

CLASS 2

Multiplication Facts

$\times 3$, $\times 4$, $\times 6$

Patterns • Strategies • Real-World Problems

 **$\times 3$:**

Double, then
add once more.

 $\times 4$:

Double, then
double again.

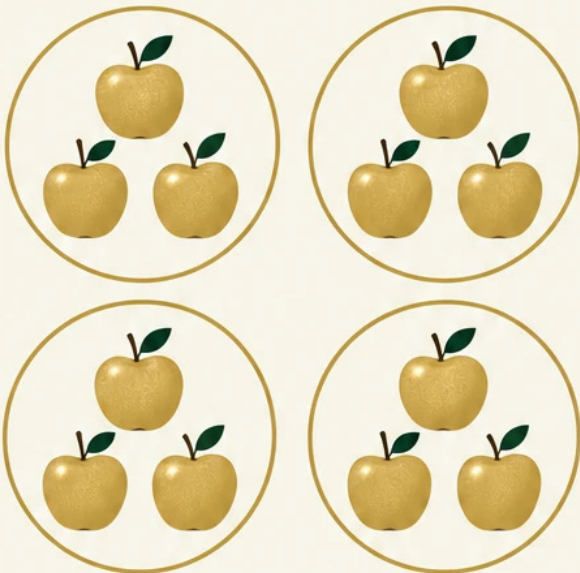
 $\times 6$:

Multiply by 3,
then double.

Multiplication Facts $\times 3$, $\times 4$, $\times 6$

1. Equal Groups and Arrays

A. Equal groups

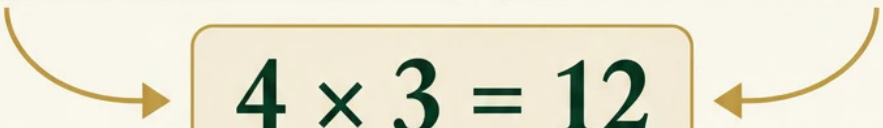


4 groups of 3
 $3 + 3 + 3 + 3 = 12$

B. An array



4 rows $\times$ 3 columns


$$4 \times 3 = 12$$

Equal groups have the same number
in each group.

Image 1 practice: Equal groups: name the factors

1.1. There are 5 bowls with 3 grapes in each. Write a multiplication equation and a repeated-addition equation.

1.2. Four boxes each hold 5 blocks. Name both factors and the product.

1.3. Rewrite $6 + 6 + 6$ as a multiplication equation using number of groups first.

1.4. Three bags contain 2, 3, and 4 stones. Can you use 3×3 to describe three equal bags? Explain and find the total.

1.5. A tray holds 4 cookies. How many cookies are on 5 full trays?

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2. Skip Counting by 3, 4, and 6

Add the same number each time.

Count by 3

3	6	9	12	15
18	21	24	27	30

Each step adds 3.

4 steps:
 $4 \times 3 = 12$

Count by 4

4	8	12	16	20
24	28	32	36	40

Each step adds 4.

6 steps:
 $6 \times 4 = 24$

Count by 6

6	12	18	24	30
36	42	48	54	60

Each step adds 6.

7 steps:
 $7 \times 6 = 42$

Your turn

3, 6, 9, __, __

6, 12, 18, __, __

Image 2 practice: Skip counting by 3, 4, and 6

2.1. Continue the pattern: 15, 18, 21, __, __. State the size of each step.

2.2. Fill the gaps while counting by 4: 8, 12, __, 20, __.

2.3. Start at 0 and make 6 jumps of 6. List the landing numbers and write a multiplication equation.

2.4. Ben lists 0, 4, 8, 12 and says, 'Four jumps of 4 land on 12.' Explain his mistake and find the landing number after four jumps.

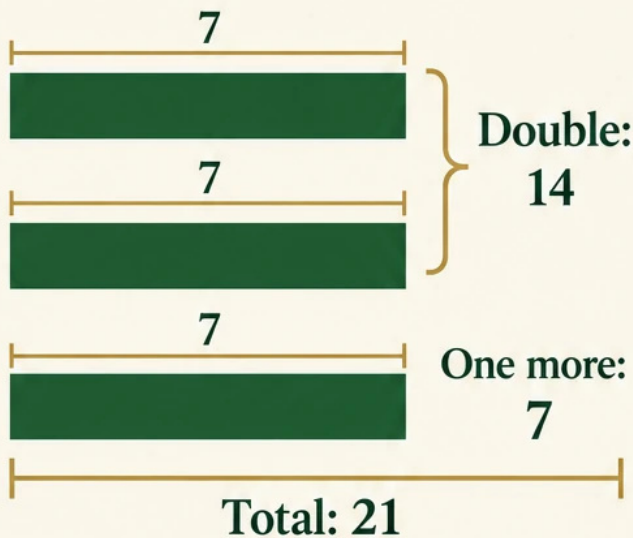
2.5. A game token starts on 6 and moves forward 3 spaces on each turn. Where will it land after 5 turns? Show how you know.

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3. Multiplying by 3

Double the number, then add it once more.

$$3 \times 7 = 21$$



1 Start with 7.

2 Double:
 $7 + 7 = 14$

3 Add one more 7:
 $14 + 7 = 21$

Try another fact.

$$\begin{aligned} 3 \times 9 &= (2 \times 9) + 9 \\ &= 18 + 9 = 27 \end{aligned}$$

$$\times 3 = \times 2 + \text{one more group}$$

Image 3 practice: Multiply by 3: double and add

3.1. Use double-and-add to find 3×2 . Show the double and the extra group.

3.2. Use double-and-add to find 3×11 .

3.3. Fill both blanks: $3 \times 5 = (2 \times 5) + \underline{\quad} = \underline{\quad}$.

3.4. Mia says $3 \times 6 = 12 + 1 = 13$. What should she add instead, and why?

3.5. You know $3 \times 10 = 30$. Find 3×12 by adding two more groups of 3.

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4. Multiplying by 4

Double the number, then double again.

$$4 \times 7$$

Step 1: Double 7

$$7 + 7 = 14$$

Step 2: Double 14

$$14 + 14 = 28$$



$$14 + 14 = 28$$

$$4 \times 7 = 28$$

Another example:

$$\begin{aligned} 4 \times 9 &= 2 \times (2 \times 9) \\ &= 2 \times 18 = 36 \end{aligned}$$

Your turn:

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

Multiplying by 4 means doubling twice.

Image 4 practice: Multiply by 4: double, then double again

4.1. Find 4×5 by doubling twice. Write both addition steps.

4.2. Complete the steps for 4×8 : double 8 to get ____; double that result to get ____.

4.3. Find 11×4 by switching the factors and doubling twice. Show each step.

4.4. To find 4×3 , Leo doubles 3 to get 6, then adds 3 to get 9. What should his second step be, and why?

4.5. Four trays each hold 12 muffins. Find the total by doubling twice, and explain what each double counts.

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5. Multiplying by 6

Multiply by 3, then double.

1

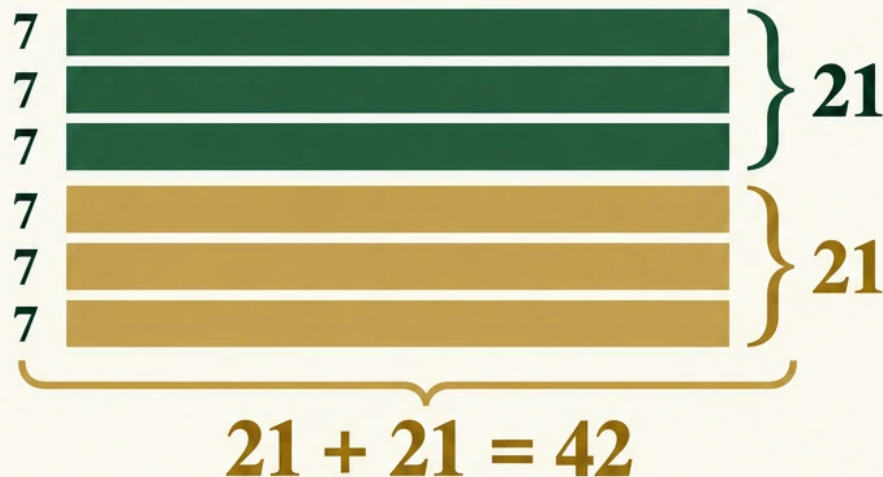
Step 1: Triple

$$3 \times 7 = 21$$

2

Step 2: Double

$$2 \times 21 = 42$$



$$6 \times 7 = 42$$

Another example:

$$6 \times 8 = 2 \times (3 \times 8) = 2 \times 24 = 48$$

Six groups = double three groups.

Image 5 practice: Multiply by 6: double three groups

5.1. Find 6×3 by first finding 3×3 .

5.2. Find 6×5 using triple-then-double.

5.3. If $3 \times 11 = 33$, what is 6×11 ?

5.4. Nora says 6×4 is 3×4 plus 3. Find and fix her mistake.

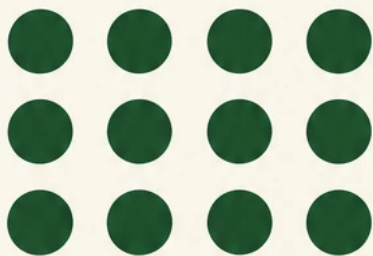
5.5. Find the missing factor: $6 \times \underline{\quad} = 60$. Check with a $\times 3$ fact.

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6. Switching Factors

Changing the order keeps the same product.

$$3 \times 4$$



3 rows of 4

$$3 \times 4 = 12$$

$$4 \times 3$$



4 rows of 3

$$4 \times 3 = 12$$

$$3 \times 4 = 4 \times 3 = 12$$

The same 12 dots, arranged differently.

The commutative property

$$a \times b = b \times a$$

$$6 \times 4 = 4 \times 6 = 24$$

Know one fact? You also know its reverse!

Image 6 practice: Switching factors: the same product

6.1. Use $4 \times 8 = 32$ to find 8×4 . Name the property.

6.2. Complete the switched pair: $6 \times 9 = \underline{\quad} \times 6 = \underline{\quad}$.

6.3. True or false: $3 \times 5 = 5 \times 3$ means that both arrays have the same number of rows.

6.4. Which equation shows switching factors? A: $4 \times 5 = 5 \times 4$. B: $4 \times 5 = 2 \times 10$.
Explain.

6.5. Do $8 - 3$ and $3 - 8$ give the same answer? What does this tell you about switching?

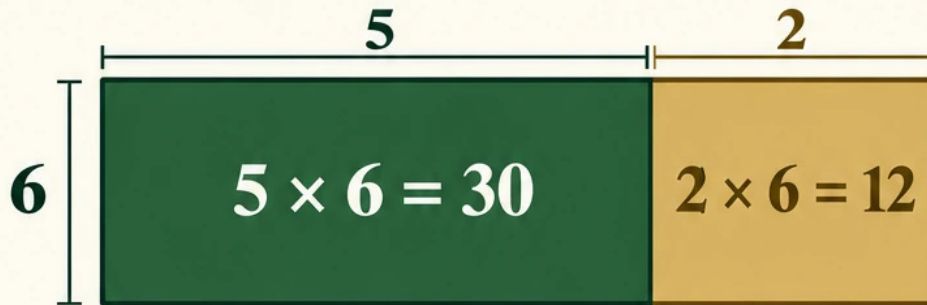
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7. Breaking Apart Tricky Facts

Use facts you know to find a new product.

$$7 \times 6$$

Break 7 into $5 + 2$.



$$7 \times 6 = (5 \times 6) + (2 \times 6)$$

$$30 + 12 = 42$$

$$7 \times 6 = 42$$

$$\begin{aligned} 9 \times 4 &= (5 \times 4) + (4 \times 4) \\ &= 20 + 16 = 36 \end{aligned}$$

The distributive property

$$a \times (b + c) = a \times b + a \times c$$

Break apart. Multiply each part. Add the products.

Image 7 practice: Break apart a fact you do not know yet

7.1. Split 8 into $5 + 3$ to find 8×3 .

7.2. Split 11 into $10 + 1$ to find 11×4 .

7.3. Find 8×6 by splitting 8 into $4 + 4$.

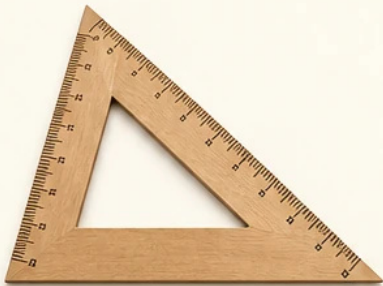
7.4. A student writes $6 \times 12 = (6 \times 10) + 2$. Correct the equation.

7.5. Find 9×3 using 10×3 minus one group of 3.

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8. Real-World Word Problems

Find equal groups. Multiply to find the total.



Triangles

A student draws 8 separate triangles.
Each has 3 sides. How many sides
in total?

$$8 \times 3 = 24 \text{ sides}$$



Pencil packs

Each pack holds 4 pencils.
How many pencils are in 7 packs?

$$7 \times 4 = 28 \text{ pencils}$$



Egg cartons

Each carton holds 6 eggs.
How many eggs are in 9 cartons?

$$9 \times 6 = 54 \text{ eggs}$$

Number of groups $\times$ Number in each group = Total

Your turn

A museum has 6 rows of seats with 4 seats in each row.
How many seats are there?

$$6 \times 4 = \underline{\quad\quad} \text{ seats}$$

Image 8 practice: Use multiplication in a story

8.1. Four shelves each hold 9 books. How many books are there? Show a switched equation too.

8.2. Five tables each have 6 seats. How many seats are available?

8.3. A baker fills 3 trays with 11 rolls each, then sells 5 rolls. How many remain?

8.4. One display has 4 rows of 8 badges. Another has 8 rows of 4 badges. Which has more, or are they equal?

8.5. A class needs 25 paintbrushes. Each pack holds 6. Are 4 packs enough? If not, how many brushes are missing?

Homework review: R1–R5

R1. Review Class 1: Find 2×8 using doubles.

R2. Review Class 1: Find 5×7 by counting in fives.

R3. Review Class 1: A box holds 10 cards. How many cards are in 12 boxes?

R4. Review Class 1: If $8 \times 5 = 40$, find 8×10 .

R5. Draw or describe two arrays showing $3 \times 5 = 5 \times 3$.

Homework review: R6–R8

R6. Find 4×12 by doubling twice.

R7. Use $3 \times 9 = 27$ to find 6×9 .

R8. Explain why $4 \times 6 = 6 \times 4$ but 4×6 is not $4 + 6$.

Homework word problems: W1–W5

W1. Three baskets each hold 5 pears. How many pears are there? Write the reversed fact too.

W2. Four children each make 6 paper stars. How many stars do they make altogether?

W3. A tray has 6 rows with 5 seed pots in each row. How many pots are there?

W4. A shop packs 3 erasers in each bag. How many erasers are in 11 bags?

W5. A display holds 4 rows of 10 postcards. It is rearranged into 10 equal rows using every postcard. How many postcards are in each new row?

Homework word problems: W6–W10

W6. Six teams each receive 4 bibs. Two spare bibs are added. How many bibs are there in total?

W7. Four boxes each contain 11 beads. A student uses 9 beads. How many remain?

W8. One club sets out 3 tables with 8 places each. Another sets out 4 tables with 6 places each. Do the clubs have the same number of places? Is this a switched pair?

W9. A library displays 8 rows of 3 books. Use 5 rows and 3 rows to find the total.

W10. A class needs 30 counters. Each packet contains 4 counters. Are 7 packets enough, and how many full packets are needed?

Homework word problems: W11–W12

W11. A florist makes 6 bunches with 9 flowers in each. She sells 2 whole bunches. How many flowers remain?

W12. A museum has 5 rows of 6 seats. A guide says rearranging them into 6 rows of 5 will add one seat. Explain the mistake and state the total.