# Laws of Indices

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

## 1. Worked example

**Simplify $5^3 \times 5^4$, leaving your answer power of 5**

Step 1 · Same base, multiplying → add the powers

$3 + 4 = 7$

Step 2 · Write the answer

$5^7$

**Answer: $5^7$**

Check: $(5 \times 5 \times 5) \times (5 \times 5 \times 5 \times 5)$ is seven 5s multiplied together ✓

## 2. Now try one with the steps

**Simplify $7^8 \div 7^3$**

Step 1 · Same base, dividing → subtract the powers

Step 2 · Write the answer

**Answer:**

## 3. Practice

Show your working. The marks tell you how much is expected.

**1.** Write $6 \times 6 \times 6 \times 6$ power of 6. [1]

**2.** Simplify $3^4 \times 3^5$, leaving your answer power of 3. [1]

**3.** Simplify $10^7 \div 10^3$, leaving your answer power of 10. [1]

**4.** Work out $9^0$. [1]

**5.** Simplify $(2^3)^2$, leaving your answer power of 2. [1]

**6.** Simplify $x^5 \times x^3$ [1]

**7.** Simplify $y^9 \div y^4$ [1]

**8.** Work out $2^3 \times 2^2$ ordinary number. [1]

**9.** Simplify $4a^2 \times 3a^5$ [2]

**10.** Simplify $(m^4)^3$ [1]

**11.** Find the value of n if $5^n \times 5^3 = 5^{10}$. [1]

**12.** Simplify $12p^8 \div 4p^3$ [2]

**13.** Simplify $(3x^2)^3$ [2]

**14.** Write $8^2$ power of 2. [2]

**15.** Simplify $(a^6 \times a^2) \div a^5$ [2]

## 4. Before you hand it in

**$3^4 \times 3^5 = 9^9$ (multiplying the bases)**

The base stays the same. $3^4 \times 3^5$ is nine 3s multiplied together, which is $3^9$.

**$x^5 \times x^3 = x^{15}$ (multiplying the powers)**

When MULTIPLYING terms, ADD the powers: $x^8$. You only multiply the powers for a power of a power, like $(x^5)^3 = x^{15}$.

**$5^0 = 0$**

$5^3 \div 5^3 = 1$, and the law says it is $5^0$. So $5^0 = 1$. Any non-zero number to the power 0 is 1.

**$2^3 \times 3^2 = 6^5$**

The laws only work when the bases match. Work it out: $2^3 \times 3^2 = 8 \times 9 = 72$.