Multiplication: Arrays, Factors and Multiples

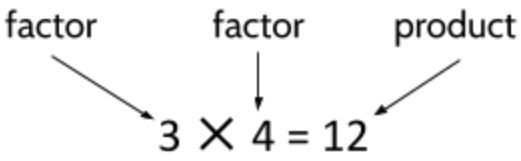
Multiplication Practice

Understanding multiplication is essential to understanding exponents. Knowing your multiplication facts can also help you focus on other kinds of math while problem-solving. In the activities below, you will use multiplication facts and creative thinking to solve puzzles.

Look at the multiplication table below. You probably know many of the multiplication facts on this table. **Circle the ones you already know**.

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

The numbers in the shaded boxes are called *factors*. You will learn more about factors later in the packet. The numbers you write in the white boxes are called *products* and are the results of multiplication.



1) Complete this 1-5 multiplication table.

2) Look at these diagonal numbers (1, 4, 9, 16, 25). Do you notice anything special about these numbers?

×	1	2	3	4	5
1					
2					
3					
4					
5					

3) Complete the mixed-up 1-5 multiplication table below. A few have been done for you.

×	5	3	1	4	2
2	10				
4					8
1		3			
5					
3				12	

The table below is called a Find the Factors[3] 1-5 puzzle. The goal is to write the numbers 1 through 5 in the correct shaded boxes, then use those factors to fill in the missing products. To solve the puzzle, look at each given product and think about what two numbers can be multiplied to get that number.

For example, to get 16, you can multiply 1 × 16 or 4 × 4. The number 16 isn't between 1 and 5, so it can't be one of the factors. The two numbers connected to 16 must both be 4.

4) Try it out. Use a pencil!

×	4				
					3
4	16		20		
		2			
			15		
				10	

Answer these questions after you have tried to solve the puzzle above.

5) What strategies did you use to figure out where to put the numbers 1 through 5 (the factors)?

If you're stuck: There are several ways to approach this puzzle. On the next page are the steps that I took to get started with this 1-5 puzzle.

[3] The Find the Factors puzzles in this section are inspired by or are from findthefactors.wordpress.com, by Iva Sallay. Non-commercial use/copying permitted.

×	4		5		
					3
4	16		20		
		2			
			15		
				10	

- With 4 on the left side, we now know that 4 × ? = 20. What can you multiply by 4 to get 20?
- Write the 5 in the factor row above.

×	4		5		
					3
4	16		20		
		2			
3	12		15		
				10	

- With the 5 on the factor row above, we now know that 5 × ? = 15. What can you multiply by 5 to get 15?
- Write the 3 on the left side.
- Now that we have 3 on the left and 4 above, we can multiply the two numbers to get 12.

×	4		5	2	
					3
4	16		20	8	
		2			
3	12		15	6	
5				10	

- Using the numbers 1 through 5, there is only one way to get a product of 10:

  $$2 \times 5 = 10$$

- Do we put the 5 or the 2 on the line above? Since there is already a 5 on the factor row above, we can't put the 5 there. We can't repeat numbers on the shaded factor line. So the 2 must go above. That means the 5 will go on the left.
- Write the 2 above and the 5 on the left.
- With the 2 above, we can multiply by 4 to get 8 and by 3 to get 6.

Can you use the hints above to finish the rest of the puzzle now? The goal is fill every square with the right number.

6) When you're finished, try the puzzles below. This is a Find the Factors 1-10 puzzle. Like the 1-5 puzzle, the goal is to write the correct number in each of the squares below. Use only one of each factor 1 through 10 in each shaded area.

Example: The two numbers that multiply to make 36 must be 6 and 6, since there is no other way to get 36 by multiplying numbers between 1 and 10.

×	6									
						1				
							25			
									100	
6	36									
		49								
			4							
										81
								16		
					64					

7) What strategies helped you solve this puzzle? What was challenging?

8) Try this level ONE Find the Factors 1-12 puzzle. Write in the numbers 1 through 12 in the correct boxes vertically and horizontally.

×												
											1	
										144		
									4			
			121									
		81										
							9					
						100						
	64											
								25				
					36							
				16								

9) What strategies helped you solve this puzzle? What was challenging?

10) This is a level TWO Find the Factors 1-10 puzzle.

×										
						14				
						4				
	3	9	27		18		15	21	24	12
						12				
						2				
						18				
						16				
						10				
						20				

11) What strategies helped you solve this puzzle? What was challenging?

12) For a real challenge, try this level THREE 1-10 puzzle.

×										
	30	36								
									45	
					27					
			6							
										14
								28		
						32				
				8						
		60								

For many more Find the Factors puzzles, go to http://findthefactors.wordpress.com.

Working on these puzzles is a good way to practice the multiplication times tables, your problem-solving skills, and your understanding of factors.