

# Different Products

Junior high school

## Objective

Estimate and approximate solutions to problems.

## Explanation of the activity

Have the class make up multiplication problems using the digits 1, 2, 3 and 4. Each digit can only be used once. Find out what the largest product among the possible answers will be.

While working on this activity, students should practice their skills of mental estimation. They should also be interpreting and generalizing their answers.

## Using the calculator

Calculator functions used: Multiplication

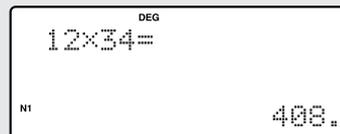
Press the following buttons and then start operation.

ON/C MODE 0

What is the largest number you can make by pressing the keys 1 2 3 and 4 once and only once?

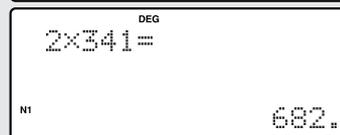
**Example:**

$$12 \times 34 =$$



DEG  
12x34=  
N1 408.

$$2 \times 341 =$$



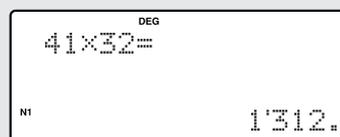
DEG  
2x341=  
N1 682.

Can you make a larger number?

Using algebra, for any four digits  $a, b, c, d$ , where  $a < b < c < d$ , the largest product is given by:  
 $(10d + a) \times (10c + b)$ .

Ans: The largest product is given by

$$41 \times 32 =$$



DEG  
41x32=  
N1 1'312.

## ••••• Using the activity in the classroom •••••

This activity could be introduced to the whole class by asking students to individually make up any multiplication using only the digits 1, 2, 3 and 4. The different multiplication problems and their answers can then be compared and students can be set the task of finding the largest product. Students should be encouraged to estimate the answers to the various multiplication problems.

## ••••• Points for students to discuss •••••

Students can explore other sets of four numbers, generalizing the rule to find the largest product using words or symbols. After generalizing, explain the rule that for any four digits  $a, b, c, d$ , where  $a < b < c < d$ , the largest product is given by:

$$(10d + a) \times (10c + b).$$

If the investigation is extended to the five digits 1, 2, 3, 4, 5, then the largest product is given by:

$$431 \times 52 = 22412.$$

For some students it may be appropriate to begin with only three digits.

### **Further Ideas**

- Find the largest product for any number of digits.
- Find the smallest product for any number of digits.
- Find the different sums that can be made by adding the digits 1, 2 and 3 once and only once. For example  $12 + 3 = 15$ . What happens for other sets of 3-digit numbers?