

Sums and Products

Junior high school

Objective

Calculate with decimals and understand the results.

Select suitable sequences of operations and methods of computation, including trial-and-improvement methods, to solve problems involving integers and decimals.

Explanation of the activity

Choose two numbers whose sum is 10.

Find out what the product of those two numbers would be.

Find the products of other pairs of numbers whose sum is 10.

Find out which number pair gives the largest possible product.

This activity helps to reinforce students' understanding of the mathematical terms 'sum' and 'product' and develops trial-and-improvement methods.

Using the calculator

Calculator functions used: Addition, multiplication, subtraction, parentheses

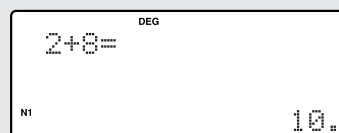
Press the following buttons and then start operation.

ON/C MODE 0

Try to find the largest product of any two numbers whose sum is 10.

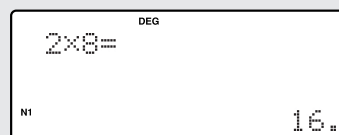
Example:

2 + 8 =



Calculator display showing the calculation 2+8= and the result 10. The display also shows DEG and N1.

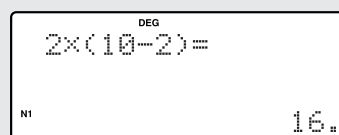
2 × 8 =



Calculator display showing the calculation 2×8= and the result 16. The display also shows DEG and N1.

You can also calculate this as $2 \times (10 - 2) = 16$.

2 × (10 - 2) =



Calculator display showing the calculation 2×(10-2)= and the result 16. The display also shows DEG and N1.

What two numbers give the largest product?

Try multiplying various combinations of numbers whose sum is 10.

Ans: $5 \times 5 = 25$

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

This activity could be introduced orally.

The largest product is 25, given by 5×5 . Some students may need to be encouraged to consider decimal numbers to verify that the largest product is 25. More able students should be encouraged to try and prove that this is the largest product.

One method of using the calculator is to enter the product as two numbers that can be edited.

Some students may prefer to enter the product as an expression such as $2 \times (10 - 2)$, which can be edited.

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

Students could be encouraged to devise similar problems to give to each other involving numbers with different sums.

Further Ideas

- Investigate products of 3, 4, 5... numbers which have the same sum. This could be explored graphically.
(Generally, for two numbers whose sum is n , the largest product is given by $(n/2)^2$, for three numbers whose sum is n , the largest product is given by $(n/3)^3$... The nearest integer to (n/e) where $e = 2.718$ is the number of numbers which will give the maximum product.)
- The problem of finding two numbers whose product is a given total can be turned into a game where students score points according to the number of trials they perform to identify the solution. For example: The sum of two numbers is 10 and their product is 19.71. What are the two numbers?

Ans: The two numbers whose product is 19.71 are 7.3 and 2.7.