


# Y9 Maths Knowledge Organiser Topic 1: Indices and Standard Form

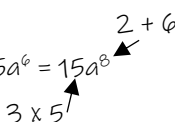
What must I be able to do?	Key Vocabulary	
<p>You may need to revise the following:</p> <ul style="list-style-type: none"> <li>• <a href="#">Year 8 Topic 1: Types of number and indices</a></li> <li>• <a href="#">Year 7 Topic 1: Types of number</a></li> </ul> <p>New content:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Write a number as a power of another number</li> <li><input type="checkbox"/> Use index laws for multiplication, division and raising a power to a power <ul style="list-style-type: none"> <li>➤ Sparx M608</li> </ul> </li> <li><input type="checkbox"/> Write a number in standard form <ul style="list-style-type: none"> <li>➤ Sparx M719, M678</li> </ul> </li> <li><input type="checkbox"/> Calculate with numbers in standard form</li> </ul>	Standard Form	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> .

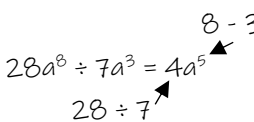
## Index Laws

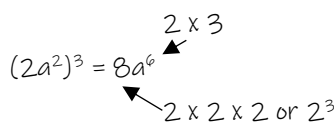
- Any number to the power of 1 is just that number.  
e.g.  $5^1 = 5$  and  $a^1 = a$
- Any number other than 0, when raised to the power of 0 will equal 1.  
e.g.  $5^0 = 1$  and  $a^0 = 1$
- When multiplying two numbers with the same base, it can be simplified by adding the powers.  
e.g.  $5^3 \times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


$a$  is the base
- 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.  $3a^2 \times 5a^6 = 15a^8$  

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

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

$2 \times 2 \times 2$  or  $2^3$

## Standard Form

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

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

e.g. Write 0.000043 in standard form

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

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  $12.8 \times 10^7$ . 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  $1.28 \times 10^8$