Lesson - Times tables to 12 x 12

Year: Year 4

Hello, I am Otto! Times tables are the secret tool behind almost all the maths you will do in the next few years: multiplying, dividing, fractions, area and much more. In Year 4 you learn all the times tables up to 12 × 12 and you should know them so well that the answers pop into your head at once.

Starter activity

A box of eggs holds 12 eggs. A shop sells 7 boxes. How many eggs is that? Try to see it as an array: 7 rows with 12 dots in each row. You could count in 12s, or you could do 7 × 10 = 70 and 7 × 2 = 14, then add 70 + 14 = 84. There are 84 eggs. You have just used a times table fact and a clever strategy!

What multiplication means

Definition: multiplication

Multiplication is repeated addition of equal groups. 4 × 6 means 4 groups of 6, which is 6 + 6 + 6 + 6 = 24. The numbers you multiply are called **factors** and the answer is called the **product**.



This array has 4 rows and 6 columns, so there are 4 × 6 = 24 dots. If you turn it on its side you get 6 rows of 4, which is 6 × 4 = 24.

Rule: multiplying in any order

You can multiply two numbers in either order: 4 × 6 = 6 × 4. This means that you only need to learn about half of the times table facts. If you know 3 × 9 = 27, then you also know 9 × 3 = 27.

Key fact: multiplying by 0 and 1

- Any number multiplied by 1 stays the same: 8 × 1 = 8.
- Any number multiplied by 0 is 0: 8 × 0 = 0.
- Any number multiplied by 10 moves each digit one place to the left: 8 × 10 = 80.

The multiplication square up to 12 × 12

×	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

Read the table by finding the row of one factor and the column of the other. For example, 7 × 8 is in row 7 and column 8, and the product is 56. Notice that the table is the same when you swap the rows and the columns.

Clever strategies for each table

Method: learning the tables

- **2, 4 and 8 times tables:** these are doubles. Double a number for × 2, double again for × 4 and double again for × 8. So 6 × 8: 6 doubled is 12, doubled is 24, doubled is 48.
- **5 and 10 times tables:** the answers end in 5 or 0. The × 5 table is half of the × 10 table: 7 × 5 is half of 70, which is 35.
- **9 times table:** multiply by 10 and subtract the number. 9 × 7 = 70 − 7 = 63. The digits of every answer up to 9 × 10 add up to 9: 6 + 3 = 9.
- **11 times table:** up to 9 × 11, repeat the digit: 11 × 4 = 44, 11 × 7 = 77. After that, 11 × 12 = 132 (11 × 10 = 110 and 11 × 2 = 22).
- **6 times table:** double the 3 times table, or take the × 5 fact and add one more group: 6 × 7 = 5 × 7 + 7 = 35 + 7 = 42.
- **12 times table:** multiply by 10, then by 2, and add: 12 × 7 = 70 + 14 = 84.

Example 1

Work out 7 × 8 by partitioning.

Split 8 into 5 + 3. Then 7 × 5 = 35 and 7 × 3 = 21. Add the two parts: 35 + 21 = **56**. So 7 × 8 = 56.

Example 2

Work out 9 × 12 and 11 × 8.

9 × 12 = 10 × 12 − 12 = 120 − 12 = **108**. 11 × 8 = 88, because the digit repeats for 11 times any single digit. So **88**.

Division is the inverse of multiplication

Definition: division

Division means sharing into equal groups, or finding how many groups of a number fit into another number. It is the **inverse** (the opposite) of multiplication. If 7 × 8 = 56 then 56 ÷ 7 = 8 and 56 ÷ 8 = 7.

Key fact: fact families

Three numbers make a fact family. For 6, 9 and 54 there are four facts: 6 × 9 = 54, 9 × 6 = 54, 54 ÷ 6 = 9 and 54 ÷ 9 = 6. Learn the multiplication facts, and the division facts come for free.

Example 3

Use 8 × 12 = 96 to write two division facts.

The fact family has the numbers 8, 12 and 96. The division facts are 96 ÷ 8 = **12** and 96 ÷ 12 = **8**.

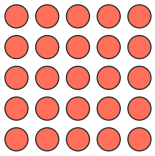
Multiples and factors

Definition: multiples and factors

The **multiples** of a number are the numbers in its times table. The multiples of 6 are 6, 12, 18, 24, 30, 36 and so on. A **factor** of a number is a whole number that divides it exactly. The factors of 12 are 1, 2, 3, 4, 6 and 12. Factors come in pairs: 1 × 12, 2 × 6 and 3 × 4.

Definition: square numbers

A **square number** is what you get when you multiply a number by itself: 1 × 1 = 1, 2 × 2 = 4, 3 × 3 = 9 and so on up to 12 × 12 = 144. A square number makes a square array of dots.



5 rows of 5 dots make 25, which is the square number 5 × 5.

Example 4

List all the factor pairs of 24.

Check each number from 1: 1 × 24 = 24, 2 × 12 = 24, 3 × 8 = 24 and 4 × 6 = 24. The next number, 5, does not divide 24. After 4 × 6 the pairs repeat in the other order. So the factors of 24 are **1, 2, 3, 4, 6, 8, 12 and 24**.

Multiplying three numbers

Rule: multiplying three numbers

When you multiply three numbers you can multiply them in any order. Choose the order that makes the calculation easiest. Look for pairs that make 10 or an easy number, such as 2 × 5 = 10 or 4 × 5 = 20.

Example 5

Work out 5 × 7 × 4.

5 × 4 = 20 is easy. Then 20 × 7 = 140. So 5 × 7 × 4 = **140**. If we did 5 × 7 = 35 first and then 35 × 4 = 140, we would get the same answer.

Watch out

Do not mix up the 6, 7 and 8 times tables: 6 × 7 = 42, 6 × 8 = 48 and 7 × 8 = 56. A common slip is to say 7 × 8 = 54. If you are not sure, work it out by partitioning: 7 × 8 = 7 × 5 + 7 × 3 = 35 + 21 = 56. Also remember that 56 = 7 × 8 is the only fact that has the digits 5, 6, 7, 8 in order: "5, 6, 7, 8 – 56 = 7 × 8".

Did you know?

The multiplication square was used by children in ancient Babylon about 4 000 years ago. Their numbers were based on 60, which is why we still have 60 minutes in an hour and 12 hours on a clock. The number 12 divides by 1, 2, 3, 4 and 6, which makes it a very useful number!

Otto's tip

Practise a little every day. Say a table out loud forwards and backwards, then ask a friend to test you with questions in a mixed order. The facts you find hard (usually the

6s, 7s, 8s and 9s) need the most practice. Make a list of your three hardest facts and learn them first!