

MATH LEVEL 1
LESSON PLAN 4
MULTIPLICATION

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Section 1: Repeated Addition as Multiplication

1. **Multiplication** is how many times a number is added to 0. It is a shortcut for writing a number added many times.

$$\begin{array}{l} \mathbf{3 \times 5} \quad = \quad \mathbf{0 + 3 + 3 + 3 + 3 + 3} \\ \text{3 times 5} \quad \quad \quad \text{3 added to 0 five times} \end{array}$$

Multiplication “0 times” is always equal to 0, because the number is not added.

$$\begin{array}{l} \mathbf{6 \times 0} \quad = \quad \mathbf{0} \\ \mathbf{75 \times 0} \quad = \quad \mathbf{0} \end{array}$$

Multiplication “1 time” is always equal to the number, which is added to 0 1 time.

$$\begin{array}{l} \mathbf{6 \times 1} \quad = \quad \mathbf{0 + 6} \quad = \quad \mathbf{6} \\ \mathbf{75 \times 1} \quad = \quad \mathbf{0 + 75} \quad = \quad \mathbf{75} \end{array}$$

Multiplication “10 times” is always equal to as many TENS as the number. It is the number followed by one ‘0’.

$$\begin{array}{l} \mathbf{6 \times 10} \quad = \quad \mathbf{0 + 6 + 6 + \dots 10 \text{ times}} \quad = \quad \mathbf{60} \\ \mathbf{75 \times 10} \quad = \quad \mathbf{0 + 75 + 75 \dots 10 \text{ times}} \quad = \quad \mathbf{750} \end{array}$$

Multiplication “100 times” is always equal to as many HUNDREDS as the number. It is the number followed by ‘00’.

$$\begin{array}{l} \mathbf{6 \times 100} \quad = \quad \mathbf{0 + 6 + 6 + \dots 100 \text{ times}} \quad = \quad \mathbf{600} \\ \mathbf{75 \times 100} \quad = \quad \mathbf{0 + 75 + 75 \dots 100 \text{ times}} \quad = \quad \mathbf{7500} \end{array}$$

(NOTE: Place as many 0’s after the number as there are 0’s in 10, 100, 1000, etc.)

2. When multiplying numbers with trailing 0’s, multiply the numbers without the trailing 0’s, and then write that product followed by the total of trailing 0’s.

$$\begin{array}{l} \mathbf{7 \times 30} \quad = \quad \mathbf{(7 \times 3) \text{ and one trailing 0}} \quad = \quad \mathbf{210} \\ \mathbf{40 \times 60} \quad = \quad \mathbf{(4 \times 6) \text{ and two trailing 0’s}} \quad = \quad \mathbf{2400} \\ \mathbf{300 \times 2000} \quad = \quad \mathbf{(3 \times 2) \text{ and five trailing 0’s}} \quad = \quad \mathbf{600000} \end{array}$$

 **EXERCISE**

Multiply the following numbers. Use paper and pencil as an aid.

- | | | | |
|--------------|--------------|-----------------|-------------------|
| (a) 3 x 10 | (d) 3 x 1000 | (g) 9 x 1 | (j) 16,437 x 0 |
| (b) 14 x 100 | (e) 231 x 1 | (h) 32,862 x 10 | (k) 446 x 1000 |
| (c) 6 x 30 | (f) 50 x 300 | (i) 500 x 20 | (l) 3,000 x 4,000 |

Answer: (a) 30 (b) 1,400 (c) 180 (d) 3,000 (e) 231 (f) 15,000 (g) 9 (h) 328,620 (i) 10,000 (j) 0 (k) 446,000 (l) 12,000,000

Section 2: The Multiplication Table

3. Skip counting is counting by a number by adding it repeatedly. One may skip count on fingers by 2 by thinking of each finger equal to 2.

2	4	6	8	10	12	14	16	18	20
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The skip counts are called **multiples** of a number. Here are multiples of 5.

5	10	15	20	25	30	35	40	45	50
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Here are the multiples of 10.

10	20	30	40	50	60	70	80	90	100
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4. The multiplication table can be made by skip counting as follows. Simply add the number again to get the next multiple.

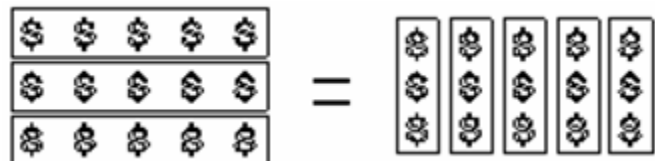
MULTIPLICATION TABLE

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

5. The product of "3 x 5" can be found at the intersection of the "row and column" marked by 3 and 5. We find that

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

This is because when items are arranged in an array, 3 rows of 5 each are equal to 5 columns of 3 each.



😊 EXERCISE

1. Make this multiplication by yourself with skip counting. Compare your table to the table above, and correct any errors.
2. Find the product of these numbers using the multiplication table.

(a) 7×6

(c) 9×5

(e) 5×8

(g) 8×3

(b) 5×7

(d) 9×8

(f) 7×4

(h) 8×7

Answer: (a) 42 (b) 35 (c) 45 (d) 72 (e) 40 (f) 28 (g) 24 (h) 56

Section 3: Multiplying a Double-digit Number

1. We multiply a double digit number by multiplying TENS and ONES separately, and then adding them together.

$$\begin{aligned} 23 \times 2 &= (20 + 3) \times 2 \\ &= 20 \times 2 + 3 \times 2 \\ &= 40 + 6 \\ &= 46 \end{aligned}$$

Similarly,

$$\begin{aligned} 35 \times 5 &= (30 + 5) \times 5 = 150 + 25 = 175 \\ 47 \times 8 &= (40 + 7) \times 8 = 320 + 56 = 376 \end{aligned}$$

2. You may create skip counts for a double-digit number like 37 as follows:

$$\begin{aligned} 37 \times 1 &= (30 + 7) \times 1 = 30 + 7 = 37 \\ 37 \times 2 &= (30 + 7) \times 2 = 60 + 14 = 74 \\ 37 \times 3 &= (30 + 7) \times 3 = 90 + 21 = 111 \\ 37 \times 4 &= (30 + 7) \times 4 = 120 + 28 = 148 \\ 37 \times 5 &= (30 + 7) \times 5 = 150 + 35 = 185 \\ 37 \times 6 &= (30 + 7) \times 6 = 180 + 42 = 222 \\ 37 \times 7 &= (30 + 7) \times 7 = 210 + 49 = 259 \\ 37 \times 8 &= (30 + 7) \times 8 = 240 + 56 = 296 \\ 37 \times 9 &= (30 + 7) \times 9 = 270 + 63 = 333 \\ 37 \times 10 &= (30 + 7) \times 10 = 300 + 70 = 370 \end{aligned}$$

😊 EXERCISE

Multiply the following numbers. Use paper and pencil as an aid.

(a) 14×3

(c) 23×7

(e) 83×2

(g) 34×6

(b) 38×3

(d) 58×7

(f) 93×4

(h) 47×9

Answer: (a) 42 (b) 114 (c) 161 (d) 406 (e) 166 (f) 372 (g) 204 (h) 423

6. With more digits in the multiplier, there are more partial products to be added. Simply start the partial product from the column of the multiplier digit. The blanks at the end of the partial products are zeros.

		2	0	9,	5	7	3,	1	3	8		
	x							2	5	3	<i>Multiplier</i>	
		6	2	8,	7	1	9,	4	1	4		
1	0,	4	7	8,	6	5	6,	9	0			
4	1,	9	1	4,	6	2	7,	6				
5	3,	0	2	2,	0	0	3,	9	1	4	<i>Product</i>	

NOTE: The carry overs are not shown in this example. We erase them anyway after getting each partial product. Do the above multiplication on your own. Use a graph paper to keep the columns lined up correctly. Confirm the answer on a calculator

☺ **EXERCISE**

Do the following multiplications by column. Check your answer against the answers given.

- (a) 93×3 (c) $3,562 \times 25$ (e) $74,703 \times 83$ (g) $16,437 \times 364$
 (b) 54×6 (d) $5,009 \times 37$ (f) $30,609 \times 54$ (h) $33,333 \times 333$

Answer: (a) 279 (b) 324 (c) 89,050 (d) 185,333 (e) 6,200,349 (f) 1,652,886 (g) 5,983,068 (h) 11,099,889

Section 5: Word Problems

7. Word problems require a translation of words into mathematical language.

(a) Example 1: What is the cost of 93 printers, if each printer costs \$75?

LOGIC:

The cost of one printer = \$75
 Therefore, the cost of 75 printers = $\$75 \times 93$
 = \$6975 Answer

(b) Example 2: If 829 men could dig a canal bed in 248 days, how many men will be required to complete the work in 1 day?

LOGIC: More man will be required to complete the work in less number of days.

Therefore, the number of men required to complete the work in 1 day
 = 829×248
 = 205,592 men Answer

☺ **EXERCISE**

Do the following word problems. Check your answer against the answers given.

- (a) A ream of paper contains 500 sheets. A school uses 1,367 reams in a year. How many sheets of paper were used in that time?

(b) If a man's car cost him 12¢ per mile to operate, how much does 30,000 miles of driving cost him in \$?

(c) If 4 men can paint a house in 3 days, how many men will it take to paint the house in 1 day?

Answer: (1) 683,500 sheets (2) \$3,600 (3) 12 men

☺ **Lesson Plan 4: Check your Understanding**

1. How is multiplication related to addition?
2. Make a Multiplication Table for numbers up to 10.
3. Multiply (a) $3,645 \times 7$ (b) $46,731 \times 34$ (c) $38,425 \times 104$

Check your answers against the answers given below.

Answers:

- 1) Multiplication is "repeated addition".
- 2) Making and using the multiplication table again and again will get you to remember it by heart.
- 3) (a) 25,515 (b) 1,588,854 (c) 3,996,200..