YEAR 8 - DEVELOPING NUMBER

@whisto maths

Standard Form

What do I need to be able to do?

By the end of this unit you should be able to:

- Write numbers in standard form and as ordinaru numbers
- Order numbers in standard form
- Odd/ Subtract with standard from
- Multiply/ Divide with standard form
- Use a calculator with standard form

Keywords

Standard (index) Form: O sustem of writing very big or very small numbers

Commutative: an operation is commutative if changing the order does not change the result

Base: The number that gets multiplied by a power

Power: The exponent — or the number that tells you how many times to use the number in multiplication. **Exponent**: The power — or the number that tells you how many times to use the number in multiplication

Indices: The power or the exponent.

Negative: a value below zero.

Positive powers of 10

l billion - 1 000 000 000

Oddition rule for indices $10^a \times 10^b = 10^{a+b}$

Subtraction rule for indices $10^a \div 10^b = 10^{a-b}$

Standard form with numbers > 1

Onu number between I and less than 10 -

A x 10 n 4

Non-example

Example

3.2 x 10 4

ll = 32000

= 3.2 x 10 x 10 x 10 x 10

 6.4×10^{-2}

0.064

0.8 × 10 4

Ony value to the power O always = 1

0.001

1 x 10-3

Negative powers of 10

101

10-2 10-1 10-3

Negative powers do not

indicate negative solutions

100

1000

Numbers between 0 and 1

0.054 $= 5.4 \times 10^{-2}$

1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
100	10-1	10-2	10-3
0	0	5	4

O negative power does not mean a negative answer — it means a number closer to 0

53x 10(07)

Order numbers in standard form

3.3 x 100

I ook at the power first 1.3×10^{-1}

This is not the

final answer

240

 2.4×10^{2}

0.13

Use a place value arid to compare the numbers for orderina

will the number be = > or < than I

Mental calculations

6.4 x 10² x 1000 Not in Standard Form

Divide the values

 $6.4 \times 10^{2} \times 10^{3}$

= 6.4 x 10⁵

Use addition for indices rule

= 24×10^5 Not in Standard Form 1

 $= 2.4 \times 10^{1} \times 10^{5}$ Use addition for

(8)x 10⁵ x(3)

 $= 2.4 \times 10^{6}$

indices rule.

$(2 \times 10^3) \div 4$

 $= (2 \div 4) \times 10^3$

 $= 0.5 \times 10^3$

Remember the layout for standard form

Ony number between I and less than 10

. Ony integer A x 10 n 4

Addition and Subtraction

Tip: Convert into ordinary numbers first and back to standard from at the end

10

Method I

= 600000 + 800000

= 1400000

= 1.4 x 10⁵

More robust method Less room for misconceptions Easier to do calculations with negative indices Can use for different powers

6 x 105 + 8 x 105 Method 2

> $= (6 + 8) \times 10^{5}$ = 14 x 10⁵

1.4 x 101 x 105

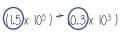
= 1.4 x 10⁵

Only works if the powers are the same

Multiplication and division

Division auestions can look like this

For multiplication and division you can look at the values for A and the powers of 10 as two separate calculations





Revisit addition and subtraction laws for indices they are needed for the calculations

 $=5 \times 10^{2}$

Oddition law for indices a m x a n = a m + n

Subtraction law for indices $a^m \div a^n = a^{m-n}$

Using a calculator

 $14 \times 10^5 \times 39 \times 10^3$

Use a calculator to work out this question to a suitable degree of accuracy

Input 14 and press $\boxed{\times 10^x}$ Then press 5 (for the power)

Input 3.9 and press **x10**x Then press 3 (for the power) Press 🔳

This gives you the solution

Click calculator for video tutorial

To put into standard form and a suitable degree of accuracy

Press SHIFT (SETUP) and then press 7 for sci mode. Choose a degree of accuracy so in most cases press 2

Onswer: 5.5 x 108