

MULTIPLICATION

What is multiplication?

Multiplication is a mathematical operation in which numbers, called **factors**, are multiplied together to get a result, called a **product**.

Multiplication can be used with numbers or decimals of any size.

How to use multiplication:

- When multiplying two numbers, it is best to **stack the numbers vertically with the number that has more digits on top**. The number with fewer digits should be placed under the first number, being sure to line up the place values.



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- To multiply two numbers, first write the numbers vertically, with the larger number on top and the smaller number on the bottom. The ones place of the top number is aligned with the ones place of the bottom number. The tens place value of the answer will be carried over and added to the answer when the tens digit is multiplied. Next, multiply the ones digit on the bottom by the tens digit of the top number. Again, bring down the ones place of your answer and carry the tens place value. Keep doing this until all the multiplication is done and then bring down the tens value of the number also.

Examples:

$$\begin{array}{r} 2 \quad 34 \\ \times 7 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 34 \\ \times 7 \\ \hline 238 \end{array}$$

- If the numbers to be multiplied have more than one digit, the same rule applies. The only difference is that under the answer for the ones digit, a zero should be placed then the tens digit can be multiplied. If there is a hundreds digit, two zeros should be added under the answer for the tens digit, then multiply. Once the multiplication is done, add the numbers.

Examples:

$$\begin{array}{r} 456 \\ \times 21 \\ \hline 456 \\ + 9120 \leftarrow \text{add zero} \\ \hline 9576 \end{array}$$

$$\begin{array}{r} 321 \\ \times 123 \\ \hline 963 \\ 6420 \leftarrow \text{add zero} \\ + 32100 \leftarrow \text{add zeros} \\ \hline 39483 \end{array}$$

- When multiplying with decimals, multiply the same way as without decimals. When the answer is complete, the decimal point is moved the same number of digits that is being multiplied. For example, if multiplying by 0.1, move the decimal point one digit to the left. If multiplying by 0.01, move the decimal point two digits to the left. If multiplying by 0.001, move the decimal point three digits to the left.



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$$\begin{array}{r} \times 0.1 \leftarrow \text{one digit} \\ .456 \leftarrow \text{move 3 digits over} \end{array}$$

Try this!

$$\begin{array}{r} 24 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} 652 \\ \times 14 \\ \hline \end{array}$$

$$\begin{array}{r} 378 \\ \times 92 \\ \hline \end{array}$$

$$\begin{array}{r} 9.8 \\ \times .5 \\ \hline \end{array}$$

$$\begin{array}{r} .57 \\ \times 2.3 \\ \hline \end{array}$$