---|
| 9 29<br>19<br>79 | + | 11 41<br>31<br>1 71 |
| + | | 1 2 3<br>4 5 6<br>7 8 9 |

**Problem C.**

| | | |
|---|---|---|
| 22 12<br>2<br>92 | + | 8 38<br>28<br>18 |
| + | | 1 2 3<br>4 5 6<br>7 8 9 |

**Problem D.**

| | | |
|---|---|---|
| 4 94<br>14<br>24 44 | + | 66 16<br>36<br>106 |
| + | | 1 2 3<br>4 5 6<br>7 8 9 |

Name _____ Class _____ Date _____

# Activity Lab 1-4

**Order of Operations**

**Materials needed:** scientific calculator

**Example**

**a.** Calculate $(7 \times 4) + 3$. Then calculate $7 \times (4 + 3)$. Compare the results.

① To find $(7 \times 4) + 3$, use the following key sequence:

Press [(], enter 7, press [×], enter 4, press [)], press [+], enter 3, press [=]. Write the result.

② Clear and calculate $7 \times (4 + 3)$. Write the result.

③ Compare the results. The first expression gives a result of 31; the second gives 49.

**b.** Calculate the same expression without any grouping symbols: $7 \times 4 + 3$. Write the result.

The result is 31, because the calculator multiplies before adding.

**Exercises**

**1. a.** Calculate $8 + 4 \times 3$. Which operation did the calculator do first?

**b.** Insert parentheses in the expression so that the calculator gives a different result from when there are no parentheses.

**2.** Insert parentheses in the following expression so that your calculator gives an answer of 10.

$32 - 6 + 5 \times 2$

**3.** Insert parentheses in the following expression so that your calculator gives an answer of 62.

$32 - 6 + 5 \times 2$

**4.** Explain the difference between your answers to Exercises 2 and 3. Why are the results different even though the numbers are the same in both expressions?

**5.** Use your calculator to evaluate the expression

$2 + 3 \times 4 - (5 - 3) \times 2$.

Insert parentheses so that the following equations are true. Use your calculator to check your answers.

**6.** $3 \times 2 + 5 = 21$

**7.** $3 + 5 \times 6 + 12 \div 6 = 50$

**8.** $3 + 5 \times 6 + 12 \div 6 = 24$

Name _____ Class _____ Date _____

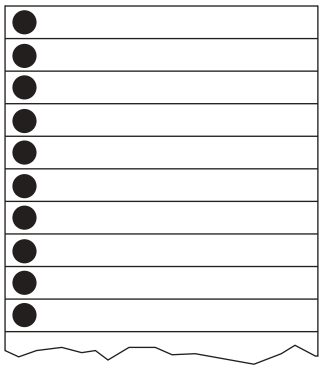
# Activity Lab 1-5

**Understanding Decimals**

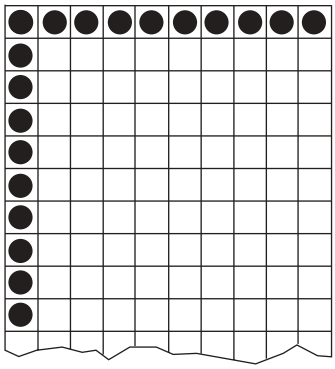
**Materials needed:** 100 counters, ruler, 1 sheet of $8\frac{1}{2}'' \times 11''$ wide-ruled paper

**Work with a partner.**

1. Place 10 counters down the left side of a piece of paper. Using a ruler, mark lines on the page to divide the ten counters as shown in the diagram at right.



2. Now place 9 counters across the top of the page. Draw lines to the bottom of the page to form a decimal square as shown in the diagram at right.



3. Place all 100 counters on the decimal square so that each square is covered.
   a. How many counters are needed to cover the decimal square?
   b. Assume that each counter corresponds to a penny. Express the amount represented by the counters in dollars and cents.
4. Place counters on the decimal square to show 25¢. Express the amount as a decimal in dollars.
5. Place counters on the decimal square starting with the column on the left. Continue to cover squares column by column, as many as you like, but don't skip any squares. When you finish, ask your partner to write how much money you have shown as a decimal in dollars and cents.
6. Switch roles and try again with a different set of counters. Continue until each of you has had three turns.

Name _____ Class _____ Date _____

# Activity Lab 1-6

## Comparing and Ordering Decimals

**Materials needed:** scientific calculator

**Example 1:** Compare 0.3 and 0.09.

① To compare 0.3 and 0.09, being with the following key sequence:

Enter 0.3, press [−], enter 0.09, press [=].

② Look at the result. Since the answer is + 0.21, $0.3 > 0.09$.

**Example 2:** Compare 5.12 and 5.099.

① Subtract 5.099 from 5.12.

② Look at the result. The answer is +0.021, so $5.12 > 5.099$.

**Example 3:** Compare 1.011 and 1.101.
$1.011 - 1.101 = -0.09$, so $1.011 < 1.101$.

**Example 4:** Order 1.001, 1.101, 1.010, 1.100, and 1.011 from smallest to largest.

① Find the *smallest* decimal. Subtract it from the other numbers to make sure it is the smallest number in the list. If your first choice is not the smallest number, choose a different number and repeat the subtractions.

② Write the *smallest* number first in your list. Repeat these steps to find the next smallest number. Complete the list.
1.001, 1.010, 1.011, 1.100, 1.101

**Exercises**

**Use <, >, or = to complete each statement. Use your calculator to help you.**

**1.** 0.05 ☐ 0.02 **2.** 3.034 ☐ 3.340 **3.** 7.60 ☐ 7.06

**4.** 1.3 ☐ 1.30 **5.** 1.15 ☐ 1.015 **6.** 3.123 ☐ 3.321

**7.** 4.56 ☐ 4.067 **8.** 2.15 ☐ 2.51 **9.** 5.34 ☐ 5.43

**Order the decimals from least to greatest. Use your calculator to help you.**

**10.** 9.306, 9.360, 10.006, 9.036, 10.603

**11.** 2.47, 7.42, 2.07, 1.74, 4.74.

**12.** The Frogs team collected $15.90 for a project. The Snails team collected $15.09. Which team collected more money for the project?

Name _____ Class _____ Date _____

# Activity Lab 1-7

## Adding and Subtracting Decimals

**Materials needed:** paper, fraction tiles

**Use fraction tiles to complete the exercises. Each tile has the value 0.01.**

1. **a.** Place 10 tiles in a row. On a separate sheet of paper, express this row as a decimal.

   **b.** How many tiles do you need to show one tenth?

   **c.** Make 3 rows of 10 tiles each. Express all 3 rows as a decimal.

   **d.** How many tiles do you need to show 3 tenths?

   **e.** Combine 7 single tiles with your 3 rows. Express them as a decimal.

   **f.** How many tiles do you need to show 37 hundredths?

2. **a.** Use fraction tiles to show each addend in the equation: $0.15 + 0.29 = ?$

   **b.** Combine the rows of 10 and the single tiles for the two numbers to show the sum.

   **c.** Make more rows of 10 from the combined single tiles, if you can. How many rows did you make?

   **d.** How many rows and single tiles are there now? Find the sum.

3. **a.** Have each partner make a decimal model using single tiles and rows. Express each model as a decimal.

   **b.** Use the models to add the two decimals together.

   **c.** Repeat three times.

4. **a.** Use fraction tiles to show the decimal 0.36.

   **b.** To take 0.07 away from 0.36, how many tiles will you remove?

   **c.** Remove the tiles to find the difference. If you remove tiles from a row, separate all of the tiles in that row into single tiles. Write the new number of rows and single tiles. Write the result as a decimal.

5. **a.** Have your partner make a decimal model using single tiles and rows.

   **b.** Express the model as a decimal.

   **c.** Write a subtraction problem in which a decimal amount is subtracted from the model.

   **d.** Have your partner use the model to subtract.

Name _____ Class _____ Date _____

# Activity Lab 1-8

## Multiplying Decimals

**Materials needed:** standard number cube

1. Copy the table below on a separate sheet of paper.

| TRIAL | First Roll | Second Roll | Multiplication Problem | Product |
|---|---|---|---|---|
| Example | 6 | 3 | $6 \times 0.3$ | 1.8 |
| Trial 1 | | | | |
| Trial 2 | | | | |
| Trial 3 | | | | |
| Trial 4 | | | | |
| Trial 5 | | | | |

   a. Roll the number cube twice. Record the values in the table.

   b. Write a multiplication problem using the following method: your first roll represents a whole number and your second roll represents a decimal with the number you rolled in the tenths place. So, if you roll a 6 and a 3, the problem would be 6 times 0.3.

   c. Calculate the product and record your answer in the table. Complete the table for five trials.

2. Draw a table like the one above, but add a middle column labeled "Third Roll." Fill in the columns for the first and second rolls with the data from the first table.

   a. Roll the number cube. Record the value in your table as the third roll for Trial 1.

   b. Write a multiplication problem continuing the pattern of the method above. This means that the third roll will represent a decimal with the number you rolled in the *hundredths* place. For example, if you roll a 2, the example problem would be $6 \times 0.3 \times 0.02$.

   c. Calculate the product and record your answer in the table. Complete the table for five trials.

3. How can you use products from your first table in the second table?

4. How do the two groups of products compare? Explain.

Name _____ Class _____ Date _____

# Activity Lab 1-9

## Dividing Decimals

**Materials needed:** scientific calculator

**Example 1:** Find the quotient $0.8 \div 0.16$.

① Enter 0.8, press ÷, enter 0.16, press =.

② Copy the result carefully to your paper. $0.8 \div 0.16 = 5$.

**Example 2:** Find the quotient $0.12 \div 0.3$.

Try entering this problem in two different ways.

① First, enter a zero, a decimal point, a one, and a two, followed by the ÷ and a zero, a decimal point, and a three. Write down the answer that you see in the window. Then press CLEAR.

② Second, enter a decimal point, a one, and a two, followed by the ÷ and a decimal point, and a three.

You should get the same answer both times. Notice that the calculator uses the leading zero (the one before the decimal point) in the answer. $0.12 \div 0.3 = 0.4$.

You can either use the leading zero when you enter a decimal into the calculator, or you can omit it. It is a good idea always to use the leading zero because it helps you to avoid careless errors, such as entering 3 when you mean to enter 0.3.

**Exercises**

**1.** $1.2 \div 0.3$

**2.** $3.3 \div 1.1$

**3.** $0.36 \div 6$

**4.** $11.564 \div 8.26$

**5.** $0.15 \div 0.3$

**6.** $45.333 \div 3.65$

**7.** $9.156 \div 4.36$

**8.** $0.5 \div 0.5$

**9.** $0.9 \div 0.3$

**10.** $0.6 \div 0.2$

**11.** Each of 5 friends contributed an equal share to buy a gift that cost $21.60. How much did each contribute?

Name _____ Class _____ Date _____

# Activity Lab 2-1

**Finding the Mean**

*Using a Spreadsheet to Understand the Mean*

**Materials needed:** a spreadsheet program

Follow these steps to create a bar graph that shows the approximate population of selected South American countries, in millions of people, and the mean population, in millions of people: Brazil, 186; Colombia, 43; Argentina, 40; Peru, 28; Venezuela, 25; Chile, 16; Ecuador, 13; Bolivia, 9; Paraguay, 6; Uruguay, 3.

1. Enter the names of the countries in cells A1 through A10.
2. Enter the population of the countries in cells B1 through B10.
3. Highlight cell A11. Enter the title "Mean Population" in cell A11.
4. Highlight cell B11. Enter your spreadsheet's built-in function for finding the mean, "=**AVERAGE(B1..B10)**". Press ENTER. What is the mean population?

   _____
5. Highlight cells A1 through B11.
6. Use the graph or chart feature of your spreadsheet program to create a bar graph of your data. Resize the window if necessary.
7. How does the population of each country compare to the mean population?

   _____
8. Based on your bar graph, explain why the statement "the mean is the value you get when you make all the bars the same height" makes sense.

   _____

   _____

   _____

Name _____ Class _____ Date _____

# Activity Lab 2-2

## Median and Mode

**Work in groups of eight. Collect the following data from each member of your group.**

1. shoe size _____

2. age _____

3. month of birth _____

4. height _____

5. Find the median of each piece of data. _____

6. Find the mode of each piece of data. _____

7. Describe the average student in your group using the median. _____

8. Describe the average student in your group using the mode. _____

9. How do these two descriptions differ? _____

Name _____ Class _____ Date _____

# Activity Lab 2-3

**Frequency Tables and Line Plots**

*Plotting Height*

**Materials needed:** ruler, graph paper

**Work in small groups of 3–4 students, or do as a whole-class activity.**

1. **a.** Measure each class member's or group member's height to the nearest inch.

   **b.** On a separate sheet of paper, write the measurements in order from smallest to largest. Include a measurement for each member of your class or group; you may need to write some heights more than once.

2. What is the range of your data?

3. **a.** Draw a line on a separate piece of paper, and write the range of numbers below the line.

   **b.** Measure with a ruler to evenly space the numbers along the line.

   **c.** Write each number only once; don't leave out any numbers in the range.

4. **a.** Place an *X* for each member's height above the correct number on the line plot.

   **b.** Stack the *X*'s if you need to write more than one *X* per height.

5. Use the line plot to find the mean, median, and mode.

6. Using the data you've collected, plan and draw a stem-and-leaf plot on a separate piece of paper.

7. Using the same data, plan and draw a box-and-whisker plot on the same paper with the stem-and-leaf plot.

8. Compare the three different kinds of plots. Which one shows the data "best"? Explain.

Name _____ Class _____ Date _____

# Activity Lab 2-4

## Bar Graphs and Line Graphs

| **Materials needed:** | two standard number cubes, twelve stackable counters in four different colors (such as chips, cubes, or game pieces) |
|---|---|

**Work in pairs.**

**1. a.** Roll both number cubes and add the two numbers together.

**b.** Choose one color of chips and stack that many chips on the table. This is Trial 1 for Color 1.

**c.** Repeat for the other three colors.

**d.** Show your results in a chart like the one below.

**e.** Repeat three times to complete Trials 2, 3, and 4 for each color.

| Trial Number | Color 1: _____ | Color 2: _____ | Color 3: _____ | Color 4: _____ |
|---|---|---|---|---|
| 1 | Number of chips: | Number of chips: | Number of chips: | Number of chips: |
| 2 | Number of chips: | Number of chips: | Number of chips: | Number of chips: |
| 3 | Number of chips: | Number of chips: | Number of chips: | Number of chips: |
| 4 | Number of chips: | Number of chips: | Number of chips: | Number of chips: |

**2. a.** Line up the stacks of chips.

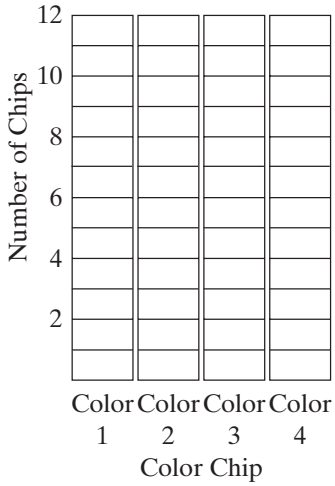
**b.** Which stack is the tallest for Trial 1?

**c.** Is it easier to compare the number of chips in the pile by counting their numbers or by looking at the stacks? Explain.

**3.** Like the stacks of chips, a bar graph helps you compare amounts quickly.

**a.** Use the data you've collected above to complete a bar graph like the one at right for Trial 1.

**b.** Fill in a box on the bar graph for each chip in each stack.




**4.** Use the data for one color of counter to create a bar graph for the four trials of that color counter.

**5.** Would you expect these two types of bar graphs to be different or similar? Explain.

Name _____ Class _____ Date _____

# Activity Lab 2-5

## Using Spreadsheets to Organize Data

**Materials needed:** spreadsheet program

A spreadsheet can be thought of as a table of values. Each cell has a name. For example, A1 is the cell in row 1 and column A. You can use your speadsheet's built-in functions to quickly create a table of values for any given expression.

| | A | B |
|---|---|---|
| 1 | Side Length (ft) | Perimeter (ft) |
| 2 | 2,345 | |
| 3 | 100,200 | |
| 4 | 35,999 | |
| 5 | | |

1. Enter the numbers in the cells as shown.
2. Create a table of values in column B that represents the perimeter of the squares whose side lengths are the numbers in column A. Since the perimeter of a square is 4 times the side length, type the formula **4*A2** in cell B2. Press ENTER. What is the perimeter of the square with side length 2,345 ft?

   _____
3. Use a copy command to find the perimeters for each of the remaining squares. What are the remaining perimeters?

   _____
4. Enter the side length 112.0345 in cell A5. What does your spreadsheet give as the value of the perimeter?

   _____
5. Use a new spreadsheet to create a table of Celsius temperatures for the Fahrenheit temperatures 32, 50, 86, 95, and 212 degrees using steps 2 and 3 above. First enter Fahrenheit temperatures in cells A2 through A5. Then enter the formula **(5/9)*(A2 – 32)** in cell B1. Use a copy command to fill in column B.

   What are the Celsius temperatures given by your spreadsheet?

   _____

Name _____ Class _____ Date _____

# Activity Lab 2-6

## Stem-and-Leaf Plots

**Use the stem-and-leaf plot to complete the exercises.**

| Stem | Leaves |
|---|---|
| 3 | 3 __ 6 7 |
| 4 | 4 7 |
| 5 | 3 5 9 |

**1.** What numbers could you put in the blank?

_____

_____

**2.** Use your answer in Exercise 1 to write the possible stem-and-leaf plots.

**3.** Find the median of each of the stem-and-leaf plots you wrote in Exercise 2.

_____

_____

**4.** What did you notice about the medians in Exercise 3?

_____

_____

_____

**5.** Find the mode of each of the stem-and-leaf plots you wrote in Exercise 2.

_____

**6.** Find the mean of each stem-and-leaf plot.

_____

_____

**7.** What did you notice about the means in Exercise 6?

_____

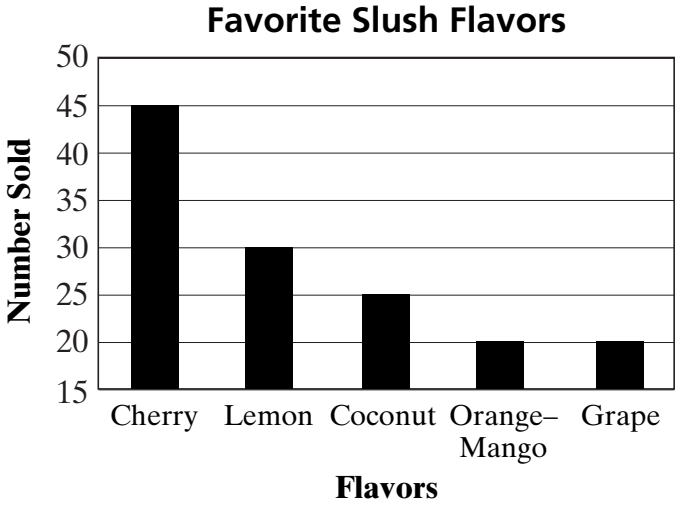
_____

Name _____ Class _____ Date _____

# Activity Lab 2-7

## Misleading Graphs and Statistics

**Study the bar graph of favorite fruit slush flavors.**




1. Explain why the graph is misleading.

_____

_____

2. Use the same data to make a graph that is not misleading.

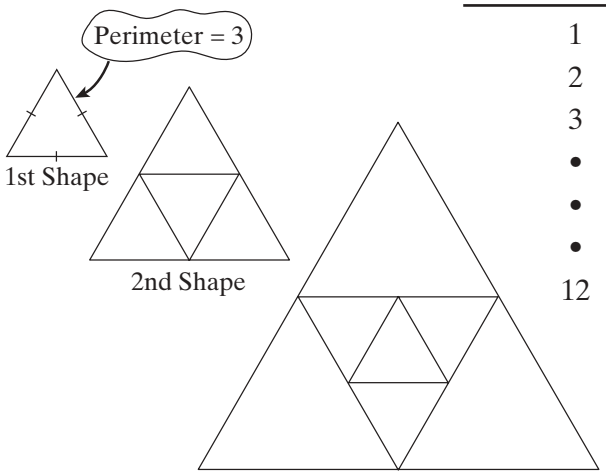
Name _____ Class _____ Date _____

# Activity Lab 3-1

**Describing a Pattern**

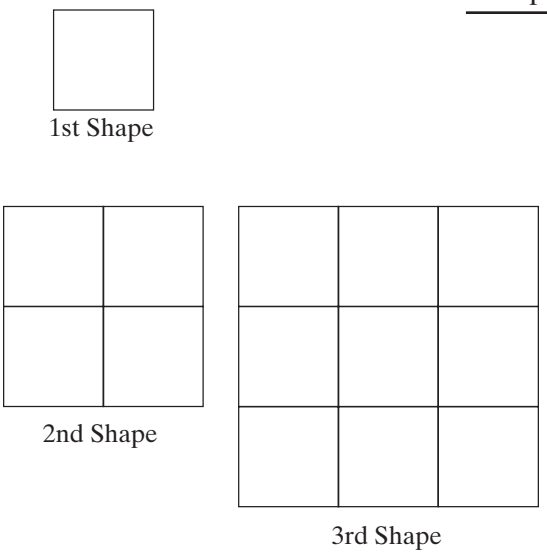
**Use pattern blocks to explore the following situations, complete the tables, and look for patterns to help you answer the questions.**

**1.** In the shape pattern below, how many triangles are needed to build the 12th shape? What is the perimeter of the 12th shape?




| Shape Number | Number of Triangles | Perimeter |
|---|---|---|
| 1 | 1 | 3 |
| 2 | 4 | 6 |
| 3 | | |
| • | | |
| • | | |
| • | | |
| 12 | | |

**2.** In the shape pattern below, how many squares are needed to build the 12th shape? What is the perimeter of the 12th shape?




| Shape Number | Number of Squares | Perimeter |
|---|---|---|
| 1 | 1 | 4 |
| 2 | 4 | 8 |
| 3 | | |
| • | | |
| • | | |
| • | | |
| 12 | | |

Name _____ Class _____ Date _____

# Activity Lab 3-2

## Variables and Expressions

**Circle the equation or equations that give the solution.**

**1.** $y = 5$

$y - 6 = 11$ $y + 15 = 20$ $6 + y = 60$

**2.** $n = 12$

$4n = 48$ $n - 12 = 1$ $12 \div n = 1$

**3.** $t = 10$

$5 + t = 10$ $t - 10 = 10$ $t \times 6 = 60$

**4.** $p = \frac{5}{12}$

$p + \frac{7}{12} = 1$ $p - \frac{3}{12} = \frac{8}{12}$ $p - \frac{4}{12} = \frac{1}{12}$

**5.** $r = \frac{1}{8}$

$r + \frac{1}{8} = \frac{1}{4}$ $r - \frac{3}{8} = \frac{1}{4}$ $\frac{5}{8} + r = \frac{7}{8}$

**Circle the equation or equations that are satisfied by the given value of *s*.**

| | | | | |
|---|---|---|---|---|
| **6.** | $s = 4$ | $s - 2 = 3$ | $10 - s = 6$ | $3s = 9$ |
| **7.** | $s = 10$ | $s - 2 = 8$ | $4 \times s = 36$ | $s + 10 = 22$ |
| **8.** | $s = \frac{7}{10}$ | $s + \frac{4}{10} = 1$ | $s - \frac{2}{10} = \frac{1}{2}$ | $2 - s = 1\frac{1}{10}$ |

Name _____ Class _____ Date _____

# Activity Lab 3-3

**Writing Algebraic Expressions**

## *Decision Making*

**Suppose you were offered the following opportunities. Which choice would you make? Explain why you would make each choice. Show an equation, number pattern, or other mathematical explanation to support your decision.**

1. Which would you rather receive? Why?

   **A:** One penny the first day, two pennies the second day, four pennies the third, eight pennies the fourth, and so on for one month.

   **B:** One dollar each day for one month.

2. Suppose you were paying money to a friend. Would that change your answer to Exercise 1? Why or why not?

3. Suppose you win a sweepstakes that pays money for thirty days. You have a choice of two options, **A** or **B**. The first day you are given 1 dollar. Which option would you choose? Why?

   **A:** The amount you receive is doubled every two days.

   **B:** The amount you receive is tripled every four days.

4. Write a problem like the others on this page. Trade papers with a classmate and try to solve each other's problems.

Name _____ Class _____ Date _____

# Activity Lab 3-4

## Using Number Sense to Solve One-Step Equations

### *Number Squares*

The numbers in each row, column, and diagonal of certain number squares have the same sum. The sum of the square below is 225.

| | | |
|---|---|---|
| 30 | 135 | 60 |
| 105 | 75 | 45 |
| 90 | 15 | 120 |

Find the sum by adding the numbers in the first row. The sum is

_____

| | | |
|---|---|---|
| 20 | 45 | 10 |
| ___ | ___ | ___ |
| 40 | 5 | ___ |

Next find the missing number in the first column.

$20 + x + 40 = 75$

$x =$ _____

**Complete each number square. Find the sum.**

**1.**

| | | |
|---|---|---|
| 8 | ___ | 6 |
| 3 | ___ | 7 |
| ___ | 9 | 2 |

sum = _____

**2.**

| | | |
|---|---|---|
| ___ | 100 | ___ |
| 80 | ___ | ___ |
| 70 | 20 | 90 |

sum = _____

**3.**

| | | |
|---|---|---|
| ___ | ___ | 42 |
| 21 | 35 | ___ |
| 28 | ___ | ___ |

sum = _____

**4.**

| | | |
|---|---|---|
| ___ | 352 | 267 |
| ___ | 284 | ___ |
| 301 | ___ | ___ |

sum = _____

Name _____ Class _____ Date _____

# Activity Lab 3-5

## Solving Addition Equations

**Work with a partner. Let the variable have the meaning assigned.**
**Write a problem that can be solved with the given equation.**
**Exchange problems with another pair of partners. Solve each problem.**

**1.** $x$ = Alec's age
$x - 9 = 17$

_____

Solution = _____

**2.** $e$ = number of eggs

$13 + e = 21$

_____

Solution = _____

**3.** $h$ = Carly's height

$h + 9 = 63$

_____

Solution = _____

**4.** $c$ = cost of a computer

$c + 425 = 1325$

_____

Solution = _____

**5.** $c$ = number of children

$8 + c = 24$

_____

Solution = _____

**6.** $m$ = miles driven

$318 + m = 765$

_____

Solution = _____

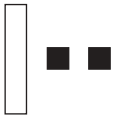
Name _____ Class _____ Date _____

# Activity Lab 3-6

## Solving Subtraction Equations

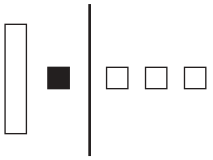
**Work with a partner. Use algebra tiles to complete each activity.**

**1.** Model each expression with algebra tiles. Follow the example.
**Example:** $c - 2$

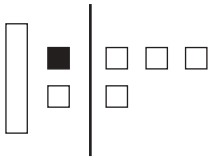


**a.** $n - 4$ **b.** $a - 1$ **c.** $b - 6$

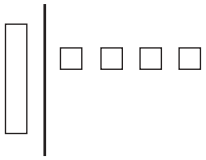
**2.** Solve with algebra tiles. Follow the example.
**Example:** $d - 1 = 3$



Model this equation.



Isolate the variable.



Find the solution.

**a.** $y - 5 = 7$ _____ **b.** $8 = x - 4$ _____

**c.** $w - 3 = 6$ _____ **d.** $6 = a - 4$ _____

**e.** $2 = b - 6$ _____ **f.** $c - 7 = 3$ _____

Name _____ Class _____ Date _____

# Activity Lab 3-7

## Solving Multiplication and Division Equations

**Materials needed:** scientific calculator

**Example 1:** Solve the equation $0.3x = 1.2$ with a graphing calculator.

Use the Equation Solver to solve the equation.

① Press MATH **6: Solver. . .**

*Note:* If there is an equation in the Equation Solver window, press ▲ on the cursor keys until you see the window titled EQUATION SOLVER.

Then press CLEAR to erase the screen and enter a new equation. To get out of the Equation Solver and return to the Home screen, press 2nd QUIT.

② Enter 0.3 and press $x$.

③ To type "=", press 2nd TEXT. Move the cursor to the "=" symbol. Press ENTER. Move the cursor to **Done**, and press ENTER. Enter 1.2.

④ Press ENTER to solve the equation. Then move the cursor over $X$. Press ENTER again. Notice that the line just under the equation gives the value: $x = 4$. The calculator always solves for $x$ unless you enter instructions to solve for a different variable.

**Example 2:** Solve the equation $1.2k = 3.6$.

① Use the same steps as in Example 1 to use Equation Solver to solve the equation.

② To type a variable other than $x$, go to the TEXT screen.

③ Press 2nd TEXT. Move the cursor to the letter you want. Press ENTER, then move the cursor to **Done** and press ENTER again.

④ When you are ready to solve for $k$, move the cursor to the bottom line that says **Solve: K**, and press ENTER.

The line just under the equation gives the value: $k = 3$.

*Check:* Is $1.2 \times 3$ equal to 3.6? Yes.

**Solve each equation.**

**1.** $5.5x = 1.1$

**2.** $0.02y = 0.08$

**3.** $17x = 404.6$

**4.** $105c = 7{,}665$

**5.** $9.9x = 99.99$

**6.** $0.2k = 20$

**7.** $11.564 = 8.26x$

**8.** $0.5 = 0.5y$

Name _____ Class _____ Date _____

# Activity Lab 3-8

## The Distributive Property

**Materials needed:** algebra tiles (one-tiles and $x$-tiles only)

1. Use algebra tiles to model $x + 3$.
2. Think of the quantity $x + 3$ as the set of tiles from Exercise 1. Consider the algebraic expression $2(x + 3)$. What does the expression mean in terms of the set for $x + 3$?
3. Use algebra tiles to model the answer for Exercise 2. Keep the sets for $x + 3$ together.
4. **a.** Rearrange your algebra tiles so that the $x$-tiles are together and the one-tiles are together. Now you have two $x$-tiles and six one-tiles. Write a new expression for this model.

   **b.** According to your models, what does $2(x + 3)$ equal?
5. **a.** Use algebra tiles to model the expression $3(2x + 4)$. What set of tiles should you use to represent the quantity $2x + 4$? How many of these sets do you need?

   **b.** Rearrange your tiles to evaluate the expression $3(2x + 4)$.
6. **a.** Look at the model below. Write the expressions modeled on each side of the equal sign. Use algebra tiles to determine if the equation is true or false. If the equation is false, explain how to make it true.

   **b.** Rearrange the tiles of the right hand side of the model above to write three equivalent expressions. Be sure to use the Distributive Property in all three expressions.
7. Based on your observations, describe how the Distributive Property works.

Name _____ Class _____ Date _____

# Activity Lab 4-1

## Divisibility and Mental Math

**Materials needed:** 24" × 24" poster board, markers for making both thick and thin lines

**Work in small groups of 3–4.**

| A number is divisible by | Rule |
|---|---|
| 2 | if it is an even number. |
| 3 | if the sum of its digits is divisible by 3. |
| 5 | if the number ends in 5 or 0. |
| 9 | if the sum of its digits is divisible by 9. |
| 10 | if the number ends in a 0. |

1. Write the whole numbers from 1 through 40 on the poster board in rows of 10 numbers each. Leave enough room around each number to make 3 circles around each number with a thin marker.
2. Use the rulers in the chart to test whether each number is divisible by 2, 3, 5, 9, and 10.
3. Have group members take turns following the directions below to circle the numbers with thin markers. If you need to circle a number more than once, make the second or third circle smaller or larger than the first. Circle the number with:

   **Yellow** if the number is exactly divisible by 2.
   **Red** if the number is exactly divisible by 3.
   **Blue** if the number is exactly divisible by 5.
   **Purple** if the number is exactly divisible by 9.
   **Green** if the number is exactly divisible by 10.

4. Use the poster to answer the questions:

   a. Name seven prime numbers. _____

   b. Which numbers have three numbers from the chart as factors?

   _____

   c. What patterns do you see?

   _____

   _____

   _____

Name _____ Class _____ Date _____

# Activity Lab 4-2

**Exponents**

**Materials needed:** Calculator with $y^x$ and $\times$ keys.

You will use the $y^x$ and $\times$ keys on a calculator to evaluate expressions involving exponents.

**1.** Complete the table.

| Enter | Press | Enter | Press | Display |
|---|---|---|---|---|
| 2 | $y^x$ | 2 | = | |
| 2 | $y^x$ | 3 | = | |
| 2 | $y^x$ | 4 | = | |
| 3 | $y^x$ | 2 | = | |
| 3 | $y^x$ | 3 | = | |
| 3 | $y^x$ | 4 | = | |
| 4 | $y^x$ | 2 | = | |
| 4 | $y^x$ | 3 | = | |
| 4 | $y^x$ | 4 | = | |

**2.** Compare the use of the $y^x$ key and the repeated use of the $\times$ key. To do this, follow these steps for comparing $6^3$ and $6 \times 6 \times 6$.

**a.** Enter 6. Press $y^x$. Enter 3. Press =. The answer is _____.

**b.** Enter 6. Press $\times$. Enter 6. Press $\times$. Enter 6. Press =.

The answer is _____.

**3.** Repeat Steps 2a and 2b to compare $4^4$ and $4 \times 4 \times 4 \times 4$.

What is the answer for each? _____

**4.** Compute $7 \times 7 \times 7 \times 7 \times 7$ by using the $y^x$ key on your calculator.

**a.** What will you enter as the exponent? _____

**b.** What is the answer on the calculator? _____

**5.** **a.** To evaluate $2^{10}$, would you choose to use the $\times$ key or the $y^x$ key? Why?

_____

_____

**b.** Evaluate $2^{10}$. Describe the operations. _____

**c.** Which keys did you press? _____

Name _____ Class _____ Date _____

# Activity Lab 4-3

**Prime Numbers and Prime Factorization**

## *Goldbach's Conjecture*

Christian Goldbach, an eighteenth-century Russian mathematician, believed that every even number greater than 4 could be written as the sum of two odd primes. For example 16 = 5 + 11. He also believed that every whole number greater than 4 could be written as the sum of three primes. For example, 16 = 2 + 3 + 11 or 16 = 2 + 7 + 7.

**1.** Complete the table.

| Number | Sum of two odd primes | Sum of three primes |
|---|---|---|
| 6 | _____ | _____ |
| 8 | _____ | _____ |
| 14 | _____ | _____ |
| 30 | _____ | _____ |
| 38 | _____ | _____ |
| 40 | _____ | _____ |
| 50 | _____ | _____ |
| 88 | _____ | _____ |
| 100 | _____ | _____ |
| 116 | _____ | _____ |
| 132 | _____ | _____ |
| 150 | _____ | _____ |
| 152 | _____ | _____ |

Choose an even number between 60 and 70 and write the number as the sum of

**2.** two primes. _____ **3.** three primes. _____

Choose an even number between 135 and 150 and write the number as the sum of

**4.** two primes. _____ **5.** three primes. _____

Name _____ Class _____ Date _____

# Activity Lab 4-4

## Greatest Common Factor

**As decoration chairperson for the drama club, you are asked to create floral centerpieces to decorate each table. Use the information given to answer each question.**

1. You are given 36 carnations, 24 roses, and 48 tulips. Each centerpiece must have an equal number of each flower and every flower must be used. How many centerpieces can you make? Describe each centerpiece.

_____

_____

2. Someone just donated 30 daisies. How many centerpieces can you make now? Describe each one.

_____

_____

3. The daisies look beautiful, but eight of your tulips just wilted. How many centerpieces can you make now? Describe each bouquet.

_____

_____

**In addition to making centerpieces, you are asked to make balloon bouquets to be placed around the dance floor. Use the information given to answer each question.**

4. You are given 27 red balloons, 36 blue balloons, and 54 green balloons. Each balloon bouquet must have an equal number of each color. How many balloon bouquets can you make? Describe each bouquet.

_____

_____

5. Your assistant just found a bag of 108 yellow balloons. How many balloon bouquets can you make now? Describe each bouquet.

_____

_____

6. Eighteen yellow balloons just popped. How many balloon bouquets can you make now? Describe each bouquet.

_____

_____

Name _____ Class _____ Date _____

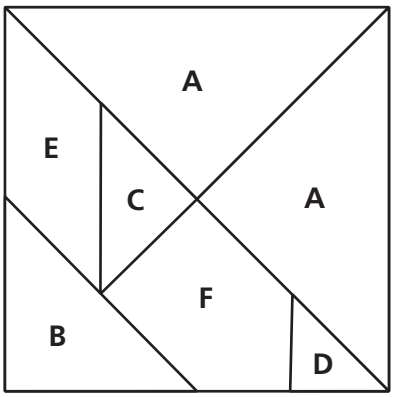
# Activity Lab 4-5

## Equivalent Fractions

**Materials needed:** paper

A tangram is a puzzle consisting of a square divided into seven pieces that can be reassembled into different figures.

1. Copy the tangram below on a separate sheet of paper. Cut out the pieces.




2. What fraction of the square does a single piece A represent?
3. The total area of the large square above is 1 square unit. Based on your answer from Exercise 2, what is the area of a piece A?
4. **a.** Compare piece B to piece A by placing the piece you cut out on top of the model above. What fraction of A does B cover?
   **b.** How can you use this information to find the area of piece B? What is the area of piece B?
5. Place parts C and D on the model and use your answers above to find the area of piece C and then piece D.
6. **a.** How can you use the area of piece C to find the area of piece E?
   **b.** What is the area of E?
7. **a.** Use piece C and piece D to find the area of piece F.
   **b.** Explain your steps.
8. With respect to all of the pieces, how can you check your work? Check your work.

Name _____ Class _____ Date _____

# Activity Lab 4-6

## Mixed Numbers and Improper Fractions

**Materials needed:** scientific calculator

**Example 1:** Write $3\frac{7}{8}$ as an improper fraction.

① Enter 3 UNIT 7 / 8 2nd [A b/c ◄► d/e] ENTER.

② The calculator displays **31 / 8**, which means that $3\frac{7}{8}$ written as an improper fraction is $\frac{31}{8}$.

**Example 2:** Write $\frac{22}{5}$ as a mixed number.

① Enter 22 / 5 2nd [A b/c ◄► d/e] ENTER.

② The calculator displays **4 ⌴ 2 / 5**, which means that $\frac{22}{5}$ written as a mixed number is $4\frac{2}{5}$.

**Exercises**

Write each mixed number as an improper fraction, and each improper fraction as a mixed number in simplest form.

**1.** $6\frac{3}{4}$

**2.** $\frac{38}{7}$

**3.** $8\frac{2}{7}$

**4.** $\frac{42}{11}$

**5.** $14\frac{3}{16}$

**6.** $\frac{56}{43}$

**7.** $23\frac{9}{11}$

**8.** $\frac{60}{31}$

**9.** $36\frac{23}{24}$

**10.** $\frac{83}{8}$

**11.** $52\frac{37}{44}$

**12.** $\frac{94}{5}$

**13.** $47\frac{38}{67}$

**14.** $\frac{183}{64}$

**15.** $231\frac{39}{47}$

**16.** $\frac{2314}{5}$

Name _____ Class _____ Date _____

# Activity Lab 4-7

## Least Common Multiple

**Materials needed:** calculator

You will use a calculator to discover an interesting relationship between the least common multiple (LCM) and the greatest common factor (GCF) of a pair of numbers.

1. The table below lists four pairs of numbers. For each pair, find the LCM and GCF and write them in the second and third columns of the table. You may use your calculator as needed.

| Numbers | LCM | GCF | Product of original numbers | Product of LCM and GCF |
|---|---|---|---|---|
| 12, 15 | | | | |
| 8, 24 | | | | |
| 7, 12 | | | | |
| 27, 36 | | | | |

2. Use your calculator to find the product of each pair of numbers. Write these products in the fourth column of the table. Then find the product of each LCM and the related GCF and write these in the fifth column.

3. What do you notice about the fourth and fifth columns?

_____

Use this observation to complete the following statement:
For any pair of numbers, the product of the numbers

_____ the product of the LCM and GCF.

This relationship is particularly useful for finding the LCM of two numbers. Simply multiply the two numbers and divide by the GCF.

4. Here is how to find the LCM of 18 and 27: Multiply $18 \times 27$.

   a. This equals _____

   b. What is the GCF? _____

   c. Divide the product by the GCF. _____

   This answer is the LCM.

Apply the strategy used in Exercise 4 to find the LCM of each pair of numbers.

5. 24, 30 _____

6. 8, 36 _____

7. 20, 25 _____

8. 12, 42 _____

Name _____ Class _____ Date _____

# Activity Lab 4-8

## Comparing and Ordering Fractions

**Materials needed:** fraction calculator

1. Subtraction can help you compare any numbers. First, see what happens when you subtract a larger number from a smaller number on your calculator. You know that $16 < 25$. Press $16$ [−] $25$ [=]. What does the display show?

   _____

   You will study about negative numbers later. For now it is helpful to know that any time you subtract a larger number from a smaller number, the difference is a negative number.

2. Compare $\frac{4}{5}$ and $\frac{6}{7}$. Subtract the fractions in order following this key sequence: $\frac{4}{5}$ [−] $\frac{6}{7}$ [=]. What does the display show?

   _____

   _____

3. Compare $\frac{3}{7}$ and $\frac{1}{3}$ by subtracting the fractions in order. What does the display show?

   _____

Note: The numbers you work with most of the time are positive numbers. In subtraction, when the difference is positive, the first number in the subtraction is larger than the second number: $\frac{3}{7} > \frac{1}{3}$.

4. Compare $\frac{18}{24}$ and $\frac{9}{12}$ by subtracting the fractions in order.

   a. What does the display show? _____

   b. Zero is the only number that is neither positive nor negative. What do you think this tells you about $\frac{18}{24}$ and $\frac{9}{12}$? _____

Use your calculator to compare the fractions. Write <, >, or = in the boxes.

5. $\frac{5}{9} \square \frac{6}{11}$
6. $\frac{1}{8} \square \frac{1}{6}$
7. $\frac{7}{10} \square \frac{3}{4}$
8. $\frac{12}{20} \square \frac{30}{50}$
9. $\frac{1}{2} \square \frac{17}{42}$
10. $\frac{5}{6} \square \frac{7}{9}$
11. $\frac{13}{16} \square \frac{3}{4}$
12. $\frac{4}{15} \square \frac{3}{8}$
13. $\frac{9}{45} \square \frac{6}{30}$
14. $\frac{9}{11} \square \frac{11}{12}$

Name _____ Class _____ Date _____

# Activity Lab 4-9

**Fractions and Decimals**

**Materials needed:** scientific calculator

**Example 1:** Write $\frac{3}{8}$ as a decimal.

① Enter 3 [/] 8 [▶D] [ENTER]. The decimal 0.375 appears on the display. So, $\frac{3}{8}$ written as a decimal is 0.375.

**Example 2:** Write $2\frac{5}{11}$ as a decimal.

① Enter 2 [UNIT] 5 [/] 11 [▶D] [ENTER]. The decimal 2.454545454 appears on the display.

② Notice that this is a repeating decimal. You can write that $2\frac{5}{11}$ as a decimal is $2.\overline{45}$.

**Example 3:** Write 0.195 as a fraction in simplest form.

① Press [2nd] [FRAC]. Use the right arrow key to move to the right to select from the menu choices. When the underline appears under **Auto**, press [ENTER]. Once you do this step, you should not have to do it again, unless you see that the calculator is not simplifying fractions automatically.

② Enter 0.195 [▶F] [ENTER]. The calculator window shows $\frac{39}{200}$. So, 0.195 written as a fraction is $\frac{39}{200}$.

**Example 4:** Write 5.0375 as a mixed number in simplest form.

① Enter 5.0375 [2nd] [$a\frac{b}{c}$◀▶$b/c$] [ENTER]. The calculator window shows 5u3/80. The u is a separator that shows that 5 is the unit part of the mixed number. This means that 5.0375 written as a mixed number is $5\frac{3}{80}$.

**Exercises**

Write each decimal as a fraction or mixed number. Write each fraction or mixed number as a decimal.

**1.** $\frac{7}{15}$ **2.** 0.42 **3.** $\frac{13}{16}$

**4.** 0.776 **5.** $42\frac{6}{20}$ **6.** $13\frac{7}{12}$

**7.** $93\frac{43}{60}$ **8.** $245\frac{6}{9}$ **9.** 325.0325

Name _____ Class _____ Date _____

# Activity Lab 5-1

## Estimating Sums and Differences

**Materials needed:** index cards

**Work with a partner.**

Write the following fractions and mixed numbers on index cards. Each player should choose two cards to start. Estimate the sum of the two cards. Take turns choosing a card. Estimate the sum of the previous card and the new card. Continue until all cards have been chosen. The winner is the person with the highest total score. Shuffle the cards. Take turns choosing a card. Estimate the difference between the total from the first game and the card chosen. The first player to reach zero is the winner.

$\frac{1}{3}$

$\frac{3}{8}$

$3\frac{1}{9}$

$1\frac{3}{11}$

$7\frac{3}{5}$

$5\frac{7}{17}$

$\frac{6}{7}$

$\frac{11}{12}$

$11\frac{11}{20}$

$3\frac{1}{5}$

$14\frac{8}{9}$

$10\frac{5}{9}$

$6\frac{6}{13}$

$\frac{27}{28}$

$13\frac{3}{8}$

$9\frac{4}{7}$

$6\frac{3}{17}$

$2\frac{3}{5}$

$4\frac{6}{17}$

$8\frac{1}{5}$

$\frac{5}{8}$

$\frac{7}{13}$

$6\frac{1}{8}$

$9\frac{7}{9}$

$3\frac{1}{17}$

$6\frac{5}{6}$

Name _____ Class _____ Date _____

# Activity Lab 5-2

## Fractions With Like Denominators

**Materials needed:** fraction calculator

**You can use a calculator to add, subtract, and simplify fractions with like denominators.**

**1.** Add $\frac{23}{48} + \frac{19}{48}$ using the following key sequence:

2 3 [/] 4 8 [+] 1 9 [/] 4 8 [=]

What does the display show? _____

**2.** The N/D → n/d appearing the lower left-hand corner of the screen indicates that the fraction can be reduced. Press [SIMP] [=].

What does the display show? _____

Notice that N/D → n/d still appears on the screen. That means the answer is not yet in lowest terms. Press [SIMP] [=] again.

Now what does the display show? _____

You should recognize that this is in lowest terms. But if you are not sure, look for the N/D → n/d. When it does not appear, the fraction on the screen is in lowest terms.

**3.** Your fraction calculator reduces fractions in steps. But if you recognize the greatest common factor (GCF) of the numerator and denominator, you can reduce the fraction in a single step. Repeat Exercise 1 and leave the answer, $\frac{42}{48}$, on the screen.

**a.** What is the GCF of 42 and 48? _____

**b.** To tell the calculator that you want to use the GCF 6 to reduce the answer in a single step, press [SIMP] 6 [=]. Did you get the same reduced fraction as before? _____

Find the following sums and differences. Write each answer in lowest terms.

**4.** $\frac{15}{92} + \frac{71}{92}$ _____

**5.** $\frac{62}{65} - \frac{47}{65}$ _____

**6.** $\frac{15}{52} + \frac{25}{52}$ _____

**7.** $\frac{33}{72} + \frac{7}{72} + \frac{19}{72}$ _____

**8.** $\frac{52}{35} - \frac{27}{35}$ _____

**9.** $\frac{9}{64} + \frac{39}{64} + \frac{8}{64}$ _____

**10.** $\frac{49}{120} + \frac{51}{120}$ _____

**11.** $\frac{113}{144} - \frac{17}{144}$ _____

Name _____ Class _____ Date _____

# Activity Lab 5-3

## Fractions With Unlike Denominators

**Materials needed:** fraction calculator

**You will use a calculator to add and subtract fractions with unlike denominators.**

1. Add $\frac{7}{24} + \frac{12}{27}$ using the following key sequence:

   7 [/] 2 4 [+] 1 2 [/] 2 7 [=]

   What does the display show? _____

2. The N/D → n/d appearing the lower left-hand corner of the screen indicates that the fraction can be reduced. Press [SIMP] [=] .

   a. What does the display show? _____

   b. Does N/D → n/d still appear on the screen? _____

That means that the answer is in lowest terms. When you do see N/D → n/d, simply press [SIMP] [=] again and again until N/D → n/d disappears. Then the fraction displayed is in lowest terms.

3. Use your calculator to add $\frac{31}{56} + \frac{26}{35}$ and give your answer in lowest terms.

   _____

   Is your answer a proper fraction or an improper fraction?

   _____

If you want to express an improper fraction as a mixed number, your calculator has a built-in function to do this. Press [a b/c]. The display should show 1u83/280. This means $1\frac{83}{280}$.(The u stands for unit.)

Any number of fractions can be added easily. Just press the [+] key between each fraction you enter. To subtract fractions, simply use the [−] key instead of the [+] key.

Find the following sums and differences. Write each answer in lowest terms and express improper fractions as mixed numbers.

4. $\frac{18}{25} + \frac{2}{19}$ _____

5. $\frac{52}{55} - \frac{6}{11}$ _____

6. $\frac{4}{3} + \frac{5}{16}$ _____

7. $\frac{5}{12} + \frac{7}{8} + \frac{9}{10}$ _____

8. $\frac{42}{64} - \frac{15}{40}$ _____

9. $\frac{23}{30} + \frac{18}{25} + \frac{7}{10}$ _____

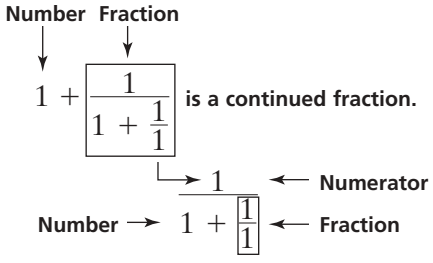
Name _____ Class _____ Date _____

# Activity Lab 5-4

## Adding Mixed Numbers

The fractions shown below are called continued fractions. A continued fraction is the sum of a number and a fraction whose numerator is 1 and whose denominator is the sum of a number and a fraction, and so on.

$$1 + \cfrac{1}{1 + \cfrac{1}{1}} = 1 + \cfrac{1}{1 + 1} = 1 + \frac{1}{2} = 1\frac{1}{2} = \frac{3}{2}$$




Write each continued fraction as a mixed number and as an improper fraction. To evaluate a continued fraction, find the denominator of the last fraction written and work backward.

| | Mixed | Improper |
|---|---|---|
| **1.** $1 + \cfrac{1}{1 + \cfrac{1}{1 + \frac{1}{1}}}$ | _____ | _____ |
| **2.** $1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \frac{1}{1}}}}$ | _____ | _____ |
| **3.** $1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \frac{1}{1}}}}}$ | _____ | _____ |
| **4.** $1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \frac{1}{1}}}}}}$ | _____ | _____ |
| **5.** Write the next fraction. | _____ | _____ |

Name _____ Class _____ Date _____

# Activity Lab 5-5

## Subtracting Mixed Numbers

**Materials needed:** fraction calculator

**You will use a calculator to add and subtract mixed numbers.**

1. Add $2\frac{6}{25} + 9\frac{11}{15}$ using the following key sequence:

   2 6 [/] 25 [+] 9 11 [/] 15 [=].

   Notice that the whole number and fraction in the display are separated by a little "u." (The u stands for unit.)

   a. Write what is shown in the display. _____

   b. Write this as a mixed number. _____

2. Subtract $5\frac{3}{16} - 2\frac{9}{24}$.

   a. What does the display show? _____

   b. Write this as a mixed number. _____

The N/D → n/d appearing in the lower left-hand corner of the screen indicates that the fraction can be reduced. Press [SIMP] [=].

   c. What does the display show? _____

   d. Write this as a mixed number. _____

   e. Does N/D → n/d still appear on the screen? _____

That means the answer is in lowest terms. When you do see N/D → n/d, simply press [SIMP] [=] again and again until N/D → n/d disappears. Then the fraction displayed is in lowest terms.

3. Add $12\frac{8}{35} + 9\frac{9}{13}$.

   a. What does the display show? _____

   b. Why do you think the calculator converted the answer to a decimal?

   _____

   _____

**Add or subtract. Write each answer in lowest terms.**

4. $5\frac{11}{12} - 1\frac{7}{30}$ _____

5. $10\frac{13}{15} + 8\frac{3}{4}$ _____

Name _____ Class _____ Date _____

# Activity Lab 5-6

## Equations With Fractions

**Write and solve an equation to solve each problem. You may find it helpful to draw a model.**

1. Jamie lives $\frac{7}{8}$ kilometer from school. On her way to school each day, she walks $\frac{2}{5}$ kilometer to Jackie's house and they walk the rest of the way together. How far does Jackie live from school?

_____

_____

2. Darrin is making spaghetti sauce. The recipe calls for $\frac{2}{3}$ cup of parmesan cheese. Darrin follows the recipe to make the sauce and serves the remaining cheese with the spaghetti when the meal is ready. If he serves $\frac{5}{6}$ cup of cheese with the meal, how much cheese did he have before he made the sauce?

_____

_____

3. Kathleen and Carlos are running a marathon. The course is $26\frac{1}{5}$ miles long. They run part of the course, take a water break, and run $10\frac{4}{5}$ miles more to the finish line. How many miles did they run before they took a water break?

_____

_____

4. Jay has two dogs. One day he buys a 5-pound bag of dog food. He feeds his big dog $1\frac{1}{4}$ pounds of food and feeds his small dog $\frac{3}{5}$ pound of food. How much dog food does he have left?

_____

_____

5. Write your own problem that can be solved using a fraction equation. Trade with a partner and solve each other's problems, then check each other's work.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 5-7

**Measuring Elapsed Time**

## *Decision Making*

**David is scheduling the order that the acts in the school variety show will appear on stage. He has made this list of the acts, the performers, and the approximate length of time it takes for each performance.**

| Performer | Act | Time | Performer | Act | Time |
|---|---|---|---|---|---|
| Kelsey and Adam | Dance routine | 5 min | Glee Club | Song medley | 6 min |
| Franco and Lonnie | Comedy routine | 5 min | Nancy | Song | 3 min |
| Aron | Magic tricks | 8 min | Yori | Guitar solo | 6 min |
| Zuri | Dance | 5 min | Sara and Edna | Song | 4 min |
| George and Kyle | Comedy | 4 min | Clay | Piano solo | 5 min |

1. How long will the acts perform in all? _____

2. How long will the show run if David allows 1 minute between each act for the performers to enter and exit the stage?

   _____

3. Should David plan for an intermission? Why or why not?

   _____

   _____

4. Should David schedule similar acts to perform one after the other? For example, all singers perform, then all dancers, and so on. Why or why not?

   _____

   _____

5. Write a schedule of the performances. If necessary, place a star showing the first act to go on stage after the intermission. Remember to schedule a minute between acts.

| Time | Performer | Act | Time | Performer | Act |
|---|---|---|---|---|---|
| 8:00 | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Name _____ Class _____ Date _____

# Activity Lab 6-1

## Multiplying Fractions

**Materials needed:** spreadsheet program

**You can use a spreadsheet to quickly find the product of two fractions, even fractions with larger numbers, such as $\frac{17}{5}$ or $\frac{6}{13}$. However, the answer won't be in lowest terms.**

**The table shows two pairs of fractions. Enter the data and titles in your spreadsheet.**

| | A | B | C |
|---|---|---|---|
| 1 | Fraction 1 | Fraction 2 | Product |
| 2 | 2 | 1 | |
| 3 | 3 | 5 | |
| 4 | | | |
| 5 | 17 | 6 | |
| 6 | 6 | 13 | |

1. Find $\frac{2}{3} \times \frac{1}{5}$. First compute the product of the numerators. In cell C2, enter the formula **A2*B2**. Now find the product of the denominators. Highlight cells C2–C3 and use the **Fill Down** command from the **CALCULATE** menu. What is the product?

   _____

2. Find $\frac{17}{5} \times \frac{6}{13}$. Copy the formulas in cells C2–C3 and paste them into cells C5–C6. Highlight cells C2–C3. Click **Edit** and then click **Copy.** Now highlight cells C5–C6. Click **Edit** and then click **Paste.** What is the product of $\frac{17}{5}$ and $\frac{6}{13}$? _____

3. Now you can use the spreadsheet to find the products of several other fractions such as $\frac{13}{20} \times \frac{2}{3}$. What pattern do you notice in the numerators in Fractions 1 and 2 and the numerator of their product? in the denominators?

   _____

   _____

   _____

4. Find the product of $3\frac{1}{6}$ and $\frac{7}{8}$. Explain what you entered.

   _____

   _____

5. Find each product.

   a. $\frac{25}{74} \times \frac{12}{91}$ _____

   b. $\frac{13}{77} \times 3\frac{1}{3}$ _____

   c. $\frac{1{,}345}{774} \times \frac{32}{481}$ _____

   d. $\frac{11{,}325}{35{,}978} \times \frac{87{,}698}{7{,}361}$ _____

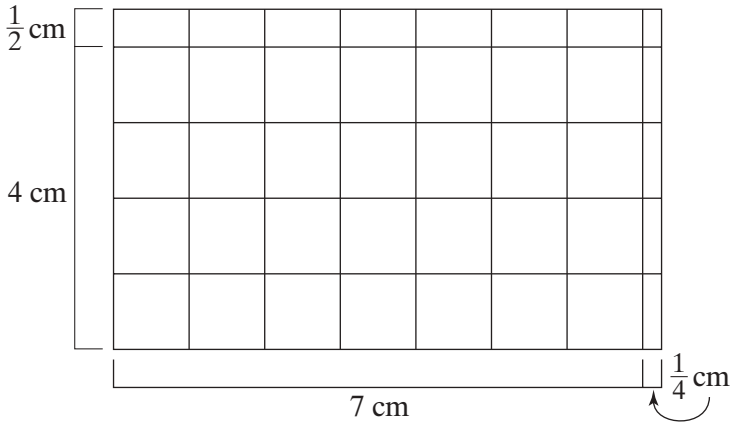
Name _____ Class _____ Date _____

# Activity Lab 6-2

## Multiplying Mixed Numbers

**Materials needed:** centimeter graph paper

**Work with a partner.**




1. **a.** Draw a rectangle with a length of $7\frac{1}{4}$ cm and a width of $4\frac{1}{2}$ cm on graph paper. The number of centimeter squares is the product.

   **b.** Count the number of whole centimeter squares or use the formula for the area of a rectangle to find the number of whole squares.

   **c.** Express the number of one-half centimeter squares as an improper fraction.

   **d.** Express the number of one-fourth centimeter squares as an improper fraction.

   **e.** Write a fraction $\left(\frac{a}{b}\right)$ to represent the one-fourth by one-half cm square left.

   **f.** Now, add the fractions to find the total area. Remember to use the Distributive Property.

   **g.** Which part(s) of the expression will you find first?

   **h.** Using the answers above, find the product of $7\frac{1}{4}$ cm and $4\frac{1}{2}$ cm.

**Draw area models to find these products.**

2. $2\frac{1}{2} \times 3\frac{1}{4}$
3. $1\frac{1}{3} \times 4\frac{1}{4}$
4. $6\frac{1}{4} \times 6\frac{1}{4}$
5. $5\frac{1}{2} \times 8\frac{1}{3}$

Name _____ Class _____ Date _____

# Activity Lab 6-3

## Dividing Fractions

**Materials needed:** fraction calculator

**Example 1:** Find $4 \div \frac{3}{5}$.

① You know that dividing by a fraction is the same as multiplying by the reciprocal of the fraction. So, you can rewrite $4 \div \frac{3}{5}$ as $4 \times \frac{5}{3}$.

② Press [2nd] [FRAC]. Press the right arrow key until you see **Auto** underlined. Press [ENTER]. *Note:* Once you've done this step, the calculator will automatically simplify fractions until someone changes it.

③ Enter 4 [×] 5 [/] 3 [2nd] [$A^{b/c} \blacktriangleleft\blacktriangleright {}^{d/e}$] [ENTER]. The calculator gives you 6u2/3, which is $6\frac{2}{3}$.

④ Check your answer by multiplying $6\frac{2}{3}$ by $\frac{3}{5}$ (because you originally divided by $\frac{3}{5}$). Enter 6 [UNIT] 2 [/] 3 [×] 3 [/] 5 [ENTER]. The calculator displays 4, so $6\frac{2}{3}$ is the correct quotient for $4 \div \frac{3}{5}$.

**Example 2:** Find $\frac{1}{7} \div \frac{2}{3}$.

Another method is to let the calculator divide the fractions directly.

Enter 1 [/] 7 [÷] 2 [/] 3 [ENTER]. The calculator gives you 3/14. The quotient is $\frac{3}{14}$.

(*Note:* If you ever see **N/D → n/d** displayed at the bottom of the display after multiplying or dividing fractions, then the calculator is not in auto simplification mode. Press [2nd] [FRAC], select **Auto** and press [ENTER] again. Then try the problem again.)

### Exercises

Find each quotient.

**1.** $5 \div \frac{3}{8}$

**2.** $11 \div \frac{5}{9}$

**3.** $32 \div \frac{15}{16}$

**4.** $\frac{7}{12} \div \frac{1}{9}$

**5.** $\frac{11}{14} \div \frac{2}{17}$

**6.** $\frac{24}{35} \div \frac{19}{22}$

**7.** $\frac{14}{33} \div 7$

**8.** $\frac{8}{15} \div 9$

**9.** $\frac{57}{62} \div 12$

Name _____ Class _____ Date _____

# Activity Lab 6-4

**Dividing Mixed Numbers**

## *Convert a Recipe*

**Materials needed:** flour, salt, cream of tartar, water, food coloring, measuring cups, measuring spoons, plastic bag for storage, bowl, paper towels, rubber gloves

**Work in small groups of 3–4 students.**

Here is a recipe for modeling clay:

$2\frac{1}{2}$ cups flour
$1\frac{1}{4}$ cups salt
2 tablespoons cream of tartar
$1\frac{1}{4}$ cup water
3 drops food coloring

The recipe makes 4 cups of clay. How would the recipe be modified to make 2 cups of clay?

1. Tell how you will change the recipe.
2. On a separate piece of paper, rewrite the recipe for making 2 cups of clay. Use the following calculations to find the amounts of the ingredients.
   a. $2\frac{1}{2} \div 2 =$
   b. $1\frac{1}{4} \div 2 =$
   c. $2 \div 2 =$
   d. $3 \div 2 =$
3. Follow these directions to make the clay.
   a. Mix the dry ingredients together (flour, salt, cream of tartar).
   b. Add water and food coloring.
   c. Use rubber gloves to mix the ingredients with your hands.
   d. Store in a plastic bag in the refrigerator.
   e. Take out of refrigerator one hour before using.
4. Use the clay to form the following three-dimensional figures: cylinder, cone, sphere, pyramid, and prism.

Name _____ Class _____ Date _____

# Activity Lab 6-5

## Solving Fraction Equations by Multiplying

*Patterns in Numbers*

**Find the sum and product of the numbers below.**

| | | Sum | Product |
|---|---|---|---|
| **1.** | 3 and $\frac{3}{2}$ | _____ | _____ |
| **2.** | 4 and $\frac{4}{3}$ | _____ | _____ |
| **3.** | 5 and $\frac{5}{4}$ | _____ | _____ |
| **4.** | 6 and $\frac{6}{5}$ | _____ | _____ |
| **5.** | 7 and $\frac{7}{6}$ | _____ | _____ |
| **6.** | 8 and $\frac{8}{7}$ | _____ | _____ |
| **7.** | 9 and $\frac{9}{8}$ | _____ | _____ |
| **8.** | 10 and $\frac{10}{9}$ | _____ | _____ |
| **9.** | 11 and $\frac{11}{10}$ | _____ | _____ |

**10.** How are the sum and product of each pair of numbers related?

_____

_____

**11.** What pattern do you see in the sums and products as you look down the column?

_____

_____

**12.** Compare the first and second number in each pair. What pattern do you see?

_____

_____

**13.** Write two equations using another pair of numbers that have the same sum and product.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 6-6

## The Customary System

**Match the given example with the appropriate unit of measure. Each unit of measure may be used more than once.**

1. **Unit of Weight**

| | |
|---|---|
| bag of apples | ounces |
| baseball | pounds |
| pencil | tons |

2. **Unit of Capacity**

| | |
|---|---|
| bathtub | cups |
| coffee cup | fluid ounces |
| container of milk | quarts |
| water bottle | pints |
| | gallons |

3. **Unit of Length**

| | |
|---|---|
| distance across your state | feet |
| distance you can throw a baseball | inches |
| your arm | yards |
| your height | miles |

**Fill in each blank with an object that will make the sentence true. The first one has been done for you.**

4. a carrot < 8 ounces
5. _____ > 10 pounds
6. _____ < 2 tons
7. _____ > 4 fluid ounces
8. _____ < 3 cups
9. _____ > 8 pints
10. _____ < 3 gallons
11. _____ > 2 quarts
12. _____ < 3 inches
13. _____ > 5 feet
14. _____ > 8 miles

Name _____ Class _____ Date _____

# Activity Lab 6-7

## Changing Units in the Customary System

**Materials needed:** ruler, yardstick, or tape measure; empty boxes or cans marked with weight or capacity measurements in customary units; calculator

**Work with a partner.**

1. Record each measure, then change units to complete each equation. Circle the most appropriate unit for measuring each object.

   a. length of your math notebook

   _____ in. = _____ ft = _____ yd = _____ mi

   b. length of an eraser

   _____ in. = _____ ft = _____ yd = _____ mi

   c. length of your classroom

   _____ in. = _____ ft = _____ yd = _____ mi

   d. approximate distance from your school to the nearest ocean

   _____ in. = _____ ft = _____ yd = _____ mi

2. Choose four containers. Record the weight or capacity shown on the container, then change units to complete each equation.

   a. product: _____

   _____ oz = _____ lb = _____ t

   b. product: _____

   _____ oz = _____ lb = _____ t

   c. product: _____

   _____ fl oz = _____ cups = _____ pt = _____ qt = _____ gal

   d. product: _____

   _____ fl oz = _____ cups = _____ pt = _____ qt = _____ gal

Name _____ Class _____ Date _____

# Activity Lab 7-1

**Ratios**

**Gina is collecting quarters and pennies in her piggy bank. Each month, she records her savings using the table below.**

| | January | February | March | April | May | June |
|---|---|---|---|---|---|---|
| Number of Quarters | 7 | | | | | |
| Number of Pennies | 35 | | | | | |
| Ratio of Quarters to Pennies | | | | | | |

1. Find the ratio of quarters to pennies in the piggy bank in January. Enter the ratio in the table.
2. For each month from February and through April, Gina doubles the number of quarters and the number pennies in her bank. In the table, enter the number of quarters and number of pennies for February, March, and April.
3. Fill in the ratio of quarters to pennies for February, March, and April.
4. Write each ratio in simplest terms. What do you notice?

_____

5. During May and June, Gina increases the number of coins she collects: she triples the number of quarters and the number of pennies in her collection in May, and again in June. Complete the top two rows of the table.
6. Fill in the ratio of quarters to pennies for May and June. Write each ratio in simplest terms.
7. What do you notice about all of the ratios in the table? Why is this true?

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 7-2

**Unit Rates**

**Materials needed:** fraction calculator

**You will use a calculator to convert rates into unit rates.**

1. Which is the better buy, \$6.00 for 12 oranges or \$9.00 for 15 oranges? To create a unit rate equivalent to $\frac{\$6}{12 \text{ oranges}}$, enter 6, press [/], enter 12, press [F⇔D]. The result is 0.5. Expressed as a unit rate, this would be \$0.50 per orange.

   a. What is the unit rate equivalent to \$9.00 for 15 oranges?

   _____

   _____

   b. Which is the better buy? Explain.

   _____

   _____

   _____

2. What keystrokes would you use to find the better buy: \$199.00 for 6 computer games or \$249.00 for 8 computer games?

   _____

   _____

3. Using your calculator, find the better buy. To the nearest cent, what is the unit rate for each?

   a. \$8.00 for 3 boxes

   _____

   b. \$22.00 for 8 boxes

   _____

   c. Which is the better buy? Explain.

   _____

   _____

   _____

Name _____ Class _____ Date _____

# Activity Lab 7-3

## Understanding Proportions

**Materials needed:** fraction calculator

**You will use a calculator to find whether two ratios are proportional by dividing fractions and by finding the difference of the cross products.**

1. To find whether $\frac{2}{9} = \frac{4}{18}$ is a proportion, enter 2, press [/], enter 9, press [÷], enter 4, press [/], enter 18, press [=].

   **a.** What answer does the calculator show? _____

   **b.** Since the numerator and denominator are the same, the two ratios form a proportion. Dividing by $\frac{4}{18}$ is the same as multiplying by its reciprocal.

   What is the reciprocal of $\frac{4}{18}$? _____

2. Is $\frac{3}{5} = \frac{8}{25}$ a proportion? Explain.

   _____

   _____

3. Is $\frac{1}{3} = \frac{9}{27}$ a proportion? _____

4. Is $\frac{3}{20} = \frac{15}{100}$ a proportion? This time, use the method of cross multiplication to find the answer. To do this, enter 3, press [×], enter 100, press [−], enter 20, press [×], enter 15, press [=].

   **a.** What answer does the calculator show? _____

   **b.** What do you think this means? Explain.

   _____

   _____

5. Use either method to determine whether each are proportions.

   **a.** $\frac{17}{169} = \frac{33}{338}$ _____

   **b.** $\frac{23}{177} = \frac{69}{531}$ _____

6. Which method do you prefer? Why?

   _____

Name _____ Class _____ Date _____

# Activity Lab 7-4

## Solving Proportions

**Adam and Bill are co-owners of a bookstore. They share the profits of the store in a ratio of 4 to 5, respectively. The profit for several items is shown below. Determine the amount of profit each person receives on the sale of each item.**

**1.** comic book: $.30

Adam's share = _____

Bill's share = _____

**2.** used paperback book: $.75

Adam's share = _____

Bill's share = _____

**3.** new paperback book: $1.25

Adam's share = _____

Bill's share = _____

**4.** puzzle: $2.39

Adam's share = _____

Bill's share = _____

**5.** best-seller: $3.75

Adam's share = _____

Bill's share = _____

**6.** What is the ratio of Adam's share of the total profit from the items in Exercises 1 through 5 to Bill's share of the total profit?

_____

Does that make sense? Explain.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 7-5

## Scale Drawings

**Materials needed:** sheet of drawing or notebook paper, pattern blocks, ruler

**Work with a partner.**

Use pattern blocks to draw a design on a sheet of paper. Next, draw a box like the one below on another sheet of paper. Then, draw the design from the first paper to scale in the box on the second paper. Write a proportion that represents the scale. Draw grids on your original design and in the box, if helpful.

What scale did you use? _____

Name _____ Class _____ Date _____

# Activity Lab 7-6

**Percents, Fractions, and Decimals**

**Materials needed:** fraction calculator

**You will use a calculator to convert fractions into decimals and percents.**

1. To convert $\frac{7}{8}$ into a decimal and then into a percent, enter 7, press [/], enter 8, press [F⇔D].

   What is displayed? _____

2. Repeat Step 1 for the following: $\frac{1}{100}$, $\frac{2}{5}$, $\frac{5}{4}$, and $\frac{3}{3}$.

   What is displayed? _____

3. To convert $\frac{3}{4}$ to a percent, enter 3, press [/], enter 4, press [F⇔D], press [×], enter 100, press [=].

   a. What is displayed? _____

   b. Why did you multiply the decimal 0.75 by 100?

   _____

**Convert each fraction into a decimal and a percent. Round to the nearest tenth of a percent.**

4. $\frac{42}{39}$ _____
5. $\frac{11}{13}$ _____
6. $\frac{17}{20}$ _____
7. $\frac{2}{9}$ _____
8. $\frac{4}{5}$ _____
9. $\frac{11}{10}$ _____
10. $\frac{7}{6}$ _____
11. $4\frac{9}{13}$ _____
12. $\frac{3}{11}$ _____
13. $2\frac{1}{4}$ _____
14. $\frac{7}{8}$ _____
15. $\frac{12}{10}$ _____

16. What advantage is a calculator when calculating decimals and percents?

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 7-7

## Finding the Percent of a Number

**Materials needed:** calculator

**You will use a calculator's [%] key to calculate the selling price of various items.**

1. Stores generally sell items for the price they paid plus a percent mark-up, or increase. How much would a retail store sell a CD for if the store paid $8.00 and added a 50% mark-up? Here's how you can use the [%] key to compute the final selling price. Enter 8 [·] 00 [+] 50 [%] [=].

   a. What is the selling price? _____

   b. To find the amount of mark-up, subtract the price the store paid for the CD from the selling price. What is the amount of mark-up?

   _____

2. "Cheap Joe's" sells items at a mark-up of just 2%. How much would Joe charge for a CD he purchased for $5? What is the amount of the mark-up?

   _____

3. Sometimes stores have sales. You can calculate the sale price easily using the [%] key on your calculator. To find the sale price of a $25 computer game marked down 25%, enter 25 [−] 25 [%] [=].

   a. What is the sale price? _____

   b. Subtract the sale price from the original price to see how much you saved by buying the game on sale. How much did you save?

   _____

**Find the selling price of a $30 pair of blue jeans for each of the following.**

4. 20% sale _____
5. 15% mark-up _____
6. 100% mark-up _____
7. 42% sale _____
8. 30% mark-up _____
9. 75% mark-up _____
10. 40% sale _____
11. 75% sale _____

Name _____ Class _____ Date _____

# Activity Lab 7-8

## Circle Graphs

**Materials needed:** colored pencils

**A circle graph is a graph of data in which the circle represents the entire data set. The table below shows the string instruments in the middle school orchestra and how many students play each instrument. Follow the steps to construct a circle graph of the data.**

| Instrument | Number of Students |
|---|---|
| bass | 4 |
| violin | 18 |
| viola | 8 |
| cello | 5 |
| percussion | 5 |

1. How many total students are in the orchestra? _____

2. How many equal sections will your circle graph need to be divided into? _____

3. Write a fraction that shows how many students in the orchestra play each instrument.

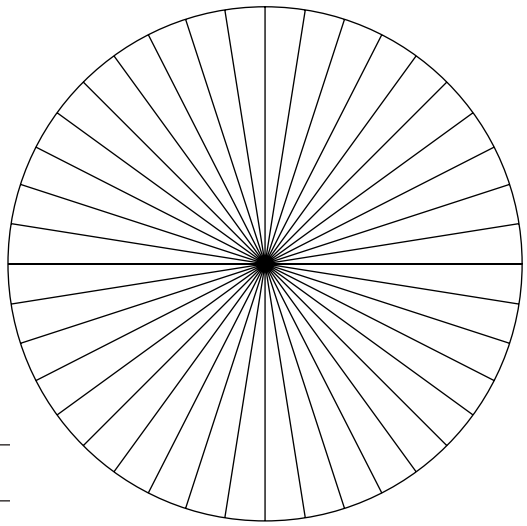
   **a.** bass _____ **b.** violin _____

   **c.** viola _____ **d.** cello _____

   **e.** percussion _____

4. Use your colored pencils and make a key for the circle graph. Shade in the graph according to your answers on #3.

Key
- ☐ bass
- ☐ violin
- ☐ viola
- ☐ cello
- ☐ percussion



5. Were there any "left over" spaces in your circle graph? Why?

_____

_____

_____

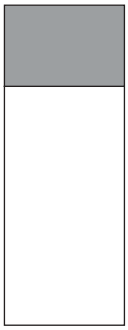
Name _____ Class _____ Date _____

# Activity Lab 7-9

## Estimating with Percents

**Estimate what percent of each figure is shaded. Then measure using a ruler and calculate the percent shaded.**

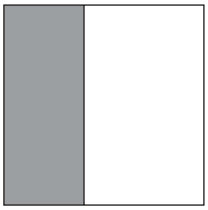
**1.**



Estimate: _____

Actual: _____

**2.**



Estimate: _____

Actual: _____

**3.** Draw a circle and shade 75% of it.

**4.** Draw a rectangle and shade 10% of it.

Name _____ Class _____ Date _____

# Activity Lab 8-1

## Points, Lines, Segments, and Rays

**Work with a partner.**

Set a timer for 10 minutes. Look around your classroom and locate examples of the figures listed below. Be creative and try to find examples that other groups may not find. When the time is up, return to your desks. Your teacher will write the name of a figure on the board and each group must then point out the example they located in the classroom. If you found an example of the figure, your team receives one point. If you found an example that no other groups found, your team receives two extra points. Your teacher can keep score on the board. The team with the most points at the end of the game wins!

**Point**

**Plane**

**Segment**

**Line**

**Ray**

**Parallel Lines**

**Skew Lines**

**Intersecting Lines**

**Intersecting Planes**

Name _____ Class _____ Date _____

# Activity Lab 8-2

**Angles**

**Materials needed:** protractor, straight edge

1. On a separate sheet of paper, draw an acute angle.
   a. Use your protractor to measure the angle. _____
   b. Draw another ray to divide the angle into two parts.
   c. Classify each of the new angles as acute, right, obtuse, or straight.
   d. Measure the two new angles, then find their sum. What do you notice?

      _____ + _____ = _____

   e. Are there any other types of angles that can be joined to form the angle you drew? If so, give an example.

      _____

2. Draw a right angle.
   a. Use your protractor to measure the angle. _____
   b. Draw another ray to divide the angle into two parts.
   c. Classify each of the new angles as acute, right, obtuse, or straight.
   d. Measure the two new angles, then find their sum. What do you notice?

      _____ + _____ = _____

   e. Are there any other types of angles that can be joined to form the angle you drew? If so, give an example.

      _____

3. Draw an obtuse angle, then measure it.
   a. Use your protractor to measure the angle. _____
   b. Draw another ray to divide the angle into two parts.
   c. Classify each of the new angles as acute, right, obtuse, or straight.
   d. Measure the two new angles, then find their sum. What do you notice?

      _____ + _____ = _____

   e. Are there any other types of angles that can be joined to form the angle you drew? If so, give an example.

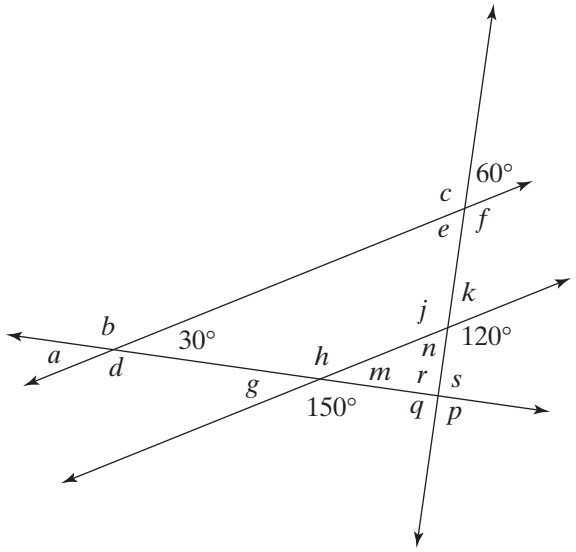
      _____

Name _____ Class _____ Date _____

# Activity Lab 8-3

## Special Pairs of Angles

**Use the diagram to find the measure of each angle and to complete the sentences below.**




**1.** $m\angle a =$ _____ $m\angle b =$ _____ $m\angle c =$ _____ $m\angle d =$ _____

$m\angle e =$ _____ $m\angle f =$ _____ $m\angle g =$ _____ $m\angle h =$ _____

$m\angle j =$ _____ $m\angle k =$ _____ $m\angle m =$ _____ $m\angle n =$ _____

$m\angle p =$ _____ $m\angle q =$ _____ $m\angle r =$ _____ $m\angle s =$ _____

**Complete each sentence using the words complementary, supplementary, vertical, or congruent. There may be more than one word that applies to each sentence.**

**2.** $\angle b$ and $\angle a$ are _____ angles.

**3.** $\angle b$ and $\angle d$ are _____ angles.

**4.** $\angle g$ and $\angle e$ are _____ angles.

**5.** $\angle p$ and $\angle r$ are _____ angles.

**6.** $\angle n$ and $\angle m$ are _____ angles.

**7.** $\angle n$ and $\angle j$ are _____ angles.

**Hint:** $\angle d$ and $\angle m$ are *supplementary* angles.

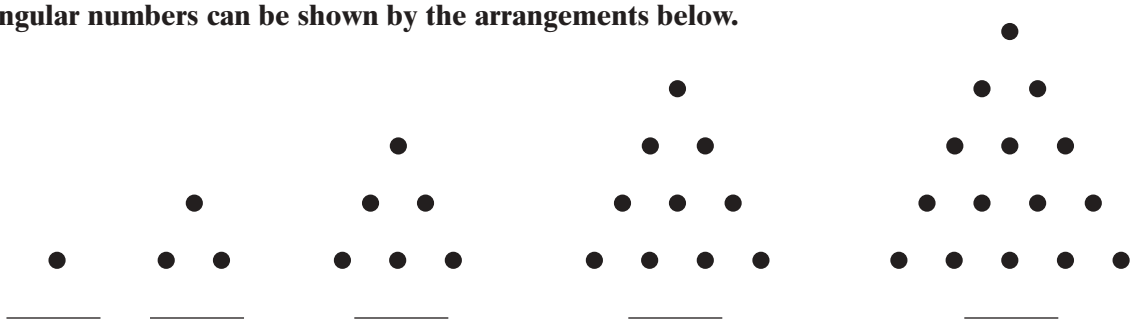
Name _____ Class _____ Date _____

# Activity Lab 8-4

**Classifying Triangles**

*Patterns in Geometry*

**Triangular numbers can be shown by the arrangements below.**

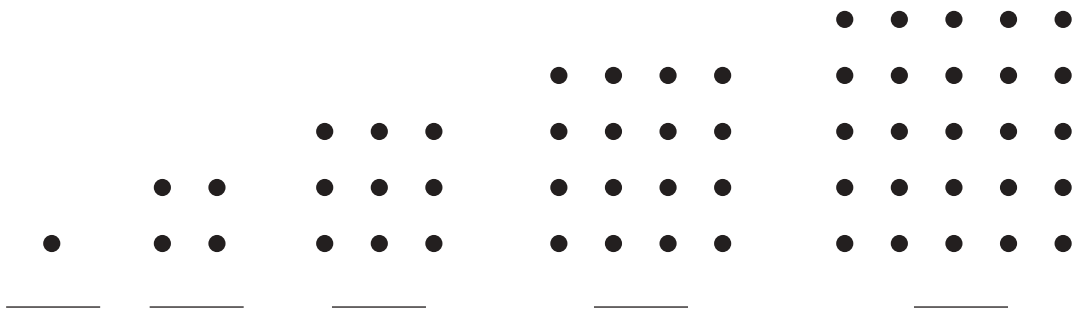


_____ _____ _____ _____ _____

1. Write the numbers represented by each arrangement.
2. What pattern do you see in the arrangements? _____
3. The pattern is also shown by the expression $\frac{n(n + 1)}{2}$, where $n$ is the place in the pattern. Write a number sentence to show the tenth and the fifteenth triangular numbers.

_____

**Square numbers can be shown by the arrangements below.**



_____ _____ _____ _____ _____

4. Write the numbers represented by each arrangement.
5. What pattern do you see in the arrangements? _____
6. Write a number sentence to show the tenth and fifteenth square numbers.

_____

7. What are the two smallest numbers that can be shown as both a triangular number and as a square number? Explain.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 8-5

## Exploring and Classifying Polygons

**Materials needed:** paper, ruler, timer or stopwatch

**Work in small groups.**

1. Use the ruler to divide your paper into equal spaces. You should have one space more than the number of group members.
2. One group member calls out the name of a polygon. The polygon can be general, such as "rectangle," or specific, such as "equilateral triangle." At the top of one of the spaces on your paper, write the name of the polygon and draw a picture of it. In the same space, write the number of sides that the polygon has.
3. When everyone is finished writing, set the timer or stopwatch for one minute. During that minute, look around the room and, in the same space in which you drew the polygon, write down as many examples of that polygon that you see. Try to find examples that others will not find. You must be able to see the polygon without moving any objects in the classroom.
4. Once a minute is up, trade papers so that no one has his or her own paper.
5. Take turns reading the examples listed on each paper. Cross out any incorrect examples and circle any correct examples that appear on more than one paper. (Work as a group to determine if any examples are incorrect.)
6. Scoring: Count the number of examples that were not crossed out or circled and multiply by three. Add the number of circled examples. Write the score in the bottom right corner of the space with the polygon.
7. Return the papers to their original owners. Play another round with a different group member calling out a polygon.
8. After every group member has had a turn naming a polygon, total the scores. The player with the most points wins.
9. a. Which polygons were the easiest to find? Which were the most difficult?

   b. Can you name any polygons that you *cannot* find in your classroom? For any polygons that the group could not find, work together to think of other examples outside the classroom of the shape.

   c. Work together to find examples of shapes in your classroom that are not polygons. How can you tell if a shape is a polygon?

Name _____ Class _____ Date _____

# Activity Lab 8-6

## Congruent and Similar Figures

**Materials needed:** rulers, yard or meter stick

**Measure items in your classroom to fill in the charts.**

| Top of Your Desk | Length | Width |
|---|---|---|
| | | |

| Your Classroom Door | Height | Width |
|---|---|---|
| | | |

| An Item with 3 Sides | Side 1 | Side 2 | Side 3 |
|---|---|---|---|
| | | | |

| An Item with 6 Sides | Side 1 | Side 2 | Side 3 | Side 4 | Side 5 | Side 6 |
|---|---|---|---|---|---|---|
| | | | | | | |

| Your Teacher | Height | Length of One Arm | Length of Shoe |
|---|---|---|---|
| | | | |

**Use the properties of similar polygons to set up proportions and answer the questions below. When it is helpful, you can draw diagrams of the similar shapes.**

1. If you build a desk for your little brother that is similar to your desk and it is one foot wide, how long will it be? _____
2. If your classroom door is re-sized for a mouse, with a height of 4 inches, how wide will the similar door be? _____
3. You are going to design a sculpture to display in front of your school. The sculpture will be similar to the triangular object you found in your classroom. If side 1 will be 30 ft long, how long will side 2 and side 3 be? _____
4. In a sudden freeze, side 4 of the six-sided object shrinks by two inches. How long are sides 1, 2, 3, 5, and 6? _____
5. Overnight, your teacher becomes a giant standing 67 feet tall! How long will each of your teacher's arms be? How long will your teacher's foot be? _____

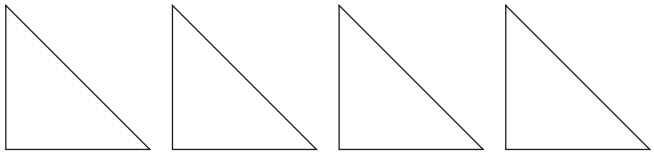
Name _____ Class _____ Date _____

# Activity Lab 8-7

## Line Symmetry

**Materials needed:** scissors

**Cut out the four triangles shown. Arrange the four triangles to form each of the shapes described below. In the boxes, draw the shapes you have formed, using dotted lines to indicate the lines of symmetry.**



**1.** Arrange the triangles to form a shape that has exactly four lines of symmetry.

**2.** Arrange the triangles to form a shape that has exactly two lines of symmetry.

**3.** Arrange the triangles into two distinct shapes, each with exactly one line of symmetry.

**4.** Arrange the triangles into two distinct shapes, each with zero lines of symmetry.

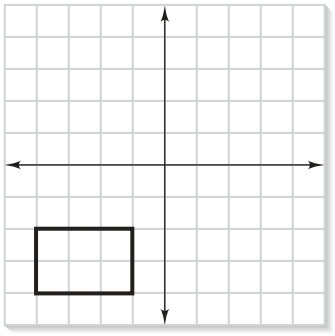
Name _____ Class _____ Date _____

# Activity Lab 8-8

**Transformations**

Each figure on the left has a set of transformation directions. Apply the given transformations, in order, to each figure and graph the images on the grid on the right. Be sure to apply each of the transformation directions in the order they are listed, or you may get a very different result!

**1.**

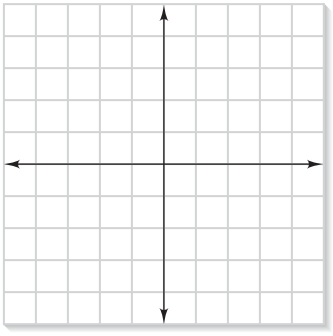


① Reflect across *y*-axis

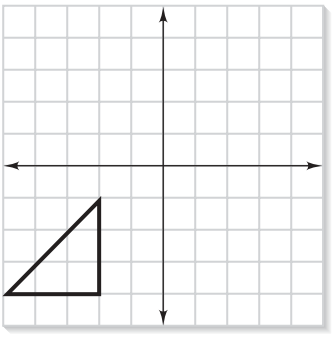
② Translate up 2 units

③ Reflect across *x*-axis

④ Reflect across *y*-axis



**2.**

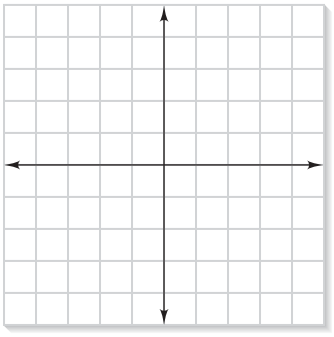


① Translate up 6 units

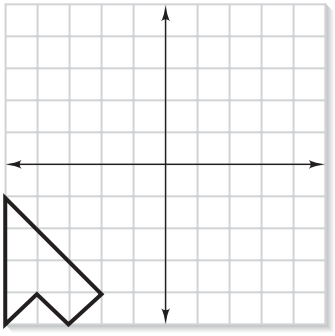
② Reflect across *x*-axis

③ Rotate 180° about the origin

④ Translate left 3 units



**3.**

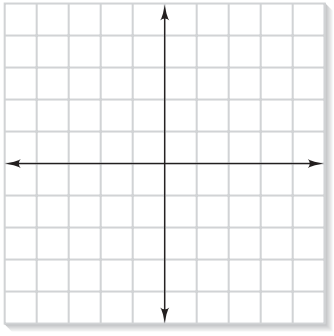


① Translate right 5 units

② Reflect across *x*-axis

③ Translate left 2 units

④ Reflect across *y*-axis



Name _____ Class _____ Date _____

# Activity Lab 9-1

## Metric Units of Length, Mass, and Capacity

**Work in groups of 3 or 4.**

**1.** Choose an appropriate metric unit of length, mass, or capacity for each item listed in the chart. If you cannot realistically measure the length, mass, and/or capacity for an item write, "does not apply." The first two have been done for you.

| | mm | cm | m | km | mL | L | kL | mg | g | kg |
|---|---|---|---|---|---|---|---|---|---|---|
| a boulder | | | X | | does not apply | | | | X | |
| a swimming pool | | | X | | | X | | does not apply | | |
| a highway | | | | | | | | | | |
| a thimble | | | | | | | | | | |
| a milk truck | | | | | | | | | | |
| a glass of juice | | | | | | | | | | |
| a boot | | | | | | | | | | |
| a lima bean | | | | | | | | | | |
| a basset hound | | | | | | | | | | |
| the Moon | | | | | | | | | | |
| an egg | | | | | | | | | | |
| an eyelash | | | | | | | | | | |

**2.** Look around your classroom and find 10 items to add to the chart. Decide which unit of length, mass, or capacity you would use to measure each item. Try to choose items that can be measured in more than one way!

| | mm | cm | m | km | mL | L | kL | mg | g | kg |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | | | | | | | | | | |
| 2. | | | | | | | | | | |
| 3. | | | | | | | | | | |
| 4. | | | | | | | | | | |
| 5. | | | | | | | | | | |
| 6. | | | | | | | | | | |
| 7. | | | | | | | | | | |
| 8. | | | | | | | | | | |
| 9. | | | | | | | | | | |
| 10. | | | | | | | | | | |

Name _____ Class _____ Date _____

# Activity Lab 9-2

## Converting Units in the Metric System

**Materials needed:** 4 rulers and 2 meter sticks

**Divide into 6 groups. Groups one and two will measure in meters, groups three and four in centimeters, and groups five and six in millimeters.**

1. Measure the length and width of your classroom floor, a student desktop, your math textbook, and a pencil. Record your measurements in the unit assigned to your group:

| | |
|---|---|
| floor length | |
| floor width | |
| desktop length | |
| desktop width | |
| textbook length | |
| textbook width | |
| pencil length | |
| pencil width | |

2. Convert your measurements to millimeters, centimeters, meters, and kilometers to complete the table:

| | millimeters | centimeters | meters | kilometers |
|---|---|---|---|---|
| floor length | | | | |
| floor width | | | | |
| desktop length | | | | |
| desktop width | | | | |
| textbook length | | | | |
| textbook width | | | | |
| pencil length | | | | |
| pencil width | | | | |

3. Compare your values with those of your classmates. Are your answers the same or different? Why?

_____

_____

4. Which unit of measurement is the most appropriate for each of the items you measured? Explain why you would choose this unit.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 9-3

## Perimeters and Areas of Rectangles

**Materials needed:** graph paper, ruler

1. Draw a small rectangle on graph paper. Record the length and width, then find the area.

   $l =$ _____ $w =$ _____ $A =$ _____

2. Draw another rectangle whose dimensions are *double* the original dimensions.

   a. Record the new dimensions. $2l =$ _____ $2w =$ _____

   b. What is the area of the larger rectangle? _____

   c. Divide the area of the larger rectangle by the area of the original rectangle.

   _____

   d. Describe what happens to the area of a rectangle when the dimensions are multiplied by 2.

   _____

   _____

3. Draw a different small rectangle. Test your rule by repeating Exercises 1 and 2 with the new rectangle. Does your rule hold?

   _____

4. Draw a rectangle whose dimensions are *triple* the dimensions of the rectangle you drew for Exercise 1.

   a. Record the new dimensions. $3l =$ _____ $3w =$ _____

   b. What do you think the area of this rectangle will be? Make a prediction.

   _____

   c. Find the area of the rectangle. _____

   How accurate was your prediction?

   _____

   d. Divide the area of this rectangle by the area of the original rectangle.

   _____

5. Suppose the dimensions of your rectangle were multiplied by a factor $n$. What would the area of the new rectangle be? Write a rule, then discuss your ideas with a classmate.

   _____

   _____

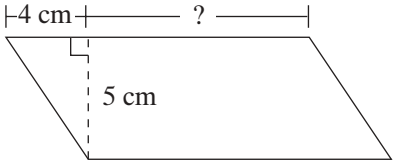
Name _____ Class _____ Date _____

# Activity Lab 9-4

## Areas of Parallelograms and Triangles

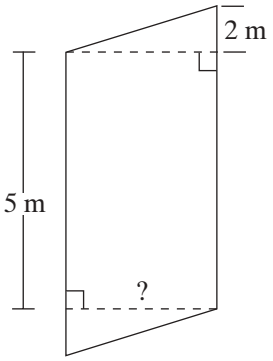
**Use the formula for the area of a parallelogram A = $b \times h$, where $b$ stands for base and $h$ stands for height. Find each missing length. The total area for each figure is given.**

**1.**



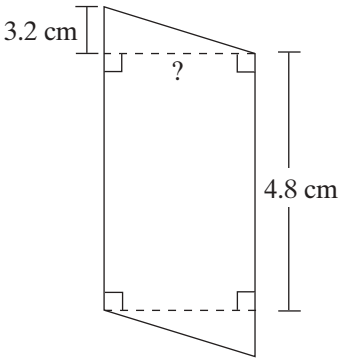

Area = 50 $cm^2$

**2.**



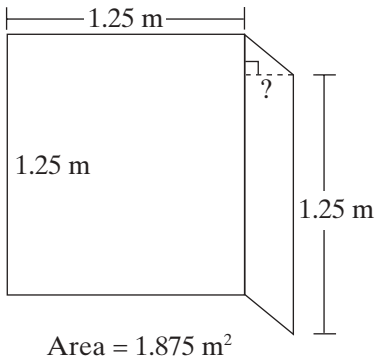

Area = 28 $m^2$

**3.**



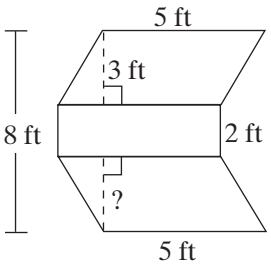

Area = 51.2 $cm^2$

**4.**



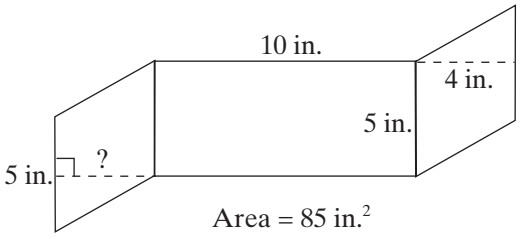

Area = 1.875 $m^2$

**5.**



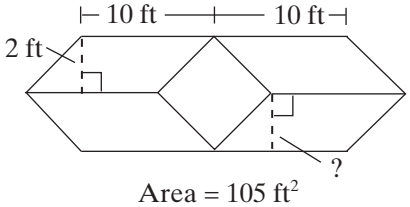

Area = 40 $ft^2$

**6.**



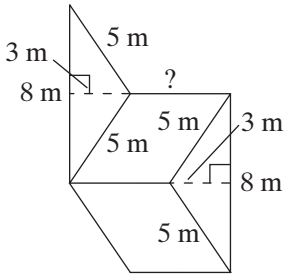

Area = 85 $in.^2$

**7.**




Area = 105 $ft^2$

**8.**




Area = 64 $m^2$

Name _____ Class _____ Date _____

# Activity Lab 9-5

## Circles and Circumference

**Materials needed:** measuring tape, ruler, two hardcover books, basketball, volleyball, softball, baseball, golf ball

**Work in pairs.**

1. Copy the table shown below on a separate sheet of paper.

| Ball | Circumference ($C$) | Diameter ($d$) | Experimental Value of $\pi$ |
|---|---|---|---|
| Basketball | | | |
| Volleyball | | | |
| Softball | | | |
| Baseball | | | |
| Golf Ball | | | |
| Average | | | |

2. Groups should take turns measuring each ball.
   a. Wrap the measuring tape around the widest part of each ball to measure the circumference $C$. Round your measurement to the nearest eighth of an inch. Record the result in the table.
   b. To measure the diameter of each ball, use two hardcover books and a ruler. Place a book snugly against each side of the ball and measure from the inner edge of one book to the inner edge of the other. Make sure you are measuring across the widest part of the ball. Round your measurement to the nearest eighth of an inch. Record the result.
3. When you have measured all five different balls, use the equation $C = \pi d$ to calculate the experimental value of $\pi$ for each. Convert your answers to decimals and round to the nearest thousandth. Make your initial calculations for each ball on your own. Then compare with your partner. Record the results in your table.
4. Add your experimental values and divide by five to find the average of your experimental values for $\pi$.
5. Round to the nearest thousandth. The actual value of $\pi$ to the nearest thousandth is 3.142. Find the difference between the average of your experimental values and the actual value of $\pi$. How do you explain this difference?

Name _____ Class _____ Date _____

# Activity Lab 9-6

**Area of a Circle**

## *Search Area*

When a person is lost, rescuers and search teams must define a search area before they go to look for the person. The search area is determined by how far the person could have gone from their last known location within the time that they have been missing. Because searchers do not often know the direction in which the person has gone, the search area takes the shape of a circle, the center of which is the person's last known location.

To calculate the search area in each situation below, find the radius of the circle by determining the distance the person could have traveled (distance = speed × time). Then, use the radius to find the area of the circular search area. ($A = \pi r^2$) Use 3.14 for $\pi$. Round your answers to the nearest square mile or square kilometer.

**1.** A hiker has been lost for 3 hours. He can hike at an average rate of 5 miles per hour.

| Radius | Search area |
|---|---|
| | |

**2.** A mountain biker is known to travel at an average speed of 10.5 miles per hour. She has been lost for 6 hours.

| Radius | Search area |
|---|---|
| | |

**3.** A swimmer has been lost for 30 minutes. She normally swims at an average speed of 4 kilometers per hour.

| Radius | Search area |
|---|---|
| | |

**4.** A man in a car has been missing for 4 hours. Searchers assume that he has been traveling at an average of 75 miles per hour.

| Radius | Search area |
|---|---|
| | |

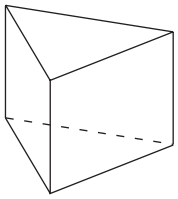
Name _____ Class _____ Date _____

# Activity Lab 9-7

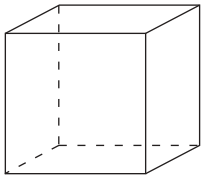
## Three-Dimensional Figures and Spatial Reasoning

**Find the vertices, edges, and faces for each figure.**

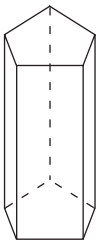
**1.** _____ vertices
_____ edges
_____ faces



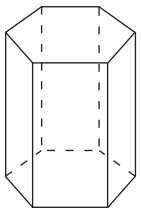
**2.** _____ vertices
_____ edges
_____ faces



**3.** _____ vertices
_____ edges
_____ faces



**4.** _____ vertices
_____ edges
_____ faces

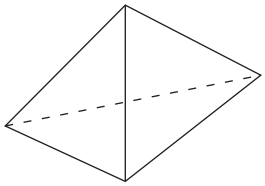


**5.** What pattern do you see in the number of vertices, edges, and faces of the prisms?

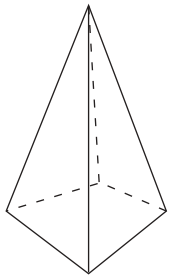
_____

_____

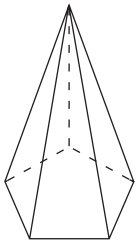
**6.** _____ vertices
_____ edges
_____ faces



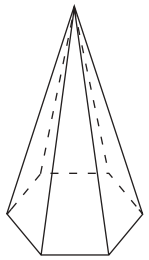
**7.** _____ vertices
_____ edges
_____ faces



**8.** _____ vertices
_____ edges
_____ faces



**9.** _____ vertices
_____ edges
_____ faces



**10.** What pattern do you see in the number of vertices, edges, and faces of the pyramids?

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 9-8

## Surface Areas of Prisms

You work for a company that makes rectangular boxes of various sizes. The dimensions of the boxes are shown in the table below.

| Box | Base dimensions | Height | Surface area |
|---|---|---|---|
| A | $w = 9$ cm; $l = 12$ cm | 10 cm | |
| B | $w = 14$ cm; $l = 10$ cm | 12 cm | |
| C | $w = 8$ cm; $l = 16$ cm | 14 cm | |
| D | $w = 9$ cm; $l = 7$ cm | 8 cm | |

1. Fill in the last column in the table by calculating the surface area of each box.
2. You are given enough paint to cover 3,000 $cm^2$ of surface. Is this enough paint to cover one of each kind of box? Explain.

_____

_____

3. Which box (A, B, C, or D) has the greatest surface area?

_____

4. If you used all the paint to cover the surfaces of only the box type in Exercise 3, how many boxes could you paint?

_____

_____

5. The company decides to increase the height of Box D by 7 cm. What would the new surface area of Box D be?

_____

6. If Box D were expanded as described in Exercise 5, would you still have enough paint to cover one of each box? Explain.

_____

_____

7. The company decides to make a new box in the shape of a triangular prism. Each of the two triangular bases of the box has a base of 10 cm and a height of 16 cm, and the height of the box is 14 cm. What is the surface area of the new box?

_____

Name _____ Class _____ Date _____

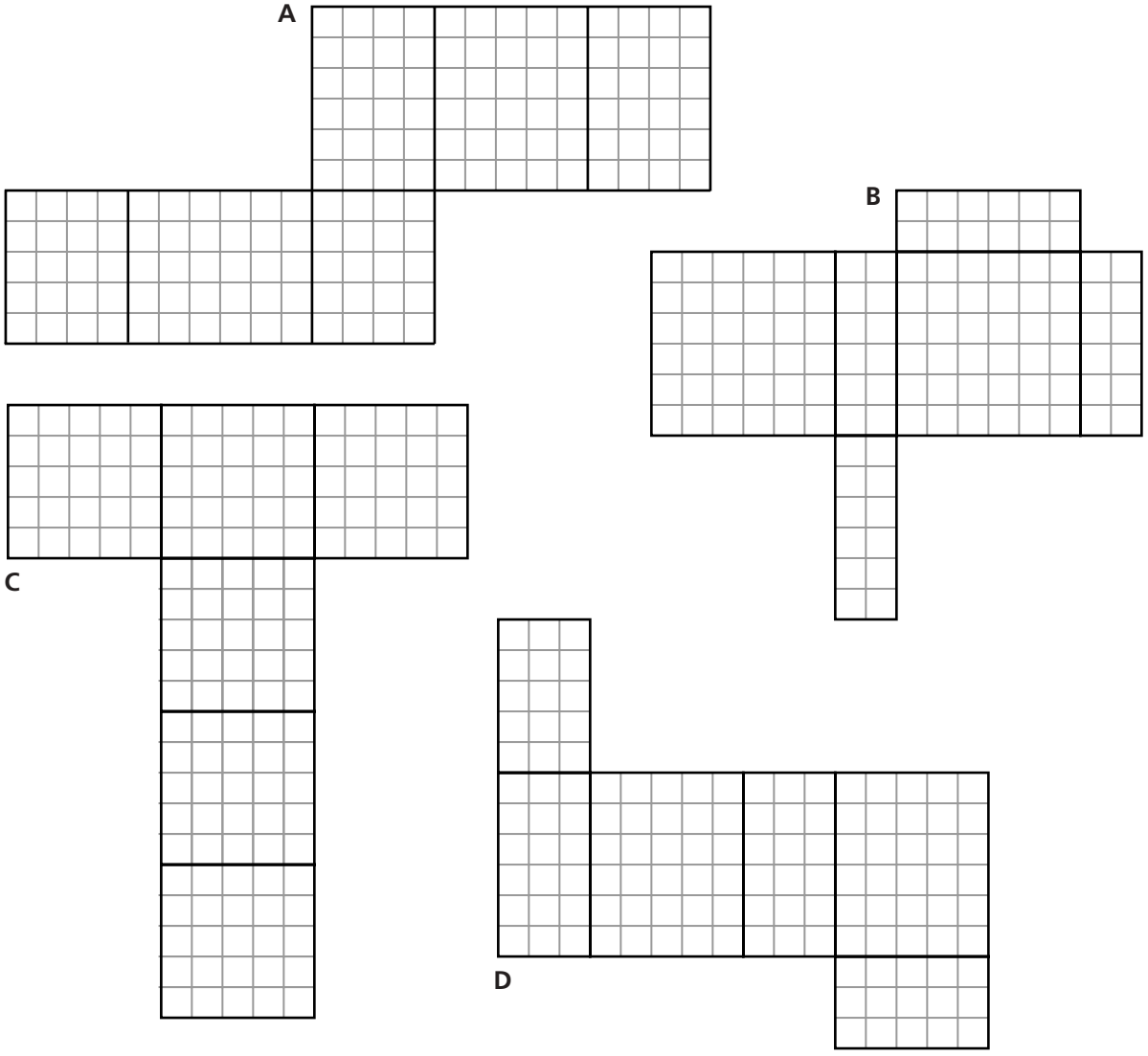
# Activity Lab 9-9

## Volumes of Rectangular Prisms

**Materials needed:** scissors, tape, ruler, graph paper

**Work in small groups of 3–4 students.**

Draw these nets on graph paper. Cut them out and fold them along the inside segments. Tape the edges together to form a solid.



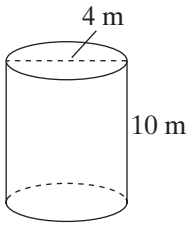

1. Find the surface area of each solid.
2. Find the volume of each solid.
3. Compare the solids. Which are congruent? Explain.

Name _____ Class _____ Date _____

# Activity Lab 9-10

## Surface Areas and Volumes of Cylinders

You can use a formula to find the volume of a cylinder. As with prisms, the volume is measured in cubic units even though you cannot fill the cylinder with cubes.




Volume of the cylinder = area of base × height

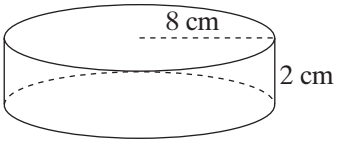
$= \pi r^2 \times$ height

The volume of the cylinder above can be found by substituting the known values into the formula.

Volume $= \pi r^2 \times$ height
$= [3.14 \times (2 \times 2)] \times 10$
$= [3.14 \times 4] \times 10$
$= [12.56] \times 10$
$= 125.6\ m^3$

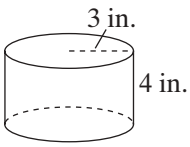
**Use the formula to find the volume of each cylinder. Use 3.14 for $\pi$.**

**1.**



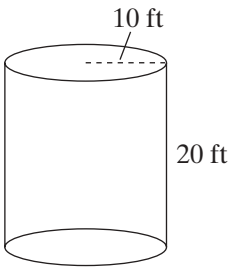

$V =$ _____

**2.**



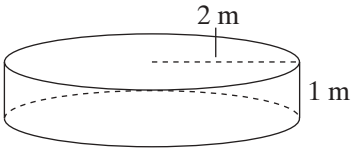

$V =$ _____

**3.**



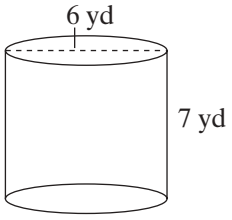

$V =$ _____

**4.**



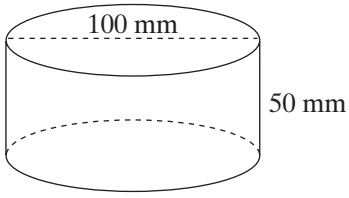

$V =$ _____

**5.**




$V =$ _____

**6.**




$V =$ _____

**7.** How is the formula for the volume of a cylinder similar to the formula for the volume of a prism?

_____

Name _____ Class _____ Date _____

# Activity Lab 10-1

## Tree Diagrams and the Counting Principle

You are going to print T-shirts to sell at your club's fundraiser. Use the chart below to draw a tree diagram that lists the possible outcomes. Use your tree diagram to answer the questions.

| Sizes | Shirt Colors | Ink Colors |
|---|---|---|
| Small | Black | Black |
| Medium | Red | White |
| Large | Gray | |
| X-Large | | |

1. How many different T-shirts can you print? _____

2. Are all of the possible combinations practical choices or should you eliminate some of the combinations? Why?

_____

3. How many of the different combinations will you actually print to sell for your fundraiser?

_____

4. Each T-shirt costs $5 to make and sells for $12.50. If you want to raise at least $900 for your club, how many T-shirts should you print?

_____

5. To raise the $900, you are going to print an equal number of each practical combination. Of the T-shirts you print, how many will be medium, black, and have white ink?

_____

6. How many red T-shirts will you print? _____

7. You take a survey and discover that the most popular colors are red and black, so you decide not to print the gray T-shirts. How many different combinations will you print? (Take into account your answers from Exercises 2 and 3 above.)

_____

Name _____ Class _____ Date _____

# Activity Lab 10-2

**Probability**

**Use the words *impossible*, *probably not*, *even chance*, *probably* and *certain* to help you describe the following events. Then find the probability.**

1. Rolling a blue on a cube painted with 3 blue faces and 3 yellow faces.

_____

2. Drawing a 5 from a stack of cards numbered 0 through 10.

_____

3. Drawing a nickel at random from a jar containing 7 dimes and 3 nickels.

_____

4. Drawing a multiple of 10 if a number is chosen from the numbers 1 through 120.

_____

5. Winning a prize in a drawing in which there are 3 prizes and 500 entries.

_____

6. Spinning a yellow if the spinner has 12 equal regions, 10 of which are yellow.

_____

7. Drawing a dime or penny at random from a jar containing 12 quarters and 7 nickels.

_____

8. Choosing at random a name starting with H from a page in the phone book beginning with Hardy and ending with Huffman.

_____

9. Drawing an S when picking a letter at random from letters in MISSISSIPPI.

_____

10. Describe an event that would have an impossible outcome.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 10-3

## Experimental Probability

**Materials needed:** index cards, box

**Work in pairs.**

1. Write each letter of the words GYMNASTICS and LACROSSE on an index card, one letter per card. Place all the cards in a box and mix them up. The player who most recently had a birthday is Player A. The other is Player B.
2. Without looking, pull one index card out of the box. If the letter on the card is a vowel, Player A gets a point. If the letter on the card is a consonant, Player B gets a point. Place the card back in the box and mix the cards up. Keep a tally of your points in a table like the one shown below.

| | Round 1 | Round 2 | Round 3 | Round 4 | Round 5 | Round 6 | Round 7 | Round 8 |
|---|---|---|---|---|---|---|---|---|
| Player A | | | | | | | | |
| Player B | | | | | | | | |

3. Take turns pulling cards out of the box. Record the points earned in your table. Each player should take four turns choosing a card, replacing the card each time. The player with the most points at the end of the game wins.
4. To determine whether the game was fair, calculate the probability of pulling out a vowel. Then calculate the probability of pulling out a consonant.
5. Did either player have an advantage? Explain.
6. Was the game *fair* or *unfair*? Explain.
7. Repeat the game using the letters of the words FAIR, UNFAIR, and GAME.
8. Determine whether the new game is *fair* or *unfair* by calculating the probabilities of drawing a vowel and drawing a consonant.
9. How can you guarantee that a game such as this is fair?

Name _____ Class _____ Date _____

# Activity Lab 10-4

## Making Predictions from Data

**Materials needed:** five sheets of used paper for each student, large and small empty wastebaskets

1. Crumple four sheets of used paper into four paper balls.
2. Place a wastebasket at the front of the room. Wait until it is your turn, then stand 6 feet from the basket and try to throw all of your paper balls into the basket, one at a time.
3. As students are throwing, keep a tally of the throws that go in and those that do not in a table such as the one below. Record the total number of balls that went in and the total number of misses for the class.

| Student | Balls That Went In | Misses | Balls Thrown |
|---|---|---|---|
| Example | \| | \|\|\| | 4 |
| 1 | | | |
| 2 | | | |
| 3 | | | |
| TOTAL | | | |

4. **a.** If you randomly chose one ball, how can you find the probability that it went in the basket? Calculate the probability using your results.

   **b.** If you randomly chose one ball, how can you find the probability that it did *not* go in the basket? Calculate the probability using your results.

   **c.** Based on these probabilities, how can you calculate the number of balls expected to go in the basket if a student throws 50 paper balls? Calculate this number.

5. **a.** How would a smaller basket change the probability of a single paper ball going in the basket?

   **b.** Repeat the experiment with one paper ball and a small wastebasket. Calculate the probability of a single ball going in the basket. Does your calculation support your prediction?

6. List two ways you could change this experiment, so that the probability of throwing a paper ball into the basket would increase.

Name _____ Class _____ Date _____

# Activity Lab 10-5

**Independent Events**

**Complete this True-False quiz. Guess if you don't know the answers.**

**a.** The oboe evolved from an outdoor instrument called the shawm.

**b.** The bassoon, a member of the oboe family, originally only had two keys.

**c.** The English horn, the bass of the oboe family, was once called an oboe da caccia.

**1.** Check your answers with the answer key at the bottom of the page. Record the number of questions answered correctly.

_____

**2.** What is the probability that you will guess the correct answer to any one item on the quiz?

_____

**3.** How many possible outcomes are there for guessing the correct answer to two questions? For three questions? You can draw a tree diagram on another sheet of paper to help you answer the questions.

_____

**4.** What is the probability that you will guess the correct answers for

**a.** two questions? _____ **b.** three questions? _____

**5.** What pattern do you notice occurring in the probability as you add each additional question to the quiz?

_____

_____

**6.** Predict the probability of guessing all the correct answers to a similar quiz that has

**a.** 5 questions. _____ **b.** 10 questions. _____

**7.** Ask 16 other students to try the True-False quiz. What fraction of them guessed the answers correctly? Is this fraction close to the probability of $\frac{1}{8}$? Explain.

_____

_____

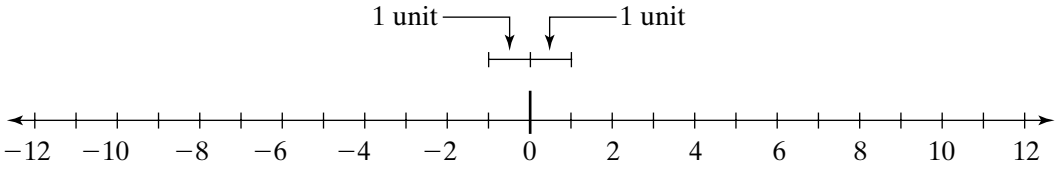
Answer Key: a. True b. False, it originally had 4 keys. c. False, the bassoon is the bass member of the family.

Name _____ Class _____ Date _____

# Activity Lab 11-1

## Exploring Integers

The absolute value of a number is the number of units the number is from zero. The absolute value of zero is zero. The absolute value of $-3$ can be written as $|-3|$.




On the number line, $-1$ is one unit from zero, so the absolute value of $-1$ is 1. This is written as $|-1| = 1$.

On the number line, $+1$ is 1 unit from zero, so the absolute value of $+1$ is 1. This is written as $|+1| = 1$.

**1.** Find the absolute value of each number.

**a.** $|-4|$ _____ **b.** $|+5|$ _____ **c.** $|-2|$ _____

**d.** $|+4|$ _____ **e.** $|-5|$ _____ **f.** $|+2|$ _____

**g.** $|-9|$ _____ **h.** $|+7|$ _____ **i.** $|-10|$ _____

**j.** $|+9|$ _____ **k.** $|-7|$ _____ **l.** $|+10|$ _____

**2.** What two numbers have an absolute value of 8? _____

**3.** What two numbers have an absolute value of 12? _____

**4.** What two numbers have an absolute value of 20? _____

**5.** What pattern do you see in the numbers that have the same absolute value?

_____

_____

**Write the next three integers in each pattern. Use absolute value notation.**

**6.** $|-8|, |+10|, |-12|, |+14|$ _____

**7.** $|-1|, |-3|, |-5|, |-7|$ _____

**8.** $|+1|, |-2|, |+3|, |-4|$ _____

**9.** $|-5|, |-10|, |-15|, |-20|$ _____

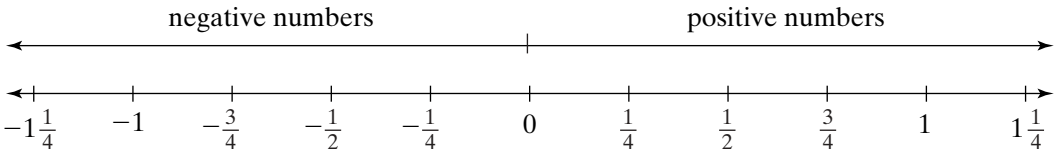
Name _____ Class _____ Date _____

# Activity Lab 11-2

## Comparing and Ordering Integers

All integers, except zero, are either positive or negative numbers.
Fractions and decimals can also be positive or negative numbers.
A number line is a useful tool for ordering numbers.

The number line below shows some positive and negative fractions.

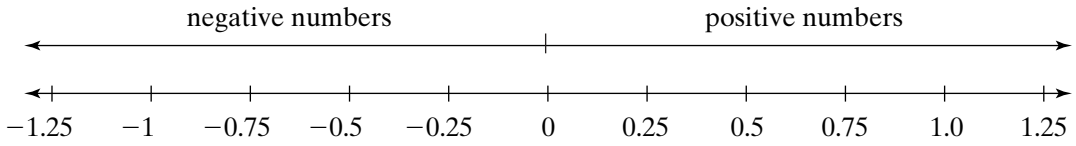



As with integers, the further to the right a fraction is located on a number line, the greater it is. The further to the left it is, the less it is.

**Order from greatest to least. Use the number line above. Locate and add fractions to the number line if necessary.**

1. $\frac{1}{2}, -\frac{1}{2}, -\frac{1}{4}$ _____
2. $\frac{2}{3}, -\frac{3}{4}, \frac{3}{8}$ _____
3. $-\frac{1}{8}, -\frac{5}{8}, \frac{3}{8}, \frac{3}{4}$ _____
4. $-\frac{1}{3}, \frac{2}{3}, \frac{1}{6}, -\frac{5}{6}$ _____

The number line below shows some positive and negative decimals.




As with integers, the further to the right a decimal is located on a number line, the greater it is. The further to the left it is, the less it is.

**Order from greatest to least. Use the number line above. Locate and add decimals to the number line if necessary.**

5. $-0.3, 0.25, -0.45$ _____
6. $0.75, -0.25, 0.5$ _____
7. $0.44, -0.89, -0.6$ _____
8. $0.1, -0.15, -0.51, 0.05$ _____
9. Would it be easier to order decimals or fractions without a number line? Explain.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 11-3

**Adding Integers**

**Materials needed:** calculator

**You will use a calculator to add integers.**

1. To find the sum of 125 and −316, enter 125, press [+], enter 316, press [+/−], press [=]. What is the sum?

   _____

2. Is the sum of 125 and −316 the same as subtracting 316 from 125? To find out, enter 125, press [−], enter 316, press [=]. Are the two answers the same?

   _____

3. Find the following sums: 9,178 + −3,301; 40,105 + −31,003; and 122,678 + −9,300,897.

   _____

   Use the method in Step 2 to see if the sums can be found by subtraction. What did you find out?

   _____

   _____

4. Find the sums of the following:
   - **a.** 712 + −48 _____
   - **b.** 10,222 + −672 _____
   - **c.** −12 + −14 _____
   - **d.** −84,416 + 76,216 _____
   - **e.** 6,412 + 1,000,317 _____
   - **f.** 432,975 + −332,976 _____
   - **g.** 7,162 + −8,841 _____
   - **h.** −7,462 + −7,462 _____
   - **i.** −867,200 + −67,200 _____

Name _____ Class _____ Date _____

# Activity Lab 11-4

## Subtracting Integers

**Materials needed:** calculator

**You will use a calculator to determine a rule for subtracting integers.**

1. To find the difference between 45 and −92, enter 45, press [−], enter 92, press [+/−], press [=].
   a. What is the difference? _____
   b. What would happen if you added 45 and 92?

   _____

2. a. What is the difference between 798 and −798?

   _____

   b. What would you get if you added 798 and 798?

   _____

3. a. What is the difference between the following pairs of integers? 50 and −22; 99 and −52; 212 and −212.

   _____

   b. Based on these results, what can you say about subtracting a negative number from a positive number?

   _____

4. a. Are the differences between the following pairs of integers positive or negative? −45 and −23; −756 and −489; −66 and −6

   _____

   b. Why?

   _____

   _____

   _____

5. a. Are the differences between the following pairs of integers positive or negative? −4 and −56; −20 and −200; −90 and −990

   _____

   b. Why?

   _____

   _____

   _____

Name _____ Class _____ Date _____

# Activity Lab 11-5

**Multiplying Integers**

## *Multiplication Race*

**Materials needed:** 18 index cards, pen

**Work with a partner**

**Step 1:** Divide the index cards evenly between you and your partner. One of you will write the numbers 1 through 9 on his or her cards (one number per card), while the other person writes the numbers –1 through –9 on his or her cards. When you are done, put all of the cards in one stack.

**Step 2:** Mix up the cards and divide them evenly again between you and your partner.

**Step 3:** At the same time, you and your partner will each turn over a card. The first person to say the correct product of the two numbers earns one point. For each turn, record the two numbers, their product, and the initials of the partner who earned the point in the chart below.

| Card 1 | Card 2 | Product | Point Earned by |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Step 4:** When all of the cards have been turned over, count the score and check all of your answers.

**Step 5:** Put all of the cards back into one stack. Remove the two top cards and set one of them aside. Place the other card face up in the center of the desk or table.

**Step 6:** This time, multiply three integers on each turn: the numbers on the card you each turn over and the number on the card in the middle of the table. Again, record the numbers that you multiply on each turn, along with your answers and who earned the point.

Name _____ Class _____ Date _____

# Activity Lab 11-6

## Dividing Integers

**For each value, write an expression using only the integers 3, 3, −3, and −3. You may use any combination of multiplication, division, addition, and subtraction. The first problem has been completed for you.**

1. $3 \div 3 + (-3 \div -3) = 2$
2. _____ $= -2$
3. _____ $= 9$
4. _____ $= 0$
5. _____ $= -36$
6. _____ $= 8$
7. _____ $= 10$
8. _____ $= -8$
9. _____ $= 15$
10. _____ $= -1$
11. What strategies did you use to find your solutions?

_____

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 11-7

## Solving Equations with Integers

**Write an equation and solve for each variable.**

1. If 8 is subtracted from $x$, the result is $-6$. $x =$ _____
2. If you multiply $p$ by $-7$, the product is 56. $p =$ _____
3. When 14 is added to $r$, the result is 5. $r =$ _____
4. If you divide $t$ by $-12$, the quotient is equal to $-5$. $t =$ _____
5. If the opposite of 16 is added to $y$, the result is 5. $y =$ _____
6. When you subtract $-12$ from $j$, the answer is 8. $j =$ _____
7. When 84 is divided by $f$, the result is $-6$. $f =$ _____
8. If you multiply $m$ by 12, the result is $-84$. $m =$ _____

**Now use your solutions to evaluate each expression.**

9. $y \div m =$ _____
10. $t + r + j =$ _____
11. $r - p =$ _____
12. $f \div x + t =$ _____
13. $j \times m =$ _____
14. $f - r + x =$ _____
15. $t \div j =$ _____
16. $m - f =$ _____
17. How would you explain to a friend the differences between solving equations with integers and solving equations with only positive numbers?

_____

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 11-8

## Graphing in the Coordinate Plane

**Materials needed:** graph paper

Write the ordered pair described by each pair of values in the table. The first one is done for you. Mark the origin (0, 0) in the center of your graph paper. Use your graph paper to plot the ordered pairs in the table. Beginning at the origin, connect the points in the order they are shown in the table.

| *x* | *y* | (*x*, *y*) |
|---|---|---|
| 0 | 0 | (0, 0) |
| −2 | 2 | |
| 1 | 2 | |
| 2 | 4 | |
| 3 | 2 | |

| *x* | *y* | (*x*, *y*) |
|---|---|---|
| 6 | 2 | |
| 4 | 0 | |
| 5 | −3 | |
| 2 | −1 | |
| −1 | −3 | |
| 0 | 0 | |

**1.** What shape was formed when you connected the points in order?

_____

**2.** How many points are found in each part of the plane?

**a.** Quadrant I _____

**b.** Quadrant II _____

**c.** Quadrant III _____

**d.** Quadrant IV _____

**e.** on the *x*-axis _____

**f.** on the *y*-axis _____

**3.** Can you tell which quadrant a point is in, or whether or not it is on an axis, without graphing it? Explain.

_____

**4.** What do you notice about the line formed by points that have the same *y*-value?

_____

**5.** How would you characterize a line formed by points having the same *x*-value?

_____

Name _____ Class _____ Date _____

# Activity Lab 11-9

## Applications of Integers

Below are the last several entries in Kenny's check register. Last Friday, he had $315 in his checking account before he deposited a check for $249. During the week, he wrote four checks and deposited another check on Friday.

| Number | Date | Description | Payment | Deposit | Balance |
|---|---|---|---|---|---|
| | | | | | $315.00 |
| | 10/4 | Deposit | | $249.00 | |
| 333 | 10/5 | Shoes & Boots | $48.00 | | |
| 334 | 10/7 | Sports & More | $139.00 | | |
| 335 | 10/8 | Food Market | $78.00 | | |
| 336 | 10/9 | Auto Insurance | $203.00 | | |
| | 10/11 | Deposit | | $249.00 | |
| | | | | | |

1. Find the "new" balance after each entry. Add the deposit or payment to the balance above the entry. Deposit amounts are positive numbers and check payments are negative numbers. Find each "new" balance in Kenny's checkbook.

2. There is a $5 charge if an account balance goes below $100 any time during the month. Based on Kenny's account balances for the week shown, will he be charged the fee this month? Explain.

_____

_____

_____

3. On 10/10, Kenny wanted to buy a new jacket costing $95. Does he have enough money in his account to buy the jacket? Explain.

_____

_____

_____

4. Kenny neglected to record check printing charges on 10/11. That charge was $11.00. Record this charge in the check register and find the new balance.

_____

Name _____ Class _____ Date _____

# Activity Lab 11-10

## Graphing Functions

A function is a rule that assigns exactly one output value to each input value. You can graph functions on the coordinate plane by using the horizontal axis for the input values and the vertical axis for the output values.

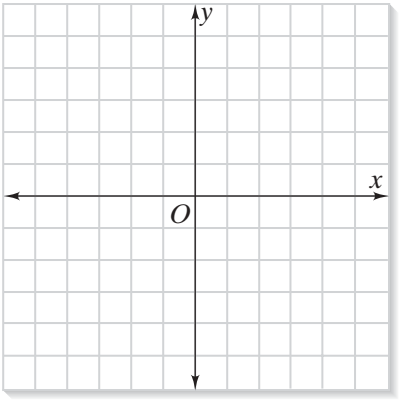
**Step 1:** Write a function, using $x$ for the input and y for the output. For example, you might write the function $y = 5x$, which means that you will multiply every input value by 5 to get the output value.

Your function: $y =$ _____

**Step 2:** Complete the function table at the right. Use your function from Step 1 to assign an output value to each of the given input values.

| *x* | *y* |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |

**Step 3:** Graph the ordered pairs $(x, y)$ from your function table on the coordinate plane at the right. Be sure to assign scales for the horizontal and vertical axes.




**Step 4:** Using the same function rule, complete out the function table at the right. When you are done, graph the coordinates on the graph from Step 3. What do you notice?

| *x* | *y* |
|---|---|
| −1 | |
| −2 | |
| −3 | |
| −4 | |
| −5 | |
| −6 | |

Name _____ Class _____ Date _____

# Activity Lab 12-1

## Solving Two-Step Equations

**1.** Evaluate the expressions below. Show your steps.

$5 \times 6 + 4 =$ _____ $5 + 6 \times 4 =$ _____

_____ _____

_____ _____

**2.** Did you get the same value for both expressions?

_____

**3.** Which operation did you perform first in each expression? Why?

_____

_____

**4.** Solve the equations below. Show your steps.

$5x + 4 = 34$ $5 + 4x = 29$

_____ _____

_____ _____

_____ _____

**5.** Which operation did you perform first to solve each equation?

_____

_____

**6.** Was it the same operation you used first in Exercise 1?

_____

**7.** How were your steps in Exercise 4 different from your steps in Exercise 1?

_____

_____

**8.** Write a rule for solving a two-operation equation containing a variable.

_____

_____

**Use your rule to solve each equation below.**

**9.** $3y + 8 = 17$ **10.** $\frac{n}{5} - 7 = 18$ **11.** $-4 + 7x = 17$

Name _____ Class _____ Date _____

# Activity Lab 12-2

**Inequalities**

The Sanderson family visited an amusement park on their vacation last year. The tables below show the heights of the children in the family and the height requirements for five rides. Study the information in the tables and answer the questions that follow.

| Child | Height in Inches |
|---|---|
| Cheryl | $36\frac{1}{2}$ |
| Mark | 48 |
| Lisa | $52\frac{3}{4}$ |
| John | 54 |

| Ride | Height Requirement in Inches |
|---|---|
| Triple Loopy Loop | $\geq 48$ |
| Carousel Corral | $\geq 36\frac{1}{2}$ |
| Monstrous Mountain | $>54$ |
| Runaway Stagecoach | $>48$ |
| Toboggan Race | $>36\frac{1}{2}$ |

**1.** List the rides that each child may ride.

**a.** Cheryl

**b.** Mark

**c.** Lisa

**d.** John

**2.** Are there any rides that none of the children are tall enough to ride? If so, which one(s)?

_____

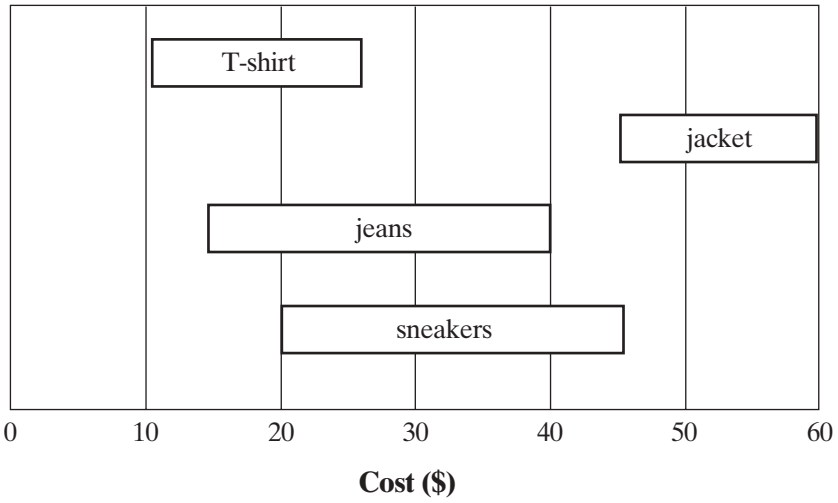
**3.** Gather information about your favorite amusement park to see if there are rides that have height requirements. Describe your findings using inequalitites and a table.

Name _____ Class _____ Date _____

# Activity Lab 12-3

## Solving One-Step Inequalities

Products can range in price from store to store and from brand to brand. The floating bar graph below represents the range in price for several products. These ranges in price represent inequalities. Study the graph, then answer the questions that follow.




1. If you have enough money to buy a T-shirt, could you buy a pair of jeans instead? Explain.

_____

_____

2. If you have enough money to buy any pair of jeans on the graph, do you have enough to buy a jacket instead? Explain.

_____

_____

3. Sam's parents allow him a budget of $25 for a pair of jeans. Write an inequality that would tell the maximum amount of his own money Sam would have to pay.

_____

4. Maria saved $40 for a jacket. Write and solve two inequalities to find the minimum and maximum amount of money she still needs to save to buy a jacket.

_____

_____

5. Write and solve two inequalities to find the minimum and maximum amount of money needed to buy all four items.

_____

_____

Name _____ Class _____ Date _____

# Activity Lab 12-4

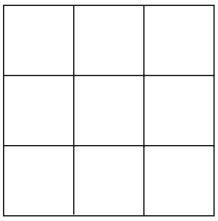
## Exploring Square Roots and Rational Numbers

**Materials needed:** A set of square tiles, calculator

**Work with a partner.**

Example: $n = 9$

- Select a set of $n$ tiles.
- Arrange your tiles into a square:



- Use the length of a side of the square to determine the square root of n
- Check your work: $\sqrt{9} = 3; 3 \times 3 = 9$

**Part 1**

Complete the table; Use $n$ tiles to determine $\sqrt{n}$ . Show your work below.

| $n$ | 9 | 16 | 25 | 6 |
|---|---|---|---|---|
| $\sqrt{n}$ | 3 | | | |

**1.** $n = 16$ **2.** $n = 25$ **3.** $n = 36$

**Part 2**

**4.** What are the dimensions of the largest square you can create using 20 tiles?

_____

**5.** Use a calculator to find $\sqrt{20}$. Round to the nearest hundredth.

_____

**6.** What are the dimensions of the largest square you can create using 30 tiles?

_____

**7.** Use a calculator to find $\sqrt{30}$. Round to the nearest hundredth.

_____

**8.** What is the relationship between the dimensions of squares and the square roots found in Exercises 4–7? Explain.

_____

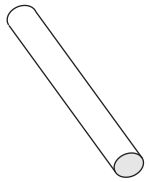
Name _____ Class _____ Date _____

# Activity Lab 12-5

## Introducing the Pythagorean Theorem

**Materials needed:** dowels of various lengths, yardsticks or meter sticks.

**Work in groups of three or four.**



A dowel is a wooden cylinder usually used to fasten objects together. In this activity, you will find the length of a dowel without measuring it directly.

**Select a dowel for your group. Find a space in the classroom where you can lean your dowel against the wall.**

1. Draw a diagram showing the wall, the floor, and your dowel.

2. Using a yardstick or meter stick, measure the distance along the wall from the top of your dowel to the floor. Label this distance in your diagram.

3. Measure the distance along the floor from the bottom of your dowel to the wall. Record this value on the diagram.

4. Use the Pythagorean Theorem to determine the length of your dowel.

5. Check your work: Measure the dowel with the yardstick or meter stick. How does this measurement compare with the value you found using the Pythagorean Theorem?

   _____

6. Suppose you are given a dowel exactly 12 feet long. Explain how you could use the dowel to find the height of your classroom door without measuring it directly.

   _____

   _____