Starter

1) Evaluate $125^{\frac{2}{3}}$ $= \left(\sqrt[3]{125}\right)^2$

$= 5^2 = 25$

2) Calculate the volume of a pyramid with base area $23mm^2$ and height 4cm. $V = \frac{1}{3}Ah = \frac{1}{3} \times 23 \times 40$

$= 306.6 mm^3$

3) Factorise $y = x^2 + 8x + 15$

$y = (x + 3)(x + 5)$

$y = (x + 1)(x - 1)$

Scientific Notation

**Today we are learning...**

What scientific notation is and how to write it.

**I will know if I have been successful if...**

Convert numbers into scientific notation..

Convert from scientific notation to numbers.

Understand where scientific notation is used in real life.

## Scientific Notation

$10^2 = 100$

$10^3 = 1000$

$10^4 = 10\,000$

$10^5 = 100\,000$

$10^6 =$

$10^7 =$

$10^8 = 100,000,000$

## Scientific Notation

The weight of a building is 345 000kg

Writing this in scientific notation...

$3.45 \times 10^5$

3.45000.

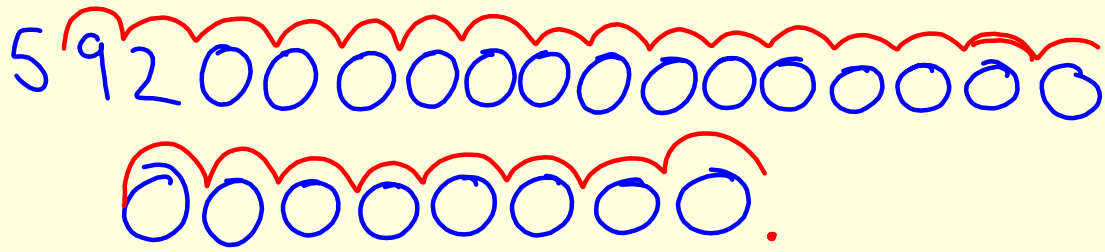
## Scientific Notation

22

The weight of the Earth is estimated to be
5,920,000,000,000,000,000,000,000 kg

Writing this in scientific notation...

$5.92 \times 10^{24}$



## Scientific Notation

The speed of light is $1.079 \times 10^{9}$ km/h.

Writing this as a number...

1,079,000,000.

1 2 3 4 5 6 7 8 9

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## Practice

1. Rewrite these sentences with the numbers written out in full

**(a)** The speed of light is $3 \times 10^8$ metres per second.

**(b)** The diameter of the earth is $1{\cdot}268 \times 10^4$ kilometres.

**(c)** A Building Society has £$2.15 \times 10^9$ in its funds.

**(d)** The radius of the orbit of an electron is $5 \times 10^{-8}$ mm.

**(e)** A space probe reached a speed of $1{\cdot}49 \times 10^5$ m.p.h.

**(f)** The earth weighs $6{\cdot}6 \times 10^{21}$ tonnes.

**(g)** A film of oil is $8 \times 10^{-7}$ mm thick.

## Indices

**Today we are summarising...**

All of our work on indices.

**I will know if I have been successful if...**

I can write numbers using scientific notation.

I can recall the three laws of indices.

I can evaluate numerical indices.

New Note

$b^0 = 1$

$b^1 = b$

The 3 Laws of Indices

$y^a \times y^b = y^{a+b}$

$y^a \div y^b = y^{a-b}$

$(y^a)^b = y^{ab}$

$f^3 \times f^9 =$

$\frac{h^8}{h^3} =$

$(k^6)^4 =$

## Evaluating Indices

1) $32^{\frac{3}{5}}$ $= \left(\sqrt[5]{32}\right)^3 = 2^3 = 8$

2) $27^{\frac{2}{3}}$

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- Identify Equivalent Expressions Involving Exponents
- Rational Exponents
- Exponents with Integer Bases
- Multiplication with Exponents

**National 5 WB 26th Feb Scientific Notation**

Plenary

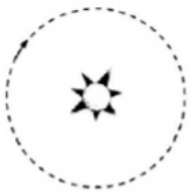
**N5 Practice Paper E, P2, Q1**

3. $E = mc^2$

Find the value of $E$ when $m = 3.6 \times 10^{-2}$ and $c = 3 \times 10^8$.

Give your answer in scientific notation. (3 marks)

4. The orbit of a planet around a star is circular.



The radius of the orbit is $4.96 \times 10^7$ kilometres.

Calculate the circumference of the orbit.

Give your answer in scientific notation. (3 marks)

Algebraic Fractions

**Today we are learning...**

How to apply the four basic operations to fractions.

**I will know if I have been successful if...**

I can add and subtract fractions by finding a common denominator.

I can multiply and divide algebraic fractions.

I can simplify fractions.

**National 5 WB 26th Feb Scientific Notation**

## Multiplying and Dividing

1) $\frac{3r}{s} \times \frac{q}{r} = \frac{3qr}{rs} = \frac{3q}{s}$ $\quad \frac{8}{8} = 1$ $\quad \frac{12}{6} = \frac{2 \times 6}{6}$

2) $\frac{xy}{3} \div \frac{4}{x} = \frac{xy}{3} \times \frac{x}{4} = \frac{x^2y}{12}$

3) $\frac{2mn^2}{3q} \div \frac{5m}{4q} = \frac{2mn^2}{3q} \times \frac{4q}{5m} = \frac{8mn^2q}{15mq}$

Page 22

Q7 - ×

Q8 - ÷

$= \frac{8n^2q}{15q}$

$= \frac{8n^2}{15}$

## Practice

**(a)** $\frac{2}{3m} \times \frac{4}{5m}$ **(b)** $\frac{1}{b} \times \frac{11}{3c}$ **(c)** $\frac{5m}{6} \times \frac{3}{2m}$ **(d)** $\frac{5}{7x} \times \frac{4x}{3}$

**(e)** $\frac{5pq}{2} \times \frac{3}{4pq^2}$ **(f)** $\frac{7ab^2}{6c} \times \frac{2c^3}{3a^2}$ **(g)** $\frac{4}{5mn} \times \frac{2m^4}{n^2}$

**(h)** $\frac{3}{2x} \div \frac{12}{x^2}$ **(i)** $\frac{24xy}{35z} \div \frac{20xy}{21z}$ **(j)** $\frac{6q^2}{25p} \div \frac{9q}{20p^2}$

**(k)** $\frac{8ab}{21c} \div \frac{9b}{14ac}$ **(l)** $\frac{10m}{21n^2} \div \frac{8mn}{9}$ **(m)** $\frac{20ax}{33y} \div \frac{15x}{44ay^2}$

## Adding and Subtracting Fractions

**Today we are learning...**

How to add and subtract algebraic fractions.

**I will know if I have been successful if...**

I can add and subtract numerical fractions.

I can add and subtract algebraic fractions.

I can answer exam style questions.

## Numerical Fractions

1) $\frac{3}{4} + \frac{3}{4} =$

2) $\frac{5}{6} + \frac{3}{12} =$

3) $\frac{4}{5} - \frac{1}{9} =$

## Adding and Subtracting

1) $\frac{a}{b} + \frac{2}{b}$

2) $\frac{3}{5b} + \frac{3}{5c}$

3) $\frac{2x}{b} - \frac{3x}{2b}$

## Practice

**(a)** $\frac{a}{5}+\frac{a}{5}$ **(b)** $\frac{2b}{5}+\frac{b}{10}$ **(c)** $\frac{3x}{4}+\frac{x}{8}$ **(d)** $\frac{p}{6}+\frac{2p}{3}$

**(e)** $\frac{y}{9}+\frac{2y}{3}$ **(f)** $\frac{3}{m}+\frac{2}{m}$ **(g)** $\frac{5}{x}+\frac{1}{x}$ **(h)** $\frac{2}{a}+\frac{5}{2a}$

**(i)** $\frac{8}{3y}-\frac{2}{y}$ **(j)** $\frac{8}{p}-\frac{3}{5p}$ **(k)** $\frac{3}{a}-\frac{2}{b}$ **(l)** $\frac{5}{x}-\frac{3}{y}$

**(m)** $\frac{7}{m}-\frac{2}{n}$ **(n)** $\frac{4}{p}-\frac{3}{q}$ **(o)** $\frac{9}{c}-\frac{7}{d}$ **(p)** $\frac{3}{2x}-\frac{2}{3y}$

**(q)** $\frac{5}{3a}-\frac{3}{2b}$ **(r)** $\frac{5}{3a}-\frac{2}{3b}$ **(s)** $\frac{5}{4m}-\frac{3}{2n}$ **(t)** $\frac{7}{3p}-\frac{2}{6q}$

## Exam Question

**2015 N5 Past Paper P1, Q1**

1. Evaluate $6\frac{1}{5} - 2\frac{1}{3}$ (2 marks)

## Simplifying Fractions

**Today we are learning...**

How to simplify fractions by finding common factors.

**I will know if I have been successful if...**

I can identify a common factor in the numerator and denominator.

I can simplify numerical fractions.

I can simplify algebraic fraction.

## Simplifying Fractions

1) $\frac{18}{24}$

2) $\frac{m^2}{m^5}$

3) $\frac{4x^5}{16x^3}$

4) $\frac{8ab^3}{12a^3b^2}$

Page 18 Question 1

## Factorising by finding a Common Factor

Simplify...

1) $\frac{3a + 3b}{6}$

2) $\frac{5b + 10b^2}{15b}$

Page 18 - Question 2

Simplify by factorising...

**2015 N5 Past Paper P1, Q12**

2. Simplify $\frac{x^2 - 4x}{x^2 + x - 20}$ (3 marks)

Hint: The denominator will have two brackets.