Different Products

• **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 [×] 34 [=]

```
12X34=          DEG
                408.
```

2 [×] 341 [=]
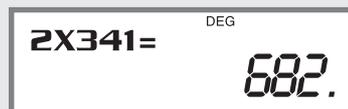
```
2X341=          DEG
                682.
```

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 [×] 32 [=]

```
41X32=          DEG
                1312.
```

Different Products

• • • • • • • • • • • **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:

$(10d + a)$ x $(10c + b)$.

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

431 x 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?