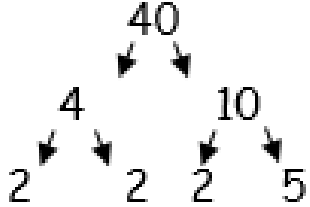


Year 8 Term 1: Numbers and the Number System

Express a number as the product of its prime factors (mathswatch 78)

e.g.



$$40 = 2 \times 2 \times 2 \times 5 = 2^3 \times 5$$

Highest Common Factor

Eg. Find the highest common factor of 12 and 18:

The factors of 12 are 1, 2, 3, 4, 6 and 12

The factors of 18 are 1, 2, 3, 6, 9 and 18

The highest number in both lists and the lowest common multiple is 6!

Lowest Common Multiple

Eg. Find the lowest common multiple of 6 and 8:

The multiples of 6 are 6, 12, 18, 24, 30...

The multiples of 8 are 8, 16, 24, 32, 40...

The lowest number in both lists and the lowest common multiple is 24!

Standard Form (Mathswatch 83)

$$\sim a \times 10^n$$

a is between 1 & 10; n is an integer

~ When mult/div in standard form, work out number part separate from the power of 10 part

$$\text{e.g. } 3 \times 10^5 \times 4 \times 10^3 = 12 \times 10^8 = 1.2 \times 10^9$$

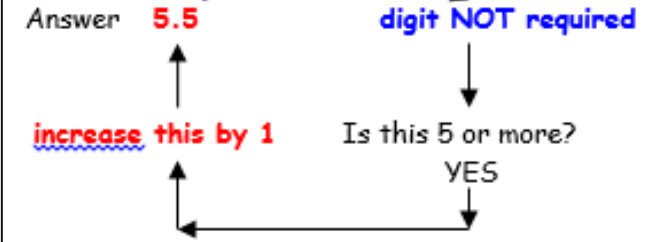


~ With a calculator use EXP or x10^x

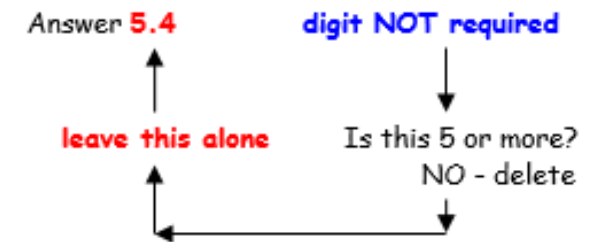
Rounding decimals (Mathswatch 31 and 32)

- Look at the digit required
- Look at the first digit NOT required

e.g. To round 5.47 to 1dp



e.g. To round 5.43 to 1dp



Round to one significant figure

(Mathswatch 90)

These all have ONE significant figure

300

80

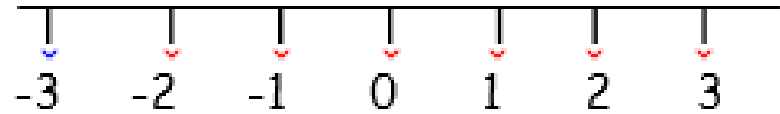
2

0.7

0.05

0.003

Negative numbers (Mathswatch 23 and 68)



$2 > -2 \rightarrow$ We say 2 is bigger than -2

$-1 < 3 \rightarrow$ We say -1 is less than 3

Remember the rules:

- When subtracting go down the number line
- When adding go up the number line
- $8 + - 2$ is the same as $8 - 2 = 6$
- $8 - + 2$ is the same as $8 - 2 = 6$
- $8 - - 2$ is the same as $8 + 2 = 10$

Order of operations (Mathswatch 75)

Bracket

Indices

Divide

Multiply

Add

Subtract

} Do these in the order they appear

} Do these in the order they appear

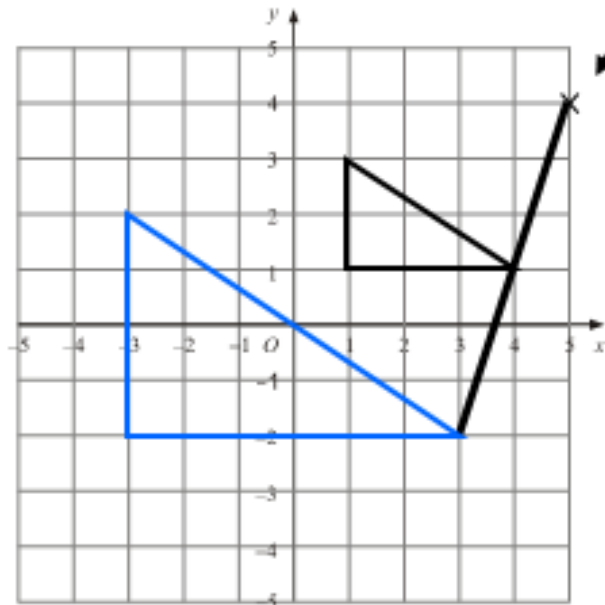
e.g. $3 + 4 \times 6 - 5 = 22$

↑
first

Enlarge a shape (Mathswatch 148)

You need to know:

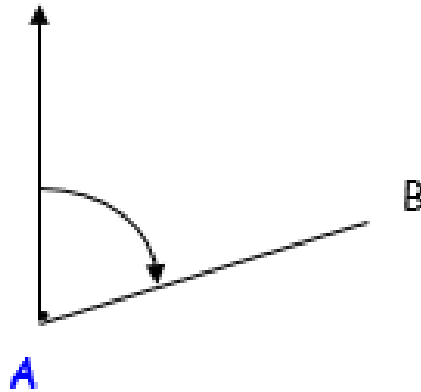
- Centre e.g. (5, 4)
- Scale factor e.g. 2



Know & use bearings (Mathswatch 124)

- A bearing is a direction measured as an angle clockwise from the North
- It needs 3 digits so may need a 0 in front e.g. 072°
- Bearings are given from a fixed point so look for the fixed point after the word 'FROM'

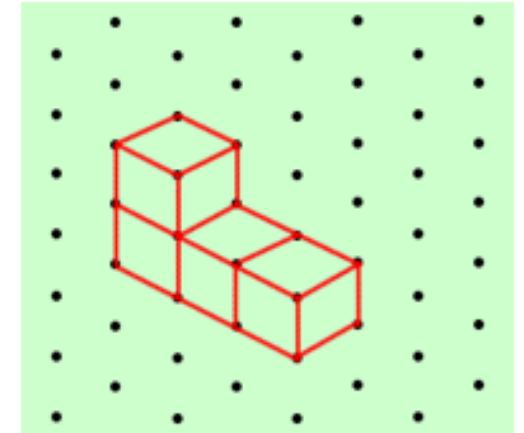
e.g. A bearing of 072° from A to B



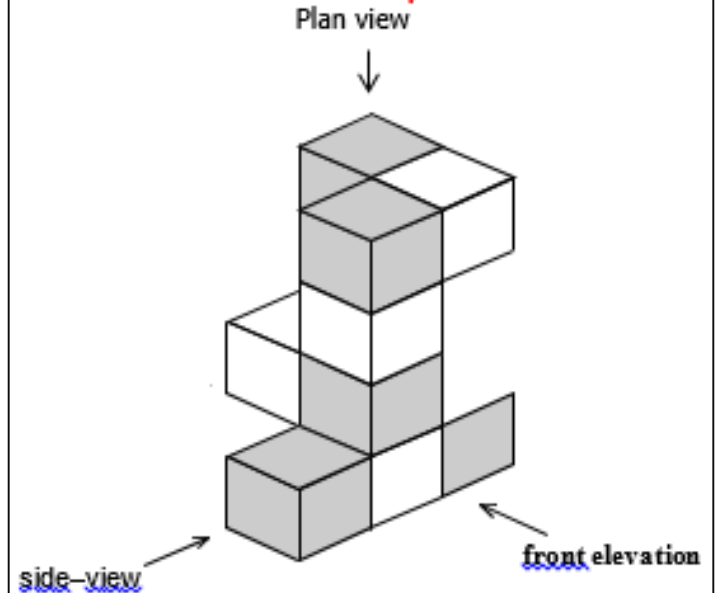
2D representations of 3D shapes

(Mathswatch 51 and 44)

- **3D drawing on isometric paper**
(notice NO horizontal lines)



- **3 views of a 3D shape**



Probability (Mathswatch 14 and 59)

- **Probability words are used to describe how likely it is that an event will happen.**

Examples of probability words are

- **certain**
- **likely**
- **even chance**
- **unlikely**
- **impossible**

Other words:

- **Equally likely** - when all outcomes have the same chance of occurring
- **Biased** - when all outcomes do NOT have the same chance of occurring
- **Probability as a fraction**

$$P(\text{event}) = \frac{\text{No. of outcomes which give the event}}{\text{Total number of outcomes}}$$

Probability (Mathswatch 59 and 60)

- **Calculate probability**

$$P(\text{event}) = \frac{\text{No. of outcomes which give the event}}{\text{Total number of outcomes}}$$

- **Probability of an event NOT happening**

$$\text{If } p(\text{event}) = p$$

$$P(\text{event NOT happening}) = 1 - p$$

$$\text{e.g. If } p(\text{rain}) = 0.3$$

$$p(\text{no rain}) = 1 - 0.3 = 0.7$$

Manipulate expressions

(Mathswatch 7 and 136)

Only like terms can be added & subtracted

e.g. $a + 2b$ cannot be added

$a^2 - 2a$ cannot be subtracted

$$a + 2a = 3a$$

$$5a^2 - 2a^2 = 3a^2$$

Terms can be simplified when multiplying

e.g. $a \times b = ab$

$$2a \times 3a = 6a^2$$

Rearrange a formula (Mathswatch 136)

- Use the same balancing steps as when you solve equations

e.g. Make 't' the new subject in:

$$v = u + at \quad (-u \text{ from each side})$$

$$v - u = at \quad (\div a \text{ each side})$$

$$\frac{v - u}{a} = \frac{at}{a}$$

$$t = \frac{v - u}{a}$$

$$t = \frac{v - u}{a}$$

$$a$$

Index Notation Mathswatch 131

For matching bases (or big number)

$$t^2 \times t^3 = t \times t \times t \times t \times t = t^5$$

for multiplies we
add the powers

$$\text{So } t^a \times t^b = t^{a+b}$$

$$\frac{t^5}{t^3} = \frac{t \times t \times t \times t \times t}{t \times t \times t} = t^2$$

for divides or
fractions subtract
the powers

Powers in brackets

$$(t^3)^2 = t^3 \times t^3 = t^6$$

for bracketed powers
multiply the powers

$$(p^3)^4 = p^{3 \times 4} = p^{12}$$

Factorise an expression (Mathswatch 94)

This is the opposite of expand - put bracket back in

$$4y - 12 = 4(y - 3)$$

$$y^2 + 7y = y(y + 7)$$

Apply the index laws (Mathswatch 82)

When multiplying ADD the indices

When dividing SUBTRACT the indices

Treat numbers as normal

$$\text{e.g. } 3a^2 \times 2a^3 = (3 \times 2)a^{2+3} = 6a^5$$

$$10a^6 \div 5a^2 = (10 \div 5)a^{6-2} = 2a^4$$

Substitution (Mathswatch 95)

- Write down the formula
- Substitute the numbers given
- Work out the unknown quantity

e.g. $v = u + at$ when $v = 19$, $a = 7$ and $t = 2$

$$19 = u + 7 \times 2$$

$$19 = u + 14$$

$$u = 5$$

Simplify fraction (Mathswatch 26)

See what number divides exactly into both the numerator and denominator

$$\begin{array}{ccc} & \div 4 & \\ \text{e.g. } & \frac{8}{12} \rightarrow & \frac{2}{3} \\ & \div 4 & \end{array}$$

$$\begin{array}{ccc} & \div 5 & \\ \text{e.g. } & \frac{15}{40} \rightarrow & \frac{3}{8} \\ & \div 5 & \end{array}$$

• Decimal to percentage to fraction

$$0.3 = 30\% = \frac{3}{10}$$

$$0.03 = 3\% = \frac{3}{100}$$

$$0.39 = 39\% = \frac{39}{100}$$

Fraction, decimal, percentage

Equivalents (Mathswatch 85)

LEARN THESE:

$$\frac{1}{4} = 0.25 = 25\%$$

$$\frac{1}{2} = 0.5 = 50\%$$

$$\frac{3}{4} = 0.75 = 75\%$$

When ordering- make them all decimals