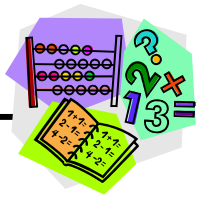
Multiplying Whole Numbers



Many strategies can be used to multiply numbers, such as

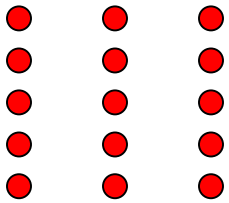
1. paper and pencil
2. Base 10 blocks (manipulatives)
3. grids and geoboards.

Whatever method you use, it is important to understand the process of multiplication.

Example

The head chef of a classy restaurant was asked to prepare meals for 3 groups of 5 customers each. How many meals will he have to prepare in total?

The diagram shows 3 groups of 5.



Entering 5 × 3 = on a calculator displays the answer 15.

5	×	3	=	15

The **product** is the answer to a multiplication question.

MULTIPLICAND × MULTIPLIER = PRODUCT

Which is the same as:

FACTOR × FACTOR = MULTIPLE

The position of the factors can be changed without changing the answer.

E.g. 5 × 3 = 15
3 × 5 = 15

Multiplying Using Paper and Pencil

When using the pencil and paper method to multiply two numbers, follow these steps.

1. Place the numbers so that one number is above the other and the numbers in the ones place are aligned.

Example

$$\begin{array}{r} 125 \\ \times\ 34 \\ \hline \end{array}$$

– Multiplicand
– Multiplier

2. Multiply the digit in the ones place of the multiplier by the digit in the ones place of the multiplicand.

4 × 5 = **20**
The answer is 20.
Each place value can have only one digit so the **0** in the ones place is placed under the ones place in the answer.

$$\begin{array}{r} {\scriptstyle 2\ \ \ } \\ 125 \\ \times\ 34 \\ \hline 0 \end{array}$$

2 from 20 is carried over to become part of the value of the next place.

3. Multiply the digit in the ones place of the multiplier by the digit in the tens place of the multiplicand. ADD the value of any carried digits to this total.

4 × 2 = **8,** + 2 = **10**

4 multiplied by 2 equals 8. Add the carried 2 to 8, and the answer is 10.

$$\begin{array}{r} {\scriptstyle 1\ \ \ } \\ 125 \\ \times\ 34 \\ \hline 00 \end{array}$$

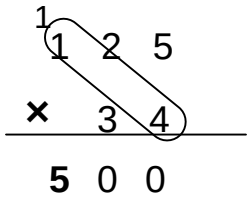
1 from 10 is carried over to the hundreds place.

0 is written below the tens place.

4. Multiply the digit in the ones place of the multiplier by the digit in the hundreds place of the multiplicand. ADD the value of any carried digits to this total.

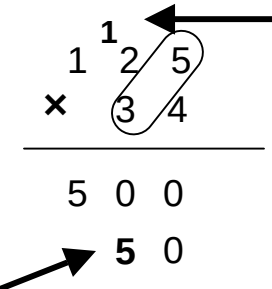
$4 \times 1 = 4, + 1 = 5$

4 multiplied by 1 equals 4. Then add the carried 1 to 4, and the answer is 5.



5. Multiply the digit in the tens place of the multiplier by the digit in the ones place of the multiplicand.

1 from 15 is carried over to become part of the value of the next place.



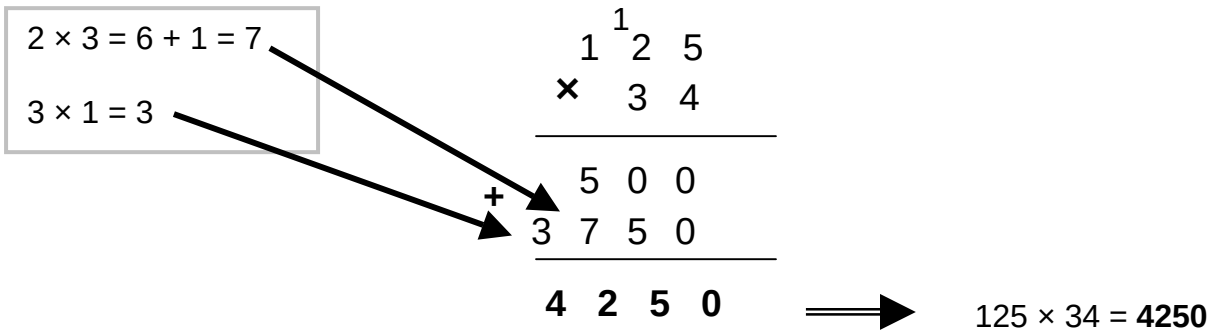
$3 \times 5 =$ **15**

Each place can only have one digit. 5 is placed under the tens place.

To show that the tens place of the multiplier is being multiplied, a zero is placed in the ones position to hold the place value.

6. Repeat steps 3 and 4 using the figure in the tens place of the multiplier.

7. Add the results together to get the final answer.



Multiplication can be expressed in numeric and word forms.

Numeric form: 125 × 34 = 4250

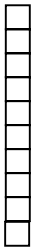
Word form: One hundred twenty-five *times* thirty-four *equals* four thousand two hundred fifty.

Multiplying Using Manipulatives

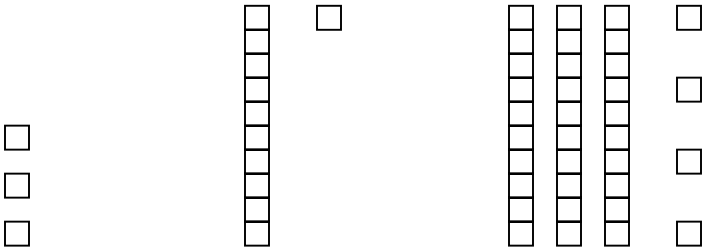
You can also multiply two numbers by using manipulatives or “Base 10 blocks.”

Ones place value blocks look like this: □

Tens place value blocks (strips) look like this:



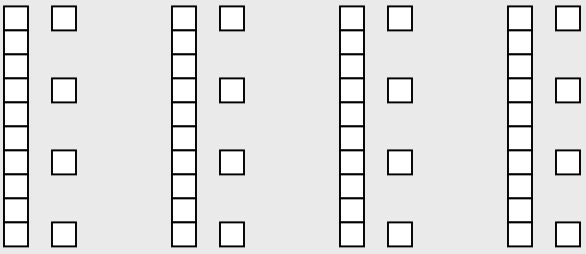
The numbers **3**, **11**, and **34** are represented as follows.



3 **11** **34**

When multiplying using base 10 blocks, the **multiplier** indicates how many identical groups of base 10 blocks you need.

Example What is the product of **14** × **4** using base 10 blocks?



= 56

The blocks are grouped to show 4 sets of 14.

Multiplying Using 10 X 10 Grids or Geoboards

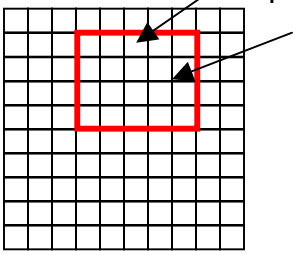
You can use grids or geoboards to represent multiplying two numbers.

On a grid, use a pencil to shade or outline the multiplicand and multiplier.

On a geoboard, use elastics to represent the multiplicand and multiplier.

The **product** of the multiplication question is the **number of squares inside the rectangle** (or square) outlined by the pencil or elastic.

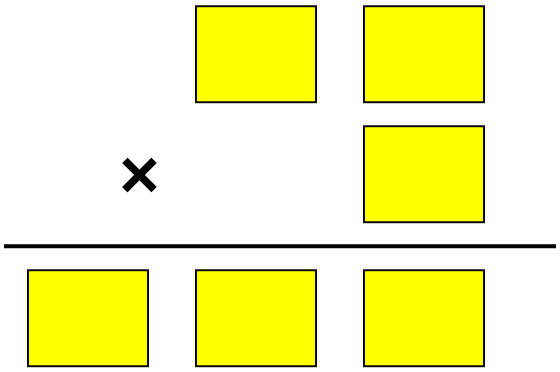
Example What is the product of **5 × 4**?



⟹ The product of 5 × 4 is 20.

Practice: Multiplying Whole Numbers

1. Complete the multiplication challenge below by filling in each box with a number between 1 and 6. Each number can only be used once.



2. Kelly raked 32 bags of leaves. She earned $2 for each bag. How much money did Kelly earn raking leaves?

3. Prithi makes friendship bracelets and sells them. It costs Prithi $1 to make each bracelet and she sells them for $4 each. If Prithi sells 12 bracelets, how much money has she made?

4. Challenge a classmate to demonstrate multiplication using grid paper and geoboards.

5. Peter makes $4.00 per child for each hour that he baby-sits. If he baby-sits 3 children for 6 hours, how much money will Peter make?

6. Replace W with a number to make the product correct.

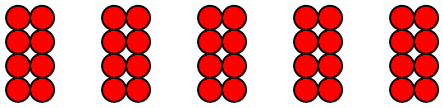
$$\begin{array}{r} W2 \\ \times \quad 7W \\ \hline 6396 \end{array}$$

With a partner, create several similar problems and challenge your classmates to solve for the missing numbers.

7. Multiply the following using pencil and paper. Show your work. Be prepared to explain how you solved the problems.

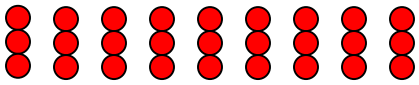
   a. 207 × 51
   b. 469 × 15
   c. 328 × 12

8. Write the multiplication statements represented by the following counters in numeric and word forms.

   a. 

   Numeric form: _____

   Word form: _____

   b. 

   Numeric form: _____

   Word form: _____

9. Write each multiplication statement in word form.

   a. 918 × 26 = 23 868

   b. 774 × 12 = 9288

10. For each of the following multiplication questions, prove that the answers are correct using one or more of the following methods: grids, geoboards, calculator, manipulatives or diagrams. Be prepared to explain the strategy you used.

    a. 3 × 3 = 9

    b. 10 × 10 = 100

    c. 8 × 11 = 88

    d. 6 × 7 = 42

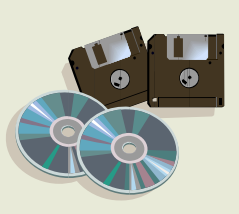
    e. 8 × 11 = 88

    f. 7 × 3 = 21

    g. 4 × 9 = 36

    h. 9 × 3 = 27

Multiplying by Multiples of 10 Using Mind Math



Many items in retail stores are packaged in groups of 10 or multiples of 10.

- For example, blank floppy discs or compact discs can often be purchased in packages of 10.
- Floor or wall tiles may be packaged in 10s, 50s or 100s.

When estimating, numbers are often **rounded** to the nearest tens place value (a multiple of ten) to make calculations easier to perform in your head.

Examples

A) Approximately how many golf balls are there all together if each box holds 12 golf balls and there are 4 boxes in total?

Round 12 to 10.

Mentally multiply 4 × 10 = **40.**

There are approximately 40 golf balls.

B) How do you calculate the GST in your mind on a product worth $24.00?

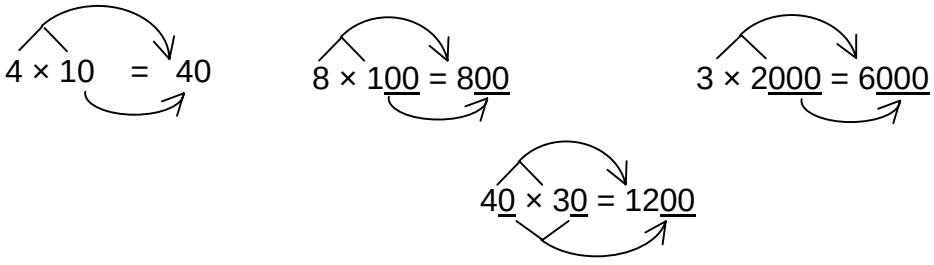
Round 7% to 10%.

Multiply 24 × 10 = **240**.

Move the decimal two spaces to the left.

The GST on a $24.00 item is approximately $2.40.

To mentally multiply by a multiple of **10**, multiply the digits of each number together and then add one zero to the answer for each zero in the original question.

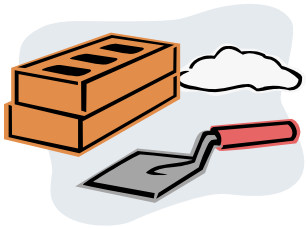


Practice: Multiplying Multiples of 10

1. Create a variety of multiplication questions using multiples of 10. Try the mind method of using multiples of 10 to estimate or solve. Challenge your classmates to a variety of mind math problems.

2. Duc's class is holding a multicultural fair at school. Students will bring food from their cultures and Duc is going to make spring rolls. If each person will eat 3 spring rolls and 150 people are expected to pass through the fair, how many spring rolls will Duc need to make?

3. John needs 124 bricks for each row of a barbeque he is building. His plans indicate that his barbeque is 16 rows in total. How many bricks will John need?



4. Gillian is landscaping City Centre Park and needs 105 plants for each garden. There are 32 gardens in the park. How many plants will she need?