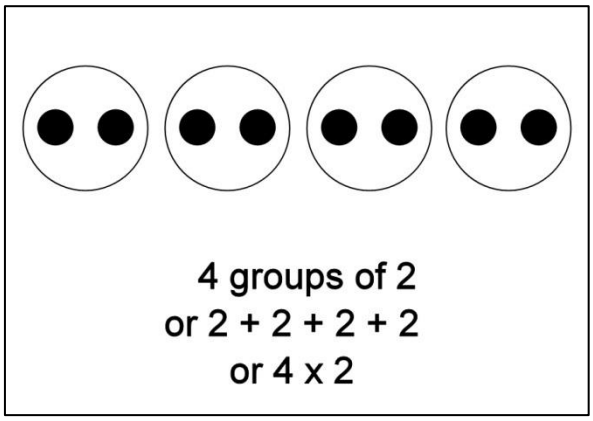
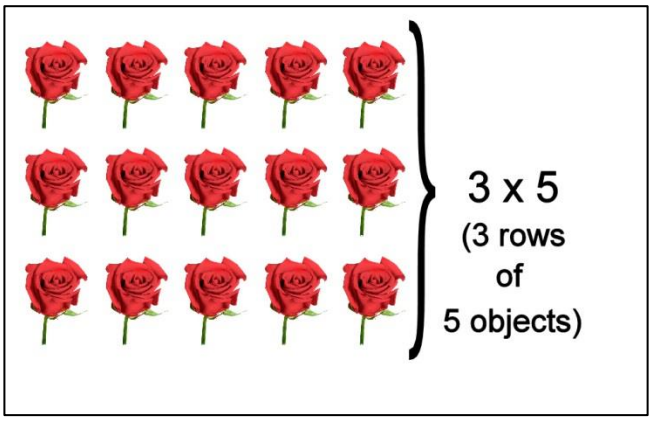
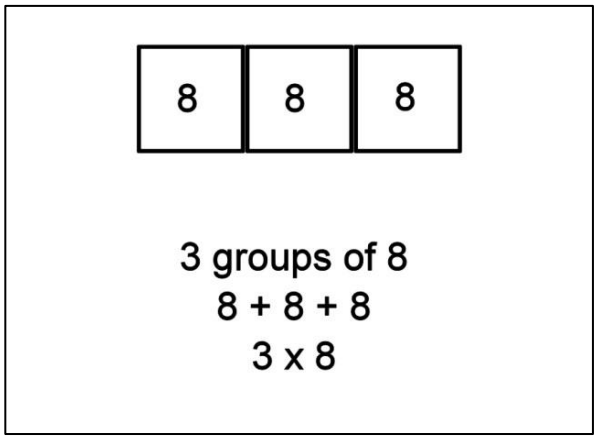
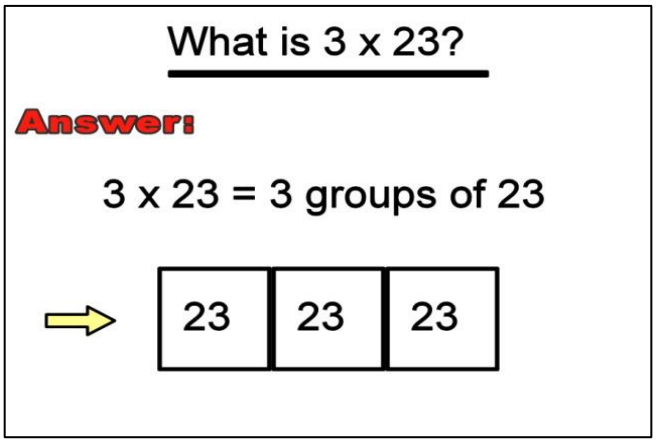
Strategies for Long Multiplication

Concept of Multiplication – Groups of a number









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

Example:

30 x 2

= 3 x 10 x 2
= 3 x 2 x 10
= 6 x 10
= 60

These are the facts we apply:

a. 3 x 10 = 30
b. Associative property of multiplication:
   2 x 3 x 5 = 6 x 5 or 2 x 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 x 3 = 60
30 x 30 = 900
800 x 3 = 2,400
700 x 300 = 210,000

12 x 10 = 120
210 x 100 = 21,000
1400 x 10 = 14,000
170 x 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 x 27) + (4 x 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 x 20) + (4 x 7)

20 + 20 + 20 + 20
+ 7 + 7 + 7 + 7

Putting it all together,

14 x 27

= (10 x 27) + (4 x 27)

= (10 x 27) + (4 x 20) + (4 x 7)

= 270 + 80 + 28

= 378

See Tips for multiplying round numbers

Strategy: Using a Grid and Place Value

Let's look at 14 x 27.

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

14 = 10 + 4

27 = 20 + 7

Step 2: We draw a 3 x 3 grid.

Step 3: Fill in the headings of the grid.

27 \ 14	10	4
20		
7		

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

27 \ 14	10	4
20	200	80
7	70	28

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

14 x 27

= 200 + 80 + 70 + 28

= 200 + 150 + 28

= 350 + 28

= 378

More Examples of using Grid Method

203 x 117

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

203 x 117 = 20,000 + 2,000 + 1,400 + 300 + 30 + 21

= 23,751

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324 x 216

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

324 x 216
= 60,000 + 3,000 + 1,800 + 4,000 + 200 + 120 + 800 + 40 + 24
= 69,984

Strategy: Traditional Method

Let's look at 14 x 27

Step 1: Write the numbers in a column.

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

Step 2: Write a zero in the first column.

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

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

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

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

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

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

$$\begin{array}{r} {\scriptstyle 2} \\ 14 \\ \times\ 27 \\ \hline 280 \\ 8 \end{array}$$

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

$$\begin{array}{r} {\scriptstyle 2} \\ 14 \\ \times\ 27 \\ \hline 280 \\ 98 \end{array}$$

Step 6: Add the answers.

$$\begin{array}{r} {\scriptstyle 2} \\ 14 \\ \times\ 27 \\ \hline {\scriptstyle 1}280 \\ +\ \ 98 \\ \hline 378 \end{array}$$

14 x 27 = 378

Practice:

Use any of the strategies shown to compute the following.

21 x 34	112 x 213	420 x 76	59 x 802
102 x 47	27 x 67	290 x 560	88 x 90
30 x 124	501 x 304	42 x 37	27 x 40