

Y9 Maths Knowledge Organiser Topic 1: Indices and Standard Form

What must I be able to do?	Key Vocabulary
<p>You may need to revise the following:</p> <ul style="list-style-type: none"> • Year 8 Topic 1: Types of number and indices • Year 7 Topic 1: Types of number <p>New content:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Write a number as a power of another number <input type="checkbox"/> Use index laws for multiplication, division and raising a power to a power <ul style="list-style-type: none"> ➤ Sparx M608 <input type="checkbox"/> Write a number in standard form <ul style="list-style-type: none"> ➤ Sparx M719, M678 <input type="checkbox"/> Calculate with numbers in standard form 	<p>Standard Form</p> <p>Standard form is a way of writing down very large or very small numbers easily. It involves writing a number as a <u>decimal between 1 and 10</u> with the decimal point after the first digit, <u>multiplied by a power of 10</u>.</p>

Index Laws

- Any number to the power of 1 is just that number.
e.g. $5^1 = 5$ and $a^1 = a$
- Any number other than 0, when raised to the power of 0 will equal 1.
e.g. $5^0 = 1$ and $a^0 = 1$
- When multiplying two numbers with the same base, it can be simplified by adding the powers.
e.g. $5^3 \times 5^7 = 5^{10}$ and $a^6 \times a^9 = a^{15}$
- When dividing two numbers with the same base, it can be simplified by subtracting the powers.
e.g. $5^7 \div 5^3 = 5^4$ and $a^{12} \div a^5 = a^7$
- When raising a power to another power, it can be simplified by multiplying the two powers together.
e.g. $(5^3)^2 = 5^6$ and $(a^4)^5 = a^{20}$

With these final 3 rules, if there are any coefficients in front of the terms, you treat them as you would any normal number.

e.g. $3a^2 \times 5a^6 = 15a^8$

$3 \times 5 \uparrow$ $2 + 6 \swarrow$

$28a^8 \div 7a^3 = 4a^5$

$28 \div 7 \uparrow$ $8 - 3 \swarrow$

$(2a^2)^3 = 8a^6$

$2 \times 2 \times 2 \text{ or } 2^3 \swarrow$

Standard Form

e.g. Write 876,000,000 in standard form.

$876,000,000 = 8.76 \times 10^8$ (10^8 as the digits have moved 8 places to the right)

e.g. Write 0.000043 in standard form

$0.000043 = 4.3 \times 10^{-5}$ (10^{-5} as the digits have moved 5 places to the left)

e.g. Calculate $(3.2 \times 10^4) \times (4 \times 10^3)$. Give your answer in standard form.

First, work with the decimals. $3.2 \times 4 = 12.8$

Second, the powers of 10. $10^4 \times 10^3 = 10^7$

which gives 12.8×10^7 . This is not standard form as 12.8 is more than 10.

So in standard form it is $1.28 \times 10 \times 10^7$ which gives us 1.28×10^8