



MULTIPLICATION



Meaning of Multiplication

- There are 5 packs. Each pack contains 6 cans of juice. How many cans of juice are there in all?

- To find how many cans in all, you can add:

$$6 + 6 + 6 + 6 + 6 = 30$$

or

you can multiply since there are equal sets.

$$\begin{array}{ccc} 5 \text{ sixes} & & \\ \uparrow & \times & \uparrow \\ 5 & & 6 \\ \text{number} & & \text{number} \\ \text{of} & & \text{in each} \\ \text{sets} & & \text{set} \end{array} = \begin{array}{c} 30 \\ = \\ 30 \\ \uparrow \\ \text{number} \\ \text{in all} \end{array}$$



Study this example.

$$8 + 8 + 8 + 8 = 32$$

$$4 \text{ eights} = 32$$

$$\begin{array}{ccc} 4 \times 8 & = & 32 \\ \uparrow & \uparrow & \uparrow \\ \text{factor} & \text{factor} & \text{product} \end{array}$$

$$8 \leftarrow \text{factor}$$

$$\begin{array}{r} \times 4 \leftarrow \text{factor} \\ \hline \end{array}$$

$$32 \leftarrow \text{product}$$

Write the multiplication fact.

1. $3 + 3 + 3 + 3 + 3 + 3$

2. $8 + 8 + 8 + 8 + 8 + 8 + 8 + 8$

3. $5 + 5 + 5 + 5$

4. $7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7$

Properties of multiplication

- The properties of multiplication can help you multiply quickly and correctly.

Commutative property

- Changing the order of the factors does not change the product.
 - Think: "order."

$$9 \times 6 = 54$$

$$6 \times 9 = 54$$

$$\begin{array}{r} 6 \quad 9 \end{array}$$

$$\begin{array}{r} \times 9 \quad \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 54 \quad 54 \end{array}$$

Associative property:

Changing the grouping of the factors doesn't change the product.

– Think "grouping."

$$(2 \times 3) \times 3 = 2 \times (3 \times 3)$$

$$6 \times 3 = 2 \times 9$$

Identity property:

The product of one and a number is the same as that number.

– Think "same."

$$1 \times 7 = 7$$

$$7 \times 1 = 7$$

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

Zero property:

The product of zero and a number is zero.

Think: "0 product"

$$0 \times 4 = 0$$

$$4 \times 0 = 0$$

$$4 \quad 0$$

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

$$\begin{array}{r} \times 4 \\ \hline \end{array}$$

$$0$$

$$0$$

• Name the property of multiplication used:

1. $5 \times 2 = 2 \times 5$ _____

2. $3 \times (2 \times 4) = (3 \times 2) \times 4$ _____

3. $0 \times 6 = 0$ _____

4. $4 \times 1 = 4$ _____

5. $(5 \times 8) \times 7 = 5 \times (8 \times 7)$ _____

6. $6 \times 0 = 0$ _____

7. $9 \times 5 = 5 \times 9$ _____

Find the missing number. Use the properties of multiplication.

8. $\underline{\quad} \times 4 = 4 \times 6$

9. $2 \times \underline{\quad} = 0$

10. $6 \times 8 = 8 \times \underline{\quad}$

11. $3 \times (2 \times 4) = (3 \times \underline{\quad}) \times 4$

12. $9 \times \underline{\quad} = 9$

13. $1 \times 7 = \underline{\quad}$

14. $0 \times 6 = \underline{\quad}$

15. $(4 \times 2) \times 4 = \underline{\quad} \times (2 \times 4)$

Distributive property:

When the same factor is distributed across two addends, the product does not change.

Think: "same factor across addends"

Factor

Addends

$$2 \times (3 + 4) = (2 \times 3) + (2 \times 4)$$

$$2 \times 7 = 6 + 8$$

$$14 = 14$$

Copy and complete.

16. $3 \times (5 + 2) = (3 \times 5) + (\underline{\quad} \times 2)$

17. $4 \times (9 + 6) = (4 \times \underline{\quad}) + (4 \times \underline{\quad})$

18. $6 \times (\underline{\quad} + \underline{\quad}) = (6 \times 8) + (6 \times 7)$

19. $\underline{\quad} \times (4 + 1) = (6 \times 4) + (6 \times 1)$

20. $6 \times (5 + 2) = (\underline{\quad} \times \underline{\quad}) + (\underline{\quad} \times \underline{\quad})$




- Problem solving.

21. The product is 0 and one factor is 3.
What is the other factor?

22. If $6 \times 13 = 78$, what is the product
of 13×6 ?

23. The product is 8 and one factor is 8.
What is the other factor?

24. If $4 \times 12 = 48$, what is $4 \times (3+9)$
equal to?



Multiplication of Two and Three
Digit Numbers

How to multiply a three digit number by a two digit number (e.g. 529×67).

Step 1:

Place one number above the other so that the hundreds', tens' and ones' places are lined up. Draw a line under the bottom number

$$\begin{array}{r} 529 \\ \times 67 \\ \hline \end{array}$$

Step 2:

- Multiply the two numbers in the ones' places. ($9 \times 7 = 63$).

This number is larger than 9 so place a 6 above the tens' place column and place 3 below the line in the ones' place column.

$$\begin{array}{r} 6 \\ 529 \\ \times 67 \\ \hline 3 \end{array}$$

Step 3:

- Multiply the digit in the top tens' place column (2) by the digit in the lower ones' place column (7).

The answer ($2 \times 7 = 14$) is added to the 6 above the top tens' place column to give an answer of 20.

The 0 of 20 is placed below the line and the 2 of the 20 is placed above the hundreds' place column.

$$\begin{array}{r} 26 \\ 529 \\ \times 67 \\ \hline 03 \end{array}$$

Step 4:

- The hundreds' place of the top number (5) is multiplied by the ones' place of the multiplier ($5 \times 7 = 35$).

The two that was previously carried to the hundreds' place is added and the 37 is placed below the line.

$$\begin{array}{r} 26 \\ 529 \\ \times 67 \\ \hline 3703 \end{array}$$

Step 5:

After 529 has been multiplied by 7 as shown above, 529 is multiplied by the tens' place of the multiplier which is 6.

The number is moved one place to the left because we are multiplying by a tens' place number.

The result would be 3174:

$$\begin{array}{r} 15 \\ 529 \\ \times 67 \\ \hline 3703 \\ 3174 - \end{array}$$

Step 6

A line is drawn under the lower product (3174) and the products are added together to get the final answer of 35443.

$$\begin{array}{r} 15 \\ 529 \\ \times 67 \\ \hline 3703 \\ 3174 \\ \hline 35443 \end{array}$$



Multiplying Three Digits

To multiply three digits:

Step 1:

Multiply by the ones.

$$\begin{array}{r} 178 \\ \times 126 \\ \hline 1068 \end{array} \leftarrow 6 \times 178$$

Step 2:

Multiply by the tens.

$$\begin{array}{r} 178 \\ \times 126 \\ \hline 1068 \\ 3560 \end{array} \leftarrow 20 \times 178$$

Step 3:

Multiply by the hundreds. Add the partial products.

$$\begin{array}{r} 178 \\ \times 126 \\ \hline 1068 \\ 3560 \\ \underline{17800} \leftarrow 100 \times 178 \\ 22,428 \end{array}$$

Copy and complete:

1. 427

$$\begin{array}{r} \times 324 \\ \hline \end{array}$$

$$1708$$

$$8540$$

$$\underline{\text{????}00}$$

$$\text{????}8$$

2. 607

$$\begin{array}{r} \times 214 \\ \hline \end{array}$$

$$2428$$

$$607$$

$$\underline{\text{???}4}$$

$$\text{????}??$$

3. 5192

$$\begin{array}{r} \times 863 \\ \hline \end{array}$$

$$15576$$

$$31152$$

$$\underline{\text{????}??}$$

$$\text{????}???$$

Find the product.

$$\begin{array}{r} 4. 541 \\ \times 122 \\ \hline \end{array}$$

$$\begin{array}{r} 5. 217 \\ \times 145 \\ \hline \end{array}$$

$$\begin{array}{r} 6. 501 \\ \times 272 \\ \hline \end{array}$$

$$\begin{array}{r} 7. 853 \\ \times 418 \\ \hline \end{array}$$

$$\begin{array}{r} 8. 672 \\ \times 405 \\ \hline \end{array}$$



Problem solving.

9. Dennis picks an average of 465 baskets of apples during the season. If each basket holds 378 apples, how many apples does Dennis pick during the season?

10. There are 245 rows of corn plants. Each row has 125 plants. How many corn plants are there in all?

11. A supermarket receives 625 cases of oranges. Each case holds 135 oranges. How many oranges in all does the supermarket receive?

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- You can look for more information at:

<http://www.aaastudy.com/mul48ax2.htm>

<http://www.mathsisfun.com/numbers/multiplication-long.html>

<http://www.adaptedmind.com/Fourth-Grade-Math-Worksheets-And-Exercises.html>