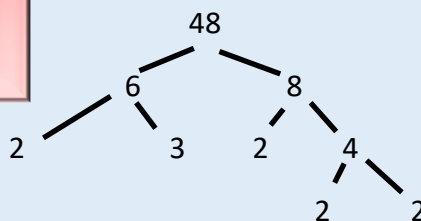# YEAR 8 HIGHER
TOPIC 1– *Factors and Powers*

What do I need to know;

1. Express a number as a product of its prime factors

2. Find the HCF and LCM of two numbers

3. Use and understand the powers of 10

4. The rules of indices

5. Complete basic standard form calculations
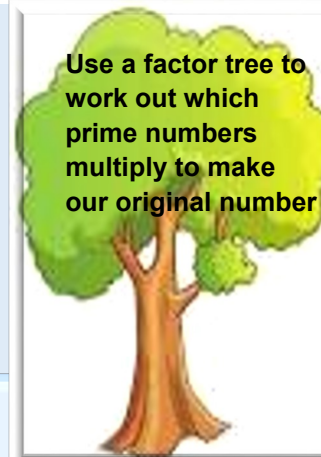
6. Be able to round to significant figures

Prime factor decomposition

48
6   8
2   3   2   4
2   2

2 x 2 x 2 x 2 x 3 2^4 x 3

Use a factor tree to work out which prime numbers multiply to make our original number

HCF
List all the factors of each number. Then identify the highest one that occurs in both lists eg. HCF of

42		and	56	
1	42	1	56	
2	21	2	28	
3	14	4	14	
4	8	6	9	
6	7	7	8	

LCM;
Start listing the multiples of both numbers until you fint the first one that occurs in both lists eg LCM of 12 and 16

12	16
24	32
36	48
48	64

Laws of Indices

Letters or numbers written to the power of 1 are written as just a single letter or number eg. a^1 **is written as a**

Multiplying ;- add the powers eg $a^2 \times a^3 = a^5$

Dividing;- subtract the powers eg $a^{15} \div a^{10} = a^5$

Raising a power to a power; multiply the powers eg $(a^5)^3 = a^{15}$

Any letter or number to the power of 0 = 1 eg $a^0 = 1$

Powers of 10 ; any of the integer pow-

One	1	10^0
Ten	10	10^1
Hundred	100	10^2
Thousand	1,000	10^3
Ten Thousand	10,000	10^4
Hundred Thousand	100,000	10^5
Million	1,000,000	10^6
Ten Million	10,000,000	10^7
Hundred Million	100,000,000	10^8

Rounding significant figures

WORKED EXAMPLE

Round these numbers to the required significant figures

A)   32.037 (4 sig fig)   32.04   next figure after 4 figures is higher than 5 so the 3 rounds up to a 4

B)   0.06612 (3 sig fig) 0.0661   fourth figure is a 2 so because it is less than 5 third figure remains as a 1   NOTE; 0's are not included or classed as significant figures until figures of value have occurred first

C)   31582 (2 sig fig) 32000   third figure is a 5 so round up second significant figure

Standard Form
writing very large or very small numbers in a simpler form

Eg. 81 900 000 000 000 written in standard form would be **8.19 x 10^{13}**

NB This number must always between 1 and 10. It is to the power of 13 because the decimal pleace has sifted 13 places to create the 8.19

EG.0.000 001 2 written in standard form would be **1.2 x 10^{-6}**