1-3.   MATHOGRAPHY

Write a letter about yourself that will help your teacher get to know you as an individual. Address each of the general topics below (in bold). Choose a few of the suggested questions to get you started.

About You: By what name do you like to be called? What are your interests, talents, and hobbies? What are you proud of? With whom do you live? What languages do you speak? When is your birthday? What are you like as a member of a team? In what ways are you excited about working in a team? In what ways are you nervous about it?

You as a Math Student: Describe your memories as a math student from kindergarten until now. What experiences in math have you liked? Why? How do you feel about taking this math class? Have you ever worked in a team in a math class before? What kinds of math do you imagine yourself doing in this class?

1-4.   DIAMOND PROBLEMS

Finding and using a pattern is an important problem-solving skill you will use in algebra. The patterns in Diamond Problems will be used later in the course to solve other types of algebraic problems.

Look for a pattern in the first three diamonds below. For the fourth diamond, explain how you could find the missing numbers (?) if you know the two numbers (#).
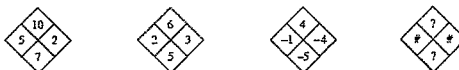

Copy the Diamond Problems below onto your paper. Then use the pattern you discovered to complete each one.

1-5.   In this course, you will need to be able to work with numbers, words, and geometric representations. Use each of these representations to answer the following problems.

a.   Draw and shade a figure that represents 100%. Label your figure "100%." Then describe the figure in words.

b.   Similarly, draw and shade figures that represent 50%, 25%, and 150%. Label each figure and describe it in words.

c.   Write another fraction that is equivalent to $\frac{4}{5}$. Draw diagrams to show that they are equal. Then find the equivalent decimals for both fractions and write the equivalent percent.

d.   Draw and shade a figure that represents "one-third." How can this figure be represented with a number?

e.   Describe what the diagram at right represents using words and numbers.
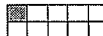
1-6.   Susan's apartment is shown at right. Assuming that all rooms are rectangular, find the areas described below. All measurements are in feet.

a.   Find the area of her living room.

b.   Find the area of her entire apartment.

c.   How much larger than her bedroom is her living room?

d.   Find the perimeter of the kitchen.
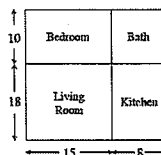
1-7.   CAR COMPARISON

The following three graphs describe two cars, A and B.
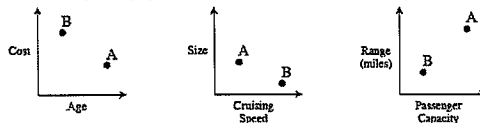
Decide whether each of the following statements is true or false. Explain your reasoning.

a.   The newer car is more expensive.

b.   The slower car is larger.

c.   The larger car is newer.

d.   The cheaper car carries more passengers.

1-12.   Examine the tile pattern at right.

   a.   On your paper, sketch Figures 4 and 5.

   b.   How does the pattern grow?
        Explain how you know.

   c.   How many tiles will there be in Figure 100?
        Explain how you know.

   Figure 1   Figure 2   Figure 3
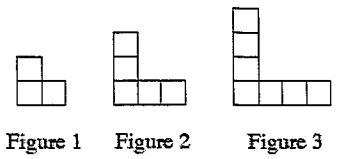
1-13.   Copy the axes below onto your paper. Add an
        appropriate scale and then place and label a point on
   the graph for each of the products listed below.

   a.   Dog-Eat-Dog has a supreme hotdog that weighs
        80 grams and has 40 grams of fat.

   b.   Hot Doggies has a diet hotdog that weighs
        50 grams and has only 9 grams of fat.

   c.   Dog-alicious has a cheap hotdog that weighs 40 grams and has 30 grams
        of fat.
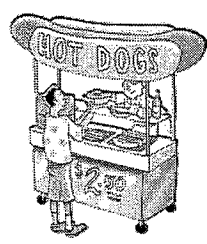
1-14.   Copy and complete each sequence below. Using words, not numbers, describe
        how the patterns work. (For example, write, "Double the previous number.")

   a. $1, 3, 6, 10, \underline{\quad}, \underline{\quad}$ b. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \underline{\quad}, \underline{\quad}$

   c. $1, 3, 9, 27, \underline{\quad}, \underline{\quad}$ d. $8, 7, 5, 2, \underline{\quad}, \underline{\quad}$

   e. $49, 47, 52, 50, 55, \underline{\quad}, \underline{\quad}$

1-15.   Recall the Diamond Problem pattern that you found in
        problem 1-4, which is represented in the diamond at right.
        Copy and complete the Diamond Problems below using the
        same pattern.
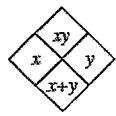
   a.   b.   c.   d.

1-16.   Use the graph at right to answer the following
        questions about quadrants and coordinates of
        points. Read the Math Notes box in this lesson if
        you need to review these concepts.

   a.   What are the coordinates of the two
        points in Quadrant II?

   b.   What are the coordinates of the two
   points in Quadrant IV?
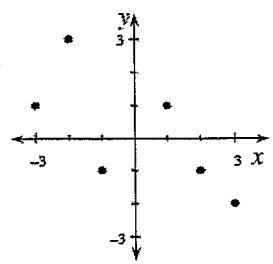
1-19.   Use your graphs from problem 1-17 to answer the questions below.

    a.   How can the graph for the rule $y = 2x + 1$ be used to predict the result for an input (x-value) of 7? How can the graph be used to predict the output (y-value) associated with an input of $3\frac{1}{2}$?

    b.   If you wanted an output of 7 for the rule $y = -x + 4$, what would you need as an input?

    c.   For each of the rules in parts (a) through (e) of problem 1-42, where does the graph cross the y-axis? Describe any patterns you notice.

1-20.   Solve the problem below by defining a variable and then writing an equation. If you find this too challenging, then use the 5-D Process described in this lesson's Math Notes box to help you get started. State your solution in a sentence.

Jabari is thinking of three numbers. The greatest number is twice as large as the least number. The middle number is three more than the least number. The sum of the three numbers is 75. Find the numbers.

1-21.   Latisha's friend Brandee forgot to take a make-up test and had these scores: 80%, 92%, 91%, 75%, 89%, 84%, 0%, and 85%.
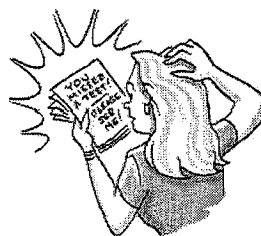
    a.   Calculate Brandee's mean. (Refer to the glossary if you do not remember how to do this.) Does this mean score really represent her abilities? Why or why not?

    b.   Brandee persuaded her teacher, Ms. Juarez, to allow her to make up the missed test. Brandee's score was a 78%. Calculate her new mean.

    c.   What difference did the 0% score make? Does this new mean represent Brandee's ability more accurately?

1-22.   The area of a rectangle is 24,396 square centimeters. If the width is 38 centimeters, what is the length? How do you know?

1-23.   Copy the number line below onto your paper. Locate the following numbers by placing the lowercase letters a through f on the number line corresponding to the values given below. Part (a) is done for you.
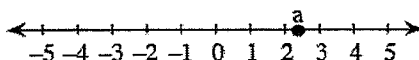
    a. $2\frac{1}{3}$ b. -2.7 c. $0.9 - 0.04$

    d. -0.2 e. $33\frac{1}{3}\%$ of 12   f. $\frac{7}{10} + \frac{2}{3}$

1-30. Kerin discovered that a human's height is related to his or her reach. Kerin is curious if the same thing is true for foot size.

   a. It was not practical for Kerin to measure her classmates' feet, so Kerin collected the following shoe-size data from some of her classmates. Make a graph with appropriately scaled axes.

Shoe Size	Height (cm)
6	153
8	160
7.5	155
8.5	161
8	168
8	166
8.5	164
6.5	156
10	170
9.5	167
7.5	158
7.5	156
8	161

   b. Is there a relationship between shoe size and height?

1-31. One important statistical display is a box plot. If you need help remembering what a box plot is, refer to the glossary before you complete parts (a) through (d) below.

   a. What is the median shoe size in problem 1-30? The minimum shoe size? The maximum?

   b. What are the quartiles (the median of the upper half, and the median of the lower half)?

   c. Above a number line, plot the five numbers you found in parts (a) and (b) and then create a box plot.

   d. Where does your own shoe size fall in the distribution of Kerin's classmates?

1-32. Latisha is determined to do well in school this year. Her goal is to maintain at least an 85% average (mean) in all of her courses.

   a. Latisha started her history class with two scores on tests, 72% and 89%. Confirm that the mean of these two scores is 80.5%. Show your work.

   b. Latisha's third score was 90%. Use her scores from part (a) to figure out her mean now. Be sure to show your work.

1-33. On your paper, copy the Diamond Problems below and use the pattern you discovered earlier to complete each of them. The pattern is shown at right. Some of these may be challenging!
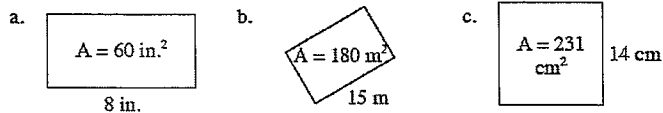
a. b. c. d.

e. f. g. h.
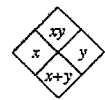
1-34.   Compute *without* using a calculator.

   a. $-15+7$ b. $8-(-21)$ c. $6(-8)$

   d. $-9 \div (-13)$ e. $-50-30$ f. $3-(-9)$

   g. $-75-(-75)$ h. $(-3)+6$ i. $9+(-14)$

   j. $28-(-2)$ k. $-3+(-2)+5$ l. $3+2+5$

1-35.   The area of each rectangle below is shown in the middle of the rectangle. For each figure, find the missing length or width.

   a.

   $A = 60$ in.^{2}

   8 in.

   b.

   $A = 180$ m^2

   15 m

   c.

   $A = 231$ cm^2 14 cm

1-36.   Without using a calculator, find the following quotients.

   a. $\frac{3}{7} \div \frac{2}{3}$ b. $1.2 \div 0.04$

   c. $\frac{11}{4}$ of $\frac{3}{7}$ d. $4.16(0.2)$

1-37.   Latisha earned an 85% on her test today. Her previous scores were 72%, 89%, and 90%. Calculate her new average (mean).

1-38.   Consider this data: 22, 15, 30, 51, 27, 33, 19.

   a.   Arrange the data into a stem-and-leaf plot. (Refer to the glossary if you need a reminder of what a stem-and-leaf plot is.)

   b.   Find the mean and median.

   c.   If the value 51 was replaced with 33, which measure(s) of central tendency would change and which would not? Explain.

1-39.   Estimate the areas of Montana and California using the grid below. Which state has the greatest area? Compare the area of Montana to the area of California. Explain how you estimated the area of each state.
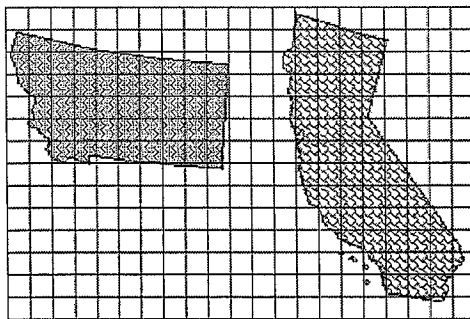
1-40.   The pattern below is composed of nested squares.

   a.   Draw the next figure in the pattern.
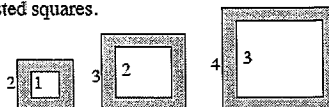
   b.   Find the area of the shaded region for the figure you drew in part (a).

1-47.   Decide whether each of the following situations represents a proportional relationship. Explain why or why not.

   a.   Karim is ordering video games. Each game costs $39.99, and there is a $4.85 shipping charge per order. How much will it cost him to order any number of video games?

   b.   A given rectangle has an area of 20 square feet. What is the length for various widths?

   c.   Oleg ran 8.8 miles in 1 hour 20 minutes. Assuming he continues at a constant rate, how long will it take him to run any number of miles?

1-48.   Jerome is keeping track of how many books he and his friends have read during the first 100 days of school. To help Jerome present the data to his teacher, make a box plot of how many books each person has read. The numbers of books are 12, 17, 24, 18, 31, 17, 21, 20, 14, 9, and 25.

1-49.   Simplify the following expressions.

   a. $-0.75 - 0.4$ b. $\frac{7}{8} - \frac{2}{3}$ c. $0.65 - 0.89$

   d. $\frac{11}{12} + \frac{4}{9}$ e. $\frac{9}{10} \cdot 2\frac{1}{3}$ f. $12 \div \frac{7}{8}$

   g. $1\frac{2}{3} + (-\frac{2}{5})$ h. $\frac{4}{7} - (-\frac{3}{8})$ i. $-4.05 + 3.18$

1-50.   Look at each graph below and write a story or description about what each graph shows.

   a.   b.   c.
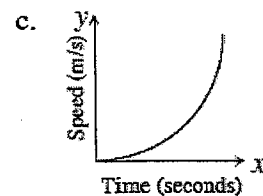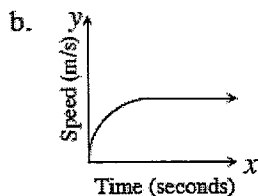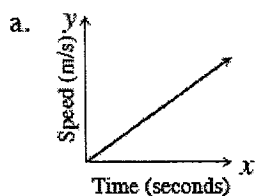
1-51.   Riley was monitoring the growth of his favorite tomato plant and collected the data shown in the table at right.

   a.   Graph Riley's data.

   b.   What can you tell Riley about his plant based on the data?

Time (days)	Height (cm)
10	3
14	4.3
18	7
21	8.9
23	11.4

1-57.   Solve each of the following proportions.

a. $\frac{x}{24} = \frac{30}{36}$ b. $\frac{5}{7} = \frac{x}{3}$

c.   If Joan read 75 pages in 4 hours how long will it take her to read 250 pages?

1-58.   3Mr. Wright was making a table to figure out how much it costs to send a certain number of regular letters through the mail. Use proportional reasoning to complete his table at right.

Number of Letters	Cost of Stamps
10	$4.50
2	$0.90
	$6.75
7	
1	
500	
	$18.90

1-59.   Kelly asked some of her classmates how many hours of sleep they get on school nights. Here are the results:

$6, 8, 7\frac{1}{2}, 9, 8, 8, 8, 9, 9, 10, 6, 8\frac{1}{2}, 9, 7, 8$

Copy the set of axes at right and create a histogram for the data. (Refer to the glossary for assistance, if needed)
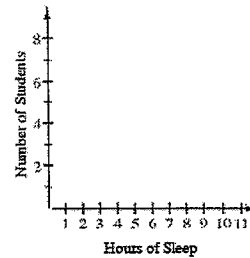
1-60.   Define a variable and then write and solve an equation for the problem below. Remember that you can use the 5-D Process (described in the Lesson 1.1.3 Math Notes box) to help you get started. State your solution in a sentence.

Todd is 10 years older than Jamal. The sum of their ages is 64. How old are Todd and Jamal?

1-61.   Throughout this book, key problems have been selected as "checkpoints." Each checkpoint problem is marked with an icon like the one at left. These checkpoint problems are provided so that you can check to be sure you are building skills at the expected level. When you have trouble with checkpoint problems, refer to the review materials and practice problems that are available in the "Checkpoint Materials" section at the back of your book.

This problem is a checkpoint for operations with signed fractions and decimals. It will be referred to as Checkpoint 1.

Simplify the following expressions.

a. $-\frac{1}{3} + -\frac{3}{8}$ b. $2.6 - (-1.5)$ c. $\left(-4\frac{1}{5}\right)\left(-\frac{1}{3}\right)$

d. $\left(\frac{2}{3}\right) \div \left(-\frac{1}{2}\right)$ e. $-1\frac{3}{4} + 5\frac{1}{3}$ f. $(-2.8) \div (-1.25)$

Check your answers by referring to the Checkpoint 1 materials located at the back of your book.

If you needed help solving these problems correctly, then you need more practice. Review the Checkpoint 1 materials and try the practice problems. Also, consider getting help outside of class time. From this point on, you will be expected to do problems like these quickly and easily.