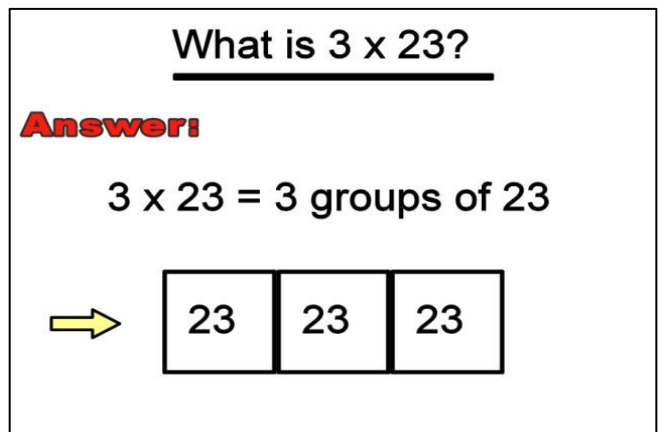
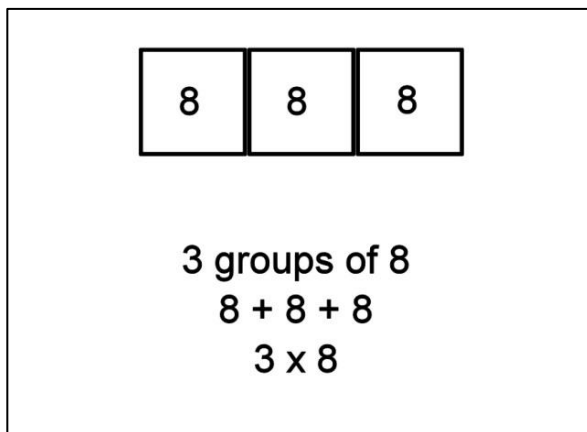
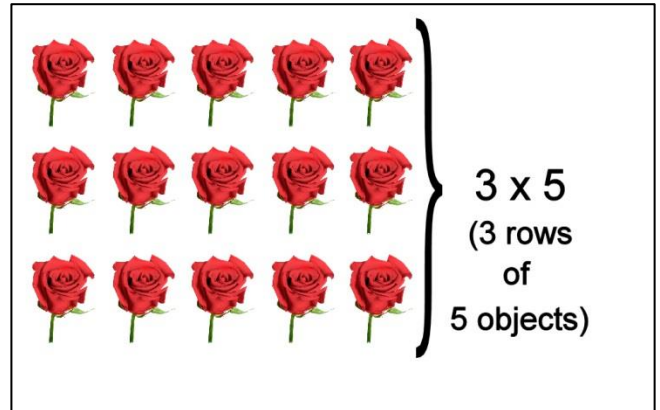
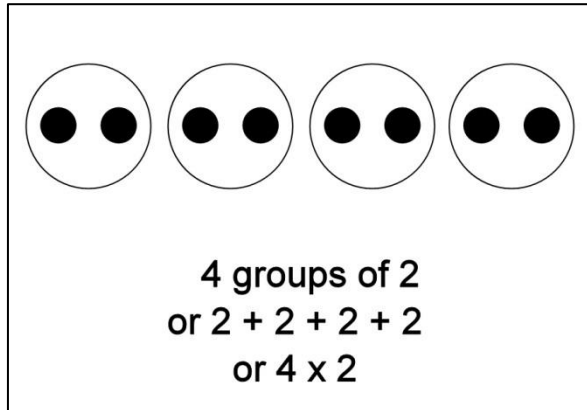


Strategies for Long Multiplication

Concept of Multiplication - Groups of a number



Let's look at multiplying numbers that end in zeros (round numbers):

Example:

$$\begin{aligned}30 \times 2 \\&= 3 \times 10 \times 2 \\&= 3 \times 2 \times 10 \\&= 6 \times 10 \\&= 60\end{aligned}$$

These are the facts we apply:

- a. $3 \times 10 = 30$
- b. Associative property of multiplication:
 $2 \times 3 \times 5 = 6 \times 5$ or 2×15

Tips for multiplying numbers that end in zeros (round numbers):

The trick is to multiply only the *non-zero* digits then add in all the **zeros** of both numbers, that is, the number of zeros in the **answer** must correspond to the total number of zeros in **both** numbers.

Examples

$$20 \times 3 = 60$$

$$30 \times 30 = 900$$

$$800 \times 3 = 2,400$$

$$700 \times 300 = 210,000$$

$$12 \times 10 = 120$$

$$210 \times 100 = 21,000$$

$$1400 \times 10 = 14,000$$

$$170 \times 10 = 1,700$$

Strategy: Using Groups

Let's look at multiplying 14 and 27.

14 x 27 means there are 14 groups of 27

or $27+27+27+27+27+27+27+27+27+27+27+27+27+27$

Let's re-phrase that as :

10 groups of 27 plus 4 groups of 27

or $(10 \times 27) + (4 \times 27)$

$27+27+27+27+27+27+27+27+27+27+27+27+27+27$

Now let's look at the 4 groups of 27:

4 groups of 27

= 4 groups of 20 plus 4 groups of 7

= $(4 \times 20) + (4 \times 7)$

$$\begin{array}{r} 20 + 20 + 20 + 20 \\ + 7 + 7 + 7 + 7 \end{array}$$

Putting it all together,

14 x 27

= $(10 \times 27) + (4 \times 27)$

= $(10 \times 27) + (4 \times 20) + (4 \times 7)$

= 270 + 80 + 28

= 378

See Tips for
multiplying round
numbers

Strategy: Using a Grid and Place Value

Let's look at 14×27 .

Step 1: We re-write 14 and 27 using place value:

$$14 = 10 + 4$$

$$27 = 20 + 7$$

Step 2: We draw a 3×3 grid.

Step 3: Fill in the headings of the grid.

	14	
27	10	4
20		
7		

Step 4: Fill in the body of the grid by multiplying the corresponding numbers.

14 27	10	4
20	200	80
7	70	28

Step 5: Add the numbers in the body of the grid.

$$\begin{aligned} &14 \times 27 \\ &= 200 + 80 + 70 + 28 \\ &= 200 + 150 + 28 \\ &= 350 + 28 \\ &= 378 \end{aligned}$$

More Examples of using Grid Method

$$203 \times 117$$

203 117	200	3
100	20,000	300
10	2,000	30
7	1,400	21

$$\begin{aligned} 203 \times 117 &= 20,000 + 2,000 + 1,400 + 300 + 30 + 21 \\ &= 23,751 \end{aligned}$$

$$324 \times 216$$

324 216	300	20	4
200	60,000	4,000	800
10	3,000	200	40
6	1,800	120	24

$$\begin{aligned} 324 \times 216 &= 60,000 + 3,000 + 1,800 + 4,000 + 200 + 120 + 800 + 40 + 24 \\ &= 69,984 \end{aligned}$$

Strategy: Traditional Method

Let's look at 14×27

Step 1: Write the numbers in a column.

$$\begin{array}{r} 14 \\ \times 27 \\ \hline \end{array}$$

Step 2: Write a zero in the first column.

$$\begin{array}{r} 14 \\ \times 27 \\ \hline 0 \end{array}$$

Step 3: Now multiply 2×4 . Write the answer in the second column.

$$\begin{array}{r} 14 \\ \times 27 \\ \hline 80 \end{array}$$

Step 4: Multiply 1×2 . Write the answer next to the previous answer.

$$\begin{array}{r} 14 \\ \times 27 \\ \hline 280 \end{array}$$

Step 5: Multiply 4 x 7. Take note of the carry-over when writing the answer 28.

$$\begin{array}{r} \\ 1 \ 4 \\ \times 2 \ 7 \\ \hline 2 \ 8 \ 0 \\ \ 8 \end{array}$$

Step 6: Multiply 1 x 7 and add the carry-over.

$$\begin{array}{r} \\ 1 \ 4 \\ \times 2 \ 7 \\ \hline 2 \ 8 \ 0 \\ \ 9 \ 8 \end{array}$$

Step 6: Add the answers.

$$\begin{array}{r} \\ 1 \ 4 \\ \times 2 \ 7 \\ \hline 2 \ 8 \ 0 \\ + \ 9 \ 8 \\ \hline 3 \ 7 \ 8 \end{array}$$

$$14 \times 27 = 378$$

Practice:

Use any of the strategies shown to compute the following.

21×34

112×213

420×76

59×802

102×47

27×67

290×560

88×90

30×124

501×304

42×37

27×40