

**Directions: Use the activities below to enable students to think about multiplication in challenging ways.**

**Ideas taken from:**

**Developing Number Sense in the Middle Grades, NCTM**

**Number Sense in the Middle Grades, Marilyn Burns**

**Note: For “The Size of Factors”, there are 60 different products.**

## Find the Missing Numbers, Multiplication

1)

- Fill in possible sets of missing digits.
- How many possible answers are there? What are they?

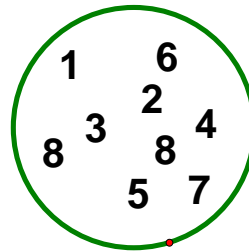
$$\begin{array}{r}
 1 \square \\
 \times \square \\
 \hline
 9 \square
 \end{array}$$

- How do you know you found all the possible answers?

2) Create your own puzzle. Exchange with another group.

3) Fill in the missing digits.

$$\begin{array}{l}
 3 \times (\square + \square) = \square \square \\
 \square \times \square + \square = \square \square
 \end{array}$$



4) Create your own puzzle. Exchange with another group.

## Multiplication Puzzlers

For each problem below, find the missing number by using your calculator and guessing and checking. Don't solve the problems by dividing, but instead see how many guesses each takes you. Record all of your guesses as shown.

For example, to solve  $4 \times \underline{\quad} = 87$ , you might start with 23 and then adjust. Below is a possible solution that shows how you are to record.

$$4 \times \underline{\quad} = 87$$

$$4 \times 23 = 92$$

$$4 \times 22 = 88$$

$$4 \times 21 = 84$$

$$4 \times 21.5 = 86$$

$$4 \times 21.6 = 86.4$$

$$4 \times 21.8 = 87.2$$

$$4 \times 21.74 = 86.96$$

$$4 \times 21.75 = 87 \quad \star$$

It took 9 guesses.

### I Try the following:

$$1) 5 \times \underline{\quad} = 96$$

$$2) 6 \times \underline{\quad} = 106$$

$$3) 4 \times \underline{\quad} = 63$$

$$4) 8 \times \underline{\quad} = 98$$

**II. Make up 4 problems. Write them below. Exchange with another group. Do their problems on the back of this sheet.**

What is the secret to creating a good problem?

# Estimating Whole Number Products

I. This game can be played as an entire classroom or within student groups. Divide into two teams. To begin, display the grid and the factor board below. Each team chooses two factors from the factor board. If the product of those numbers is displayed on the grid, the team captures that cell. The first team to capture four cells in a row (vertically, horizontally, or diagonally) is the winning team.

Make your estimates using estimation strategies such as front-end or rounding. The product of the units digits will give you an additional clue.

187	1189	1769	943	697
1403	319	1219	1037	437
901	1159	323	551	2501
1007	253	1537	671	391
583	779	3233	667	451

11	29
17	41
19	53
23	61

II. Create a game-board by choosing a new set of factors. Then create a grid of possible products.

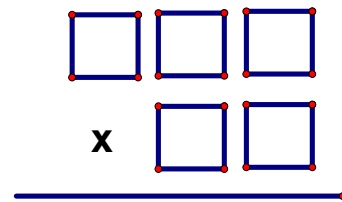




## The Size of Factors

1) Pick 5 digits. Use the same five digits for both questions below.

- Arrange the digits in the multiplication problem to produce the largest product possible. Write your solution below.



- How do you know you have the largest possible? \_\_\_\_\_
- Arrange the digits to produce the smallest product possible. Write your solution.
- How do you know you have the smallest possible?
- How many different products are possible using the five digits selected?

2) Try it with 5 different digits. Then write your method for arranging any five digits into a three digit by two digit multiplication problem to form the largest and smallest possible product?