# Prior Knowledge

**Place Value** – what the digits represent in a number

**Decimal places** – the digits after the decimal point

**Multiplying by 10** – all digits move one place to the left

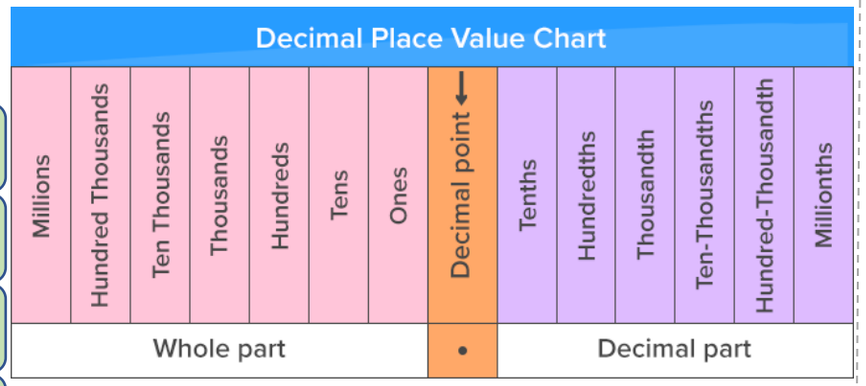
**Dividing by 10** – all digits move one place to the right

**Multiplying by 100** – all digits move two places to the left

**Dividing by 100** – all digits move two place to the right

**Rounding** – making the number simpler but keeping it close to what it was.

Eg) 34 + 29, 89 – 23, 82 x 21 and 114 ÷ 6




Multiply by 10, 100, 1000 digits move left

Divide by 10, 100, 1000 digits move right


Round to nearest ten

63 → 60

65 → 70

524 → 520

Round to nearest hundred

435 → 400

462 → 500

7328 → 7300

**The 4 Operations** – These are +, -, x and ÷. You can answer questions involving **whole** numbers and these four operations.

**Even Number** – Can be divided exactly by 2. They end in **2, 4, 6, 8, 0.**

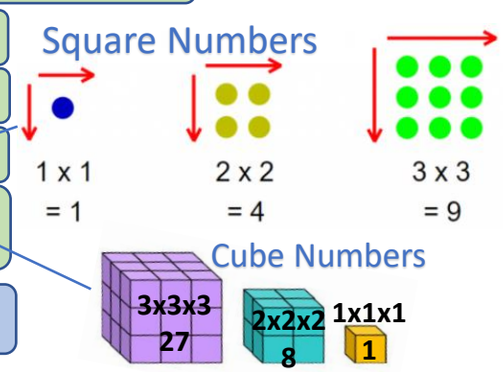
**Odd Numbers** – Can not be divided exactly by 2. They end in **1, 3, 5, 7, 9.**

**Factors** – Numbers that divide into a number exactly.

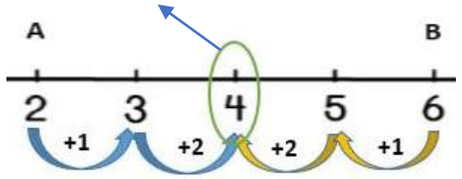
**Multiples** – Extended times tables

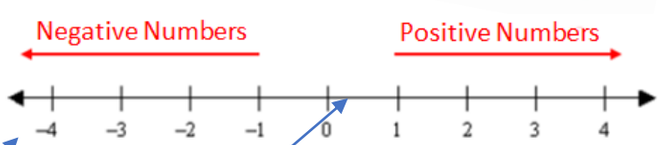
**Square Numbers** – A number has been multiplied by itself.

**Cube Numbers** – A number has been multiplied by itself three times.




**Midpoint** – You need to be able to find the midpoint value between two numbers.

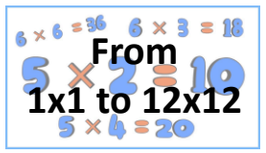


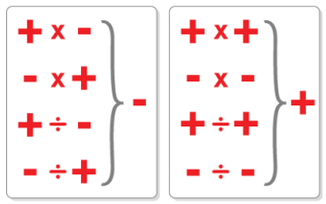




**Negative Numbers** – Real numbers that are less than zero.
**Positive Numbers** – Real numbers that are greater than zero.

**Ordering Directed Numbers** – You need to be able to put negative and positive numbers in size order.

**Multiplication Tables**




**Rules for x and ÷ directed numbers** - You need to know and use the rules when you multiply and divide by positive and negative numbers.

# Foundation – Unit 1 - Number

Key Concepts

| | | |
|---|---|---|
| **BIDMAS** | What we use to do a calculation its called **the priority of operations**. | **B**rackets, **I**ndices (powers), **D**ivision and **M**ultiplication, **A**ddition and **S**ubtraction. |
| **Not equal sign** | The not equal to sign is an equal sign with a line through it. | $\neq$ |
| **Function** | A rule that changes an input to an output | 7 → [ + 2 ] → 9 |
| **Inverse Function** | The rule that changes the number back again (reverses the function) | 7 ← [ – 2 ] ← 9 |
| **Roots** | **Square root** is the inverse of squaring **Cube root** is the inverse of cubing. |  |
| **Decimal places (d.p.)** | To round to 1 d.p. look at the 2nd d.p.<br>To round to 2 d.p. look at the 3rd d.p. | 35.23 is 35.2 (1 d.p.)<br>35.27 is 35.3 (1 d.p.) |
| **Dividing by a decimal** | Write as a fraction then multiply both numbers by (10, 100,...) until you have a whole number to divide by. | $6 \div 0.5 = \frac{6}{0.5} = \frac{60}{5} = 12$ |
| **Converting units** | 1m=100cm, 1km=1000m etc..... | 3.2km = 3.2 x 1000 = 3200m |
| **Significant figures (s.f.)** | Digits that carry meaningful contributions<br>To round to 3 s.f. look at the 4th s.f. etc... | 256800 is 257000 (3sf)<br>0.0002482 is 0.000248 (3sf) |
| **Estimating** | Rounding before doing the calculation. | **22 x 81 ≈ 20 x 80 ≈ 1600** |
| **Dealing with a fraction in BIDMAS** | For $\frac{calculation\ 1}{calculation\ 2}$ work out (calculation 1)÷(calculation 2) using the priority of operations (**BIDMAS**). | $\frac{3+5\times 2}{3\times 4^2} = \frac{3+10}{3\times 16} = \frac{13}{48}$ |
| **Prime Number** | Prime has only two factors, 1 and itself. | **2, 3, 5, 7, 11, 13, 17, 19, 23, ...** |
| **Highest Common Factor** | HCF — the largest number that is a **factor** of both numbers. | ***Hint: List all the factors*** |
| **Lowest Common Multiple** | LCM — the smallest number that is a **multiple** of both numbers. | ***Hint: Start listing the multiples (times tables)*** |
| **Surd** | A number that still has a square root in, its an exact value – its not been rounded. | $3\sqrt{2}$ *is a surd* $3\times\sqrt{2}$.<br>$\sqrt{4}$ *not a surd as it is* 2. |
| **Base number** | This is the number that is being multiplied by itself. | Index or power<br>Base → $10^3 = 10\times10\times10$ |
| **Index (Power)** | The small number written above the base | |
| **Multiplying powers** | Add the indices if base numbers the same | $5^3 \times 5^4 = 5^{3+4} = 5^7$ |
| **Dividing powers** | Subtract the indices | $5^6 \div 5^2 = 5^{6-2} = 5^4$ |
| **Prefix** | Some powers of 10 have a prefix – e.g. 1000 is kilo | 1 **Kilo**gram (**K**g) = 1000 grams (g) |
| **Prime factor decomposition** | All numbers can be written as a product of prime factors. | **Eg) 50 = 2x5x5** |

# Prior Knowledge

Midpoint of two numbers: add the two values and divide the result by 2.

$M = \frac{x_1 + x_2}{2}$

**Mode** – The mode is the value that appears most often in a set of data.

**Mean** – The mean is the total of all the values, divided by the number of values.

**Median** – The median is the middle number in a list of numbers ordered from lowest to highest.

**Range** – The range is the difference between the lowest value and the highest value.

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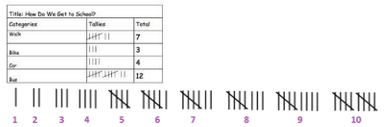
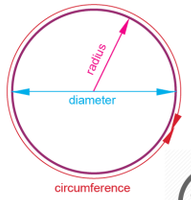
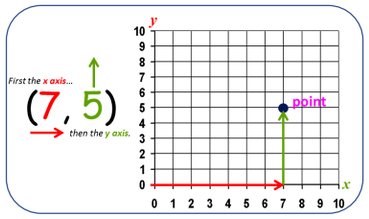


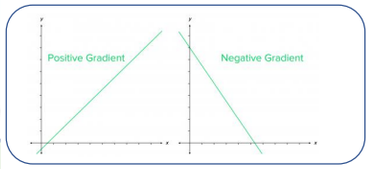





Greater than $>$ Greater than or equal to $\geq$

Less than $<$ Less than or equal to $\leq$

Not equal to $\neq$

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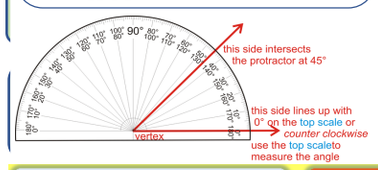




| Expanding Brackets | Factorising Brackets |
|---|---|
| $7(x+2)$ (multiply) | $7x + 14$ (Common factor?) |
| $7x + 14$ | $7(x+2)$ |

Factorise: divide each term by the highest common factor, writing the HCF outside the bracket.

**Index, Expanded, and Number Forms**

$5^2 = 5 \times 5 = 25$

$5^2$ is called **"Index Form"**

$5 \times 5$ is called **"Expanded Form"**

**25** is called **"Numerical Form"**

**Laws of indices**

$a^m \times a^n = a^{m+n}$

$a^m \div a^n = a^{m-n}$

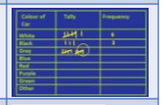
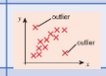
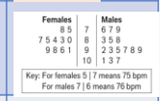
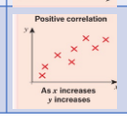
$(a^m)^n = a^{m \times n}$

$2^5 \times 2^3 = 2^{5+3} = 2^8$

$7^6 \div 7^2 = 7^{6-2} = 7^4$

$(2^3)^2 = 2^{3 \times 2} = 2^6$

# Foundation – Unit 3 – Graphs, Tables and Charts

| | | |
|---|---|---|
| **Discrete Data** | Only take particular values. You can write groups such as 1-5, 6-10. | Eg Shoe size. |
| **Continuous Data** | Measured, can have any value. Write inequalities for the groups with no gaps between them. | Eg length or time. |
| **Data Collection Sheet** | A table to record data as you collect it. |  |
| **Distance Chart** | Show the distance between several places. |  |
| **Line Graph** | Useful for identifying trends. |  |
| **Trend** | The general direction of change | |
| **Histogram** | Type of frequency diagram used for grouped continuous data. There are no gaps between the bars. |  |
| **Stem and Leaf Diagram** | Numerical data split into "stems" and "leaves". The numbers are placed in order. |  |
| **Outlier** | A value that does not fit the pattern of the data. You can ignore an outlier if it is due to a measuring or recording error. |  |
| **Back-to-back stem and leaf diagram** | Compares two set of data. Needs to have two keys. |  |
| **Frequency Polygon** | Join the midpoints of the tops of the bars in a histogram with straight lines. |  |
| **Correlation** | Shows that there may be a link/relationship between two events. Correlation does not show causation (does not show that one even caused the other). |  |

$7^2 = 7 \times 7 = 49$

$8^2 = 8 \times 8 = 64$

$9^2 = 9 \times 9 = 81$

$10^2 = 10 \times 10 = 100$

Simplify algebraic expressions: collect like terms (terms with the same variable)

$4x + 8 + 3x + 7 = 7x + 15$

**Multiply terms**

$4a^2 \times 2a^5$

Multiply Numbers — Add Powers

$= 8a^7$

Substitution: Swapping an algebraic letter for its value.

Work out the value of the expression

$5x + y$

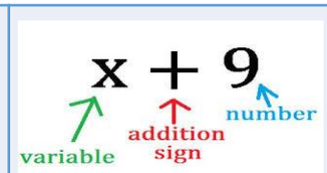
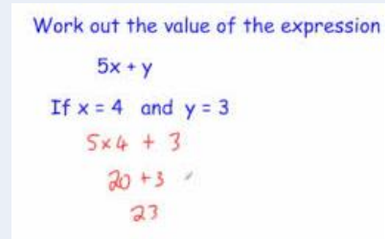
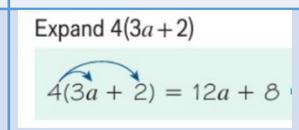
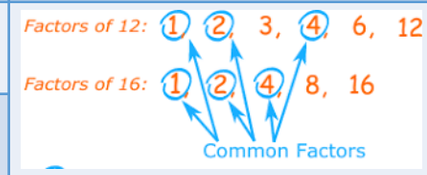
If $x = 4$ and $y = 3$

$5 \times 4 + 3$

$20 + 3$

$23$

# Foundation – Unit 2 - Algebra

| | | |
|---|---|---|
| **Variable** | The letters used in algebraic expressions to stand for numbers. Called a variable because they **vary**. |   |
| **Multiplying powers** | Add the indices if base numbers the same | $5^3 \times 5^4 = 5^{3+4} = 5^7$ |
| **Dividing powers** | Subtract the indices if base numbers the same | $5^6 \div 5^2 = 5^{6-2} = 5^4$ |
| **Anything to the power zero** | Is one | $3^0 = 1$ $a^0 = 1$ |
| **Substitution** | Swapping an algebraic letter for its value. |   |
| **Expanding a Single Bracket** | Multiply each term inside the bracket by the term outside. |   |
| **Factors** | Numbers or letters that divide into a term exactly. |   |
| **Common Factors** | A factor of two or more terms. | |
| Identity $\equiv$ | Two expressions are equal for all values of the variable. | **5(x+1)** ≡ 5x + 5 is an identity because 5(x+1) has the same value as 5x + 5 for all values of x. |
| Not equal $\neq$ | Used to show that two expressions are not equal. | $5(x+6) \neq 5x + 12$ |
| **Multiply Algebraic Terms** | Multiply the numbers first and then the letters. | **2a x 3b = 2 x 3 x a x b = 6ab** |
| **Divide Algebraic Terms** | Divide the numbers first and then the letters. | $\frac{10x}{2} = \frac{10}{2} \times x = 5x$ |
| Simplifying Terms | • Write numbers before letters (for coefficients).<br>• Write letters in alphabetical order.<br>• Write higher power terms first. | $9x^2 - 2x - 11x^2 + 5x + 7$ $= -2x^2 + 3x + 7$ |

# Prior Knowledge

Midpoint of two numbers: add the two values and divide the result by 2.

$$M = \frac{x_1 + x_2}{2}$$

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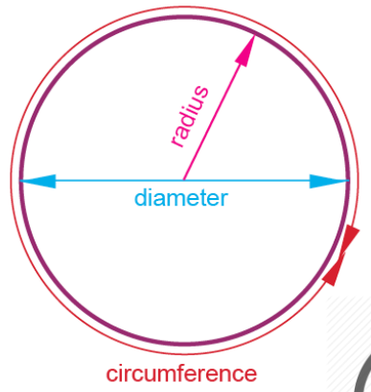
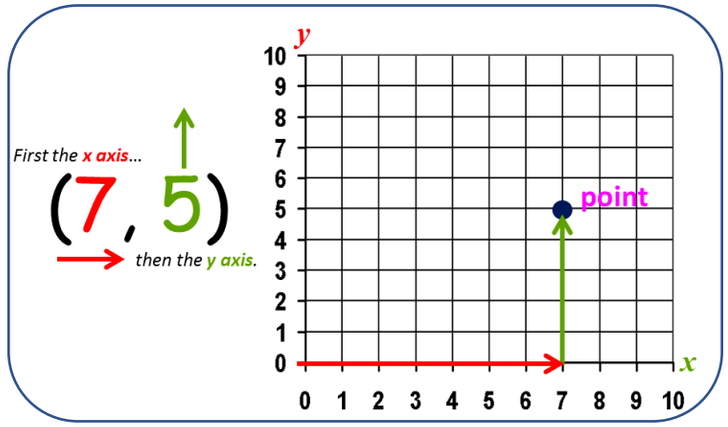
**Range** — The range is the difference between the lowest value and the highest value.

A tally chart should have titles on columns and clearly drawn tallies.

| Title: How Do We Get to School? | | |
|---|---|---|
| Categories | Tallies | Total |
| Walk | 卌 II | 7 |
| Bike | III | 3 |
| Car | IIII | 4 |
| Bus | 卌 卌 II | 12 |



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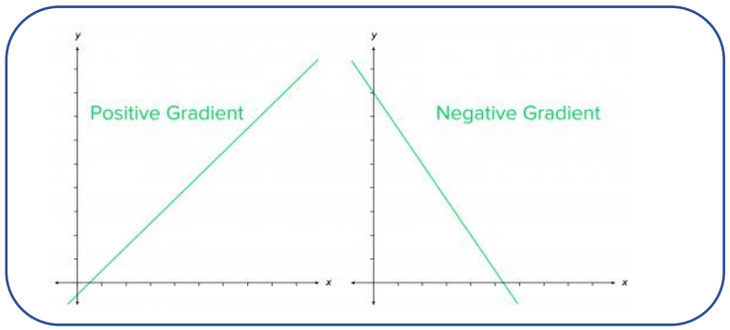


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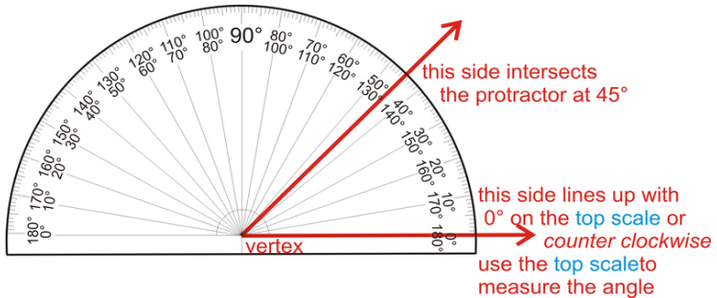



# Foundation – Unit 3 – Graphs, Tables and Charts

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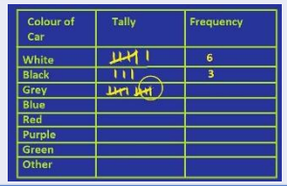
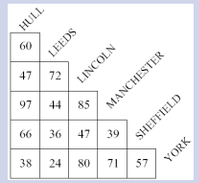
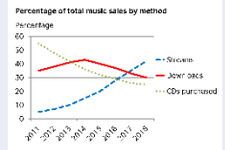
| **Data Collection Sheet** | A table to record data as you collect it. |  |
| **Distance Chart** | Show the distance between several places. |  |
| **Line Graph** | Useful for identifying trends. |  |
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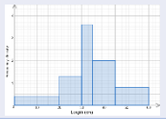
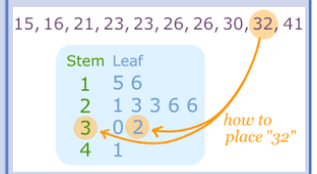
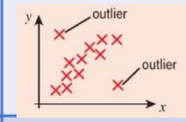
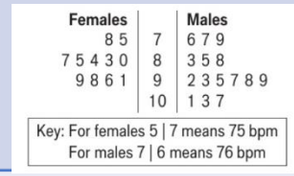
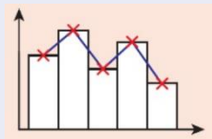
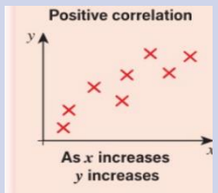
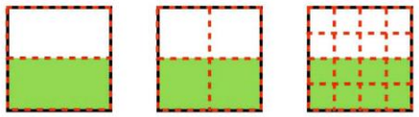
| **Histogram** | Type of frequency diagram used for grouped continuous data. There are no gaps between the bars. |  |
| **Stem and Leaf Diagram** | Numerical data split into "stems" and "leaves". The numbers are placed in order. |  |
| **Outlier** | A value that does not fit the pattern of the data. You can ignore an outlier if it is due to a measuring or recording error. |  |
| **Back-to-back stem and leaf diagram** | Compares two set of data. Needs to have two keys. |  |
| **Frequency Polygon** | Join the midpoints of the tops of the bars in a histogram with straight lines. |  |
| **Correlation** | Shows that there may be a link/relationship between two events. Correlation does not show causation (does not show that one even caused the other). |  |

# Prior Knowledge

To simplify a fraction, Divide the numerator and denominator by the greatest common factor.



| $\frac{1}{2}$ | $\frac{2}{4}$ | $\frac{8}{16}$ |
|---|---|---|
| 1÷2 | 2÷4 | 8÷16 |
| =0.5 | =0.5 | =0.5 |

1000 grams = 1 kilogram

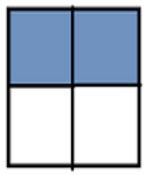
$$a + b = b + a$$

$$xy = yx$$

**2** ⇦ Numerator - How many parts you have

⇦ vinculum

**4** ⇦ Denominator- How many total parts there are



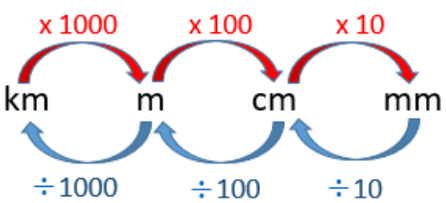
the **LCM** of two (or more) integers is the **smallest** positive **multiple** they **share**

LCM

Multiples of 4: ...-16, -12, -8, -4, 0, 4, 8, 12, 16, ...

Multiples of 6: ...-18, -12, -6, 0, 6, 12, 18, ...

## Converting Metric Lengths



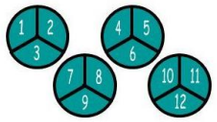

## Convert Mixed Numbers to Improper Fractions

$4\frac{2}{3}$

FIRST multiply denominator by the whole number

$3 \times 4 = 12$

How many thirds are in the whole number?



FIRST 3 x 4

NEXT add the product to the numerator

$12 + 2 = 14$

PLUS how many thirds are in the fraction?

NEXT 12 + 2

$4\frac{2}{3}$

TOTAL THIRDS = $\frac{14}{3}$

LAST The sum is the numerator

Keep the same denominator

Percentage of a quantity:
Find 1% by dividing by 100, then multiply by required percentage.
**OR** Use combinations of 10% (divide by 10) and 1% (divide by 100) to find required amount.

1 million = 1,000,000

## Convert Fractions, Decimals and Percents

| Fractions | | Decimals | | Percents |
|---|---|---|---|---|
| $\frac{3}{4}$ | Divide numerator by denominator | 0.75 | Multiply by 100 | 75% |
| $\frac{2}{5}$ | Write as fraction and simplify | 0.4 | Divide by 100 | 40% |

## MULTIPLYING FRACTIONS BY WHOLE NUMBERS

STEP-BY-STEP

$\frac{2}{7} \times 3$

STEP ONE: $\frac{2}{7} \times \frac{3}{1}$ STEP TWO: $= \frac{2 \times 3}{7 \times 1}$ STEP THREE: $= \frac{6}{7}$

To add or subtract fractions, they must have the same denominators. Use the LCM to find equivalent fractions with the same denominator.

## Multiply a Whole # by a Fraction

Multiply numerator by whole number

The denominator stays the same

# Foundation – Unit 4 – Fractions and Percentages

Key Concepts

| | | |
|---|---|---|
| **Comparing Fractions** | To compare fractions, write them with the same denominator then compare numerators. | Compare $\frac{3}{4}$ & $\frac{2}{3}$<br>The LCM of 3 and 4 is 12<br>$\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ $\frac{2 \times 4}{3 \times 4} = \frac{8}{12}$<br>$\frac{9}{12} > \frac{8}{12}$ |
| **Multiply Fractions** | Multiply the numerators and multiply the denominators. | $\frac{2}{3} \times \frac{1}{5} = \frac{2 \times 1}{3 \times 5} = \frac{2}{15}$ |
| **Add or Subtract Fractions** | Write them with a common denominator then add or subtract the numerators. | $\frac{2}{3} + \frac{1}{9} = \frac{6}{9} + \frac{1}{9} = \frac{7}{9}$ |
| **Fraction of an Amount** | Divide by the denominator, multiply by the numerator. | Work out $\frac{3}{5}$ of 40.<br>$\frac{1}{5}$ of $40 = \frac{1}{5} \times 40 = \frac{40}{5} = 40 \div 5 = 8$<br>×3 ×3<br>$\frac{3}{5}$ of $40 = 3 \times 8 = 24$ |
| **Unit Fraction** | A unit fraction has a numerator of 1. | $\frac{1}{n}$ |
| **Reciprocal** | The reciprocal of a fraction is the "upside down" fraction. | The reciprocal of 2 (or $\frac{2}{1}$) is $\frac{1}{2}$. |
| **Decimal to a fraction** | The denominator is the smallest place value. | $0.723 = \frac{723}{1000}$ |
| **Fraction to a percentage** | Convert the fraction to one with the denominator of 100, then the numerator is the percentage. | ×5<br>$\frac{6}{20} = \frac{30}{100} = 30\%$<br>×5 |
| **Deposit** | First payment towards the cost of something. | **Deposit + balance = total** |
| **Balance** | The remaining amount which is owing after a deposit. | |
| **Increase by a percentage** | Work out the increase and add to the original number. | **10% of 30 = 3**<br>**30 + 3 = 33** |
| **Decrease by a percentage** | Work out the decrease and subtract from the original number. | **20% of 40 = 8**<br>**40 – 8 = 32** |
| **VAT (Value Added Tax)** | VAT is tax charged at 20% on most goods and services. |  |

# Prior Knowledge

**Inverse operations** are opposite **operations**. They are the **operation** that reverses the effect of another **operation.**

To solve a single step equation, use the inverse operation and a balancing method.

**Substitution** means putting numbers in place of letters to calculate the value of an expression.

$8a - 5 = 11$
$+5 \quad +5$
$8a = 16$
$\div 8 \quad \div 8$
$a = 2$

Work out the value of the expression

$5x + y$

If $x = 4$ and $y = 3$

$5 \times 4 + 3$

$20 + 3$

$23$

Arithmetic sequences are where terms increase (or decrease) by a fixed number (common difference).

-6, 1, 8, 15, 22

+7 +7 +7 +7

To work out the **term to term rule**, give the starting number of the sequence and then describe the pattern of the numbers.

Expand brackets: multiply each term inside the bracket by the term outside.

Simplify algebraic expressions: collect like terms (terms with the same variable).

$7x$

$4x + 8 + 3x + 7 = 7x + 15$

$15$

**Expanding Brackets**

multiply

$7(x + 2)$

$7x + 14$

*Equality and Inequality*

larger > smaller

| | | |
|---|---|---|
| = equal | > greater than | ≥ greater than or equal |
| ≠ not equal | < less than | ≤ less than or equal |

**Multiply terms**

$4a^2 \times 2a^5$

Multiply Numbers

Add Powers

$= 8a^7$

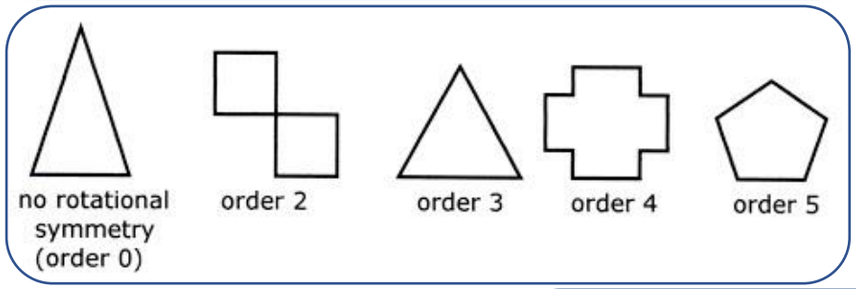
Key Concepts

## Foundation – Unit 5 – Equations, Inequalities and Sequences

| | | |
|---|---|---|
| **Subject** | `The subject of a formula is the letter on its own on one side of the equals sign. | In t=y+4, t is the subject. |
| **Equation** | Contains an unknown number (a letter) and an = sign. | Variable<br>$2x + 3 = 8$ |
| **Solve an equation** | Work out the value of the unknown number by using inverse operations. | $\frac{x}{12} - 5 = 4$<br>$+5 \quad +5$<br>$\times 12 \quad \frac{x}{12} = 9 \quad \times 12$<br>$x = 108$ |
| **Solve an inequality** | Solve in the same way as a linear equation: use inverse operations to work out the unknown value. | $x - 18 > -5$<br>$x - 18 + 18 > -5 + 18$<br>$x > 13$ |
| **Substitution** | Replace values in a formula to solve the resulting equation. | $x + \frac{x}{2}$<br>$x = 5$<br>$5 + \frac{5}{2}$ |
| **Formula** | Shows the relationship between two or more variables (letters). | Speed = distance ÷ time |
| **Sequence** | Pattern of numbers or shapes that follows a rule. | 3, 5, 7, 9, ...<br>1st term, 2nd term, 3rd term, 4th term<br>three dots means goes on forever (infinite)<br>("term", "element" or "member" mean the same thing) |
| **Term** | The numbers in a sequence. | |
| **Term-to-term rule** | Describes how to get from one term to the next. | 9, 13, 17, 21....<br>..... 25, 29<br>term to term rule: add 4 |
| **Arithmetic Sequence** | Goes up or down in equal steps of a common difference. Term-to-term rule is add or subtract. | -6, 1, 8, 15, 22<br>+7 +7 +7 +7 |
| **Geometric Sequence** | The term-to-term rule is multiply or divide by a number. | 2, 4, 8, 16, 32<br>x2 x2 x2 x2 |

# Prior Knowledge

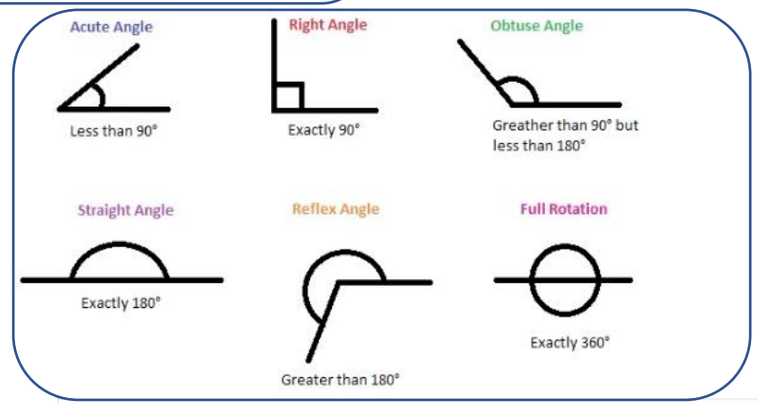
An object's degree of **rotational symmetry** is the number of distinct orientations in which it looks exactly the same for each **rotation**.

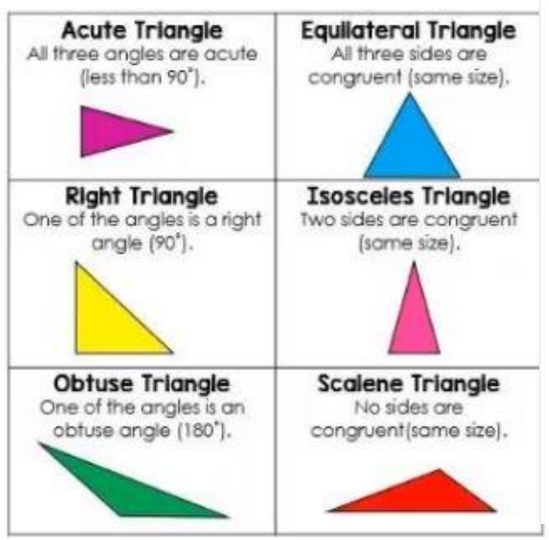


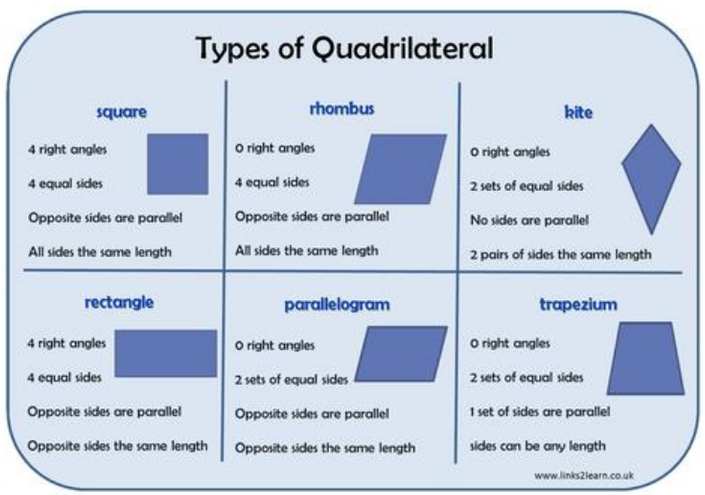

| Number of Sides | Polygon Name |
|---|---|
| 3 | triangle |
| 4 | quadrilateral |
| 5 | pentagon |
| 6 | hexagon |
| 7 | heptagon |
| 8 | octagon |
| 9 | nonagon |
| 10 | decagon |
| 12 | dodecagon |
| n | n-gon |

An **Interior Angle** is an angle inside a shape.

The **Exterior Angle** is the angle between any side of a shape, and a line extended from the next side.

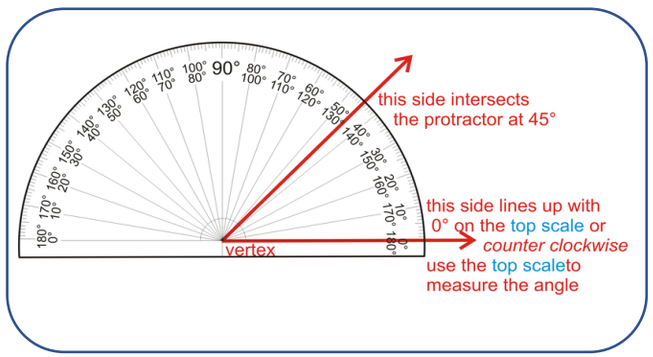


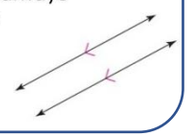




Angles in a triangle add to 180°.

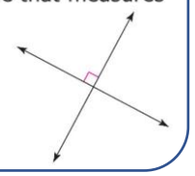
Angles in a quadrilateral add to 360°.




**Parallel lines** are lines in the same plane that never intersect. They are always the same distance apart.

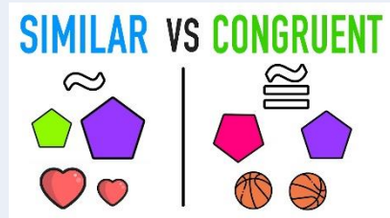
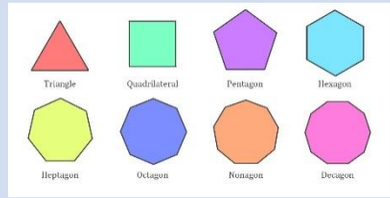
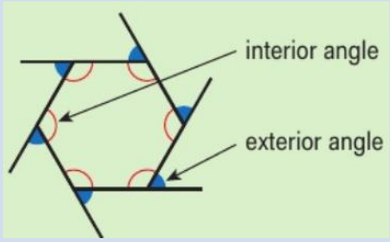
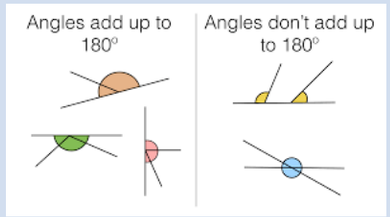


**Perpendicular lines** are lines that meet at a right angle, that is, at an angle that measures 90°.



Key Concepts

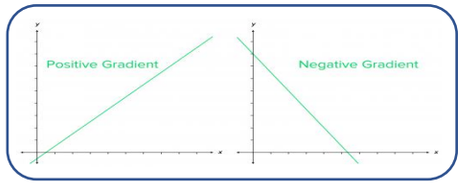
# Foundation – Unit 6 - Angles

| | | |
|---|---|---|
| **Congruent Shapes** | Exact same shape and size, but reflected, rotated or translated. |   |
| **Similar Shapes** | Same shape but enlarged (bigger or smaller). Sides are in the same ratios. | |
| **Polygon** | 2-dimensional shape bound by straight sides. |   |
| **Regular Polygon** | All equal side lengths and all equal angles. |   |
| **Irregular Polygon** | Unequal side lengths and unequal angles. |  |
| **Tessellation** | Shapes fitting together. For shapes to tesselate, all angles at the point where the shapes meet must add to 360°. |  |
| **Angle sum** | Sum of the interior angles of a polygon. | Sum = (sides – 2) x 180 |
| **Interior Angle** | An **Interior Angle** is an angle inside a shape. |   |
| **Exterior Angle** | The **Exterior Angle** is the angle between any side of a shape, and a line extended from the next side. | |
| **Straight Line** | Angles on a straight line add up to 180°. |   |

# Prior Knowledge

Midpoint of two numbers: add the two values and divide the result by 2.

$$M = \frac{x_1 + x_2}{2}$$




**Mode** – The mode is the value that appears most often in a set of data.

**Mean** – The mean is the total of all the values, divided by the number of values.

**Median** – The median is the middle number in a list of numbers ordered from lowest to highest.

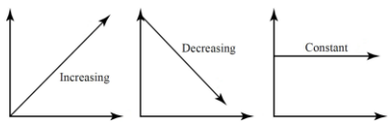
**Range** – The range is the difference between the lowest value and the highest value.

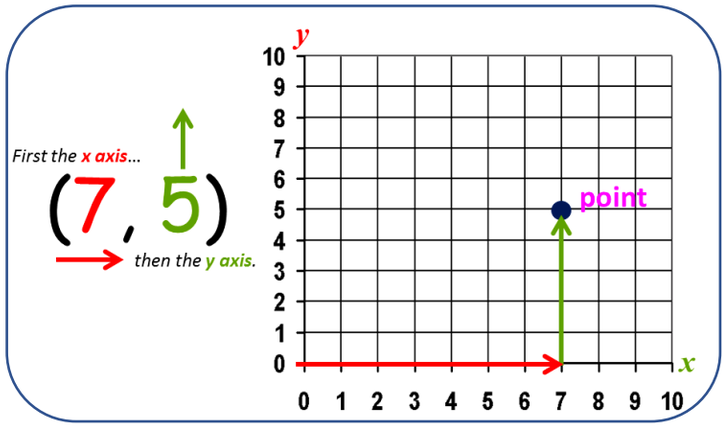
A tally chart should have titles on columns and clearly drawn tallies.

**A year** – contains 12 months
A **quarter** – refers to a 3 month period.

**Increase** – the values are going up.
**Decrease** – the values are going down.
**Constant rate** – going up or down by the same value each time.

| Title: How Do We Get to School? | | |
|---|---|---|
| Categories | Tallies | Total |
| Walk | 卌 \|\| | 7 |
| Bike | \|\|\| | 3 |
| Car | \|\|\|\| | 4 |
| Bus | 卌 卌 \|\| | 12 |


| | | | |
|---|---|---|---|
| Greater than | > | Greater than or equal to | ≥ |
| Less than | < | Less than or equal to | ≤ |
| Not equal to | ≠ | | |

**Frequency** – The amount of times something occurs

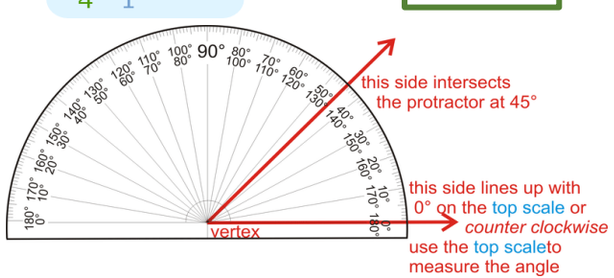
**Stem and Leaf Diagram** – Splits values by place value. Shows spread. Needs a key.

15, 16, 21, 23, 23, 26, 26, 30, 32, 41

| Stem | Leaf |
|---|---|
| 1 | 5 6 |
| 2 | 1 3 3 6 6 |
| 3 | 0 2 |
| 4 | 1 |

how to place "32"

Key
1 | 2 = 12




A bar chart should have a title, titles on both axes, equal scale on the y axis and gaps between the bars.


# Foundation – Unit 7 – Averages and Range

Key Concepts

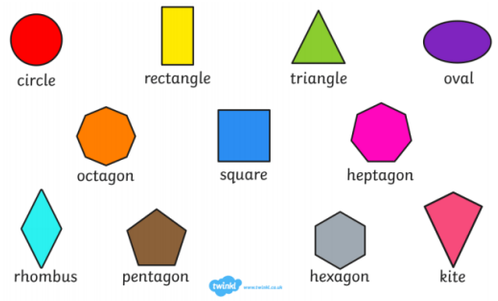
| | | |
|---|---|---|
| Mean | Total of the values divided by the number of values. | **Mean**<br>Add all the numbers then divide by the amount of numbers<br>9, 3, 1, 8, 3, 6<br>9 + 3 + 1 + 8 + 3 + 6 = 30<br>30 ÷ 6 = 5<br>The mean is 5 |
| Frequency | The total number of values. | Club / Tally / Frequency<br>Hockey: 卌 \|\|\| 8<br>Badminton: 卌 \|\| 7<br>Football: 卌 5 |
| Median | Middle value when then data is written in order. When *n* data values are written in order, the median is (*n*+1)/2 th value. | **Median**<br>Order the set of numbers, the median is the middle number<br>9, 3, 1, 8, 3, 6<br>1, 3, 3, 6, 8, 9<br>The median is 4.5 |
| Outlier | An extreme value that doesn't fit the overall pattern. | Outlier |
| Modal class | Class with the highest frequency. | **Mode**<br>The most common number<br>9, 3, 1, 8, 3, 6<br>The mode is 3 |
| Mode | Data value with the highest frequency. | |
| Sample | A selection taken from a larger group that will, hopefully, let you find out things about the larger group. | Population<br>Sample |
| Population | The whole group that is being studied. | |
| Bias | A sample is biased if individuals or groups from the population are not represented in the sample. | **Are the Samples Biased or Unbiased?**<br>Improve the football stadium or buy band instruments?<br>SAMPLE A: Members of the cheerleading team — BIASED<br>SAMPLE B: Two students from each table at lunchtime — UNBIASED |
| Ratings | Number of people who watched a programme. | Series One |
| Appreciation Figure | The percentage of viewers who describe it as "good" or "excellent". | |
| Range | Shows the spread of the data. The difference between the largest and smallest value. | **Range**<br>The difference between the highest number and lowest number<br>9, 3, 1, 8, 3, 6<br>9 - 1 = 8<br>The range is 8 |

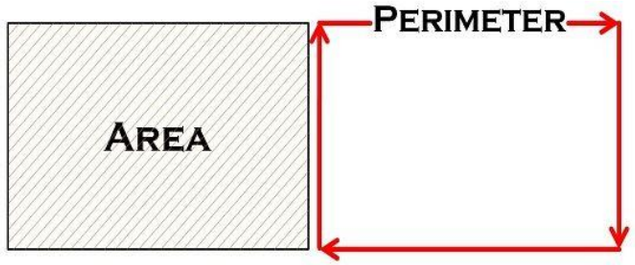
| Series One | | | | | |
|---|---|---|---|---|---|
| Episode | 1 | 2 | 3 | 4 | 5 |
| Ratings (millions) | 6.3 | 5.9 | 5.6 | 5.7 | 5.5 |
| Appreciation figure (%) | 74 | 76 | 74 | 74 | 73 |

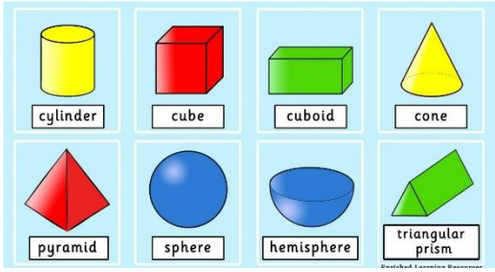
# Prior Knowledge

If a shape has two dimensions, it means there are 2 ways it can be measured in space.

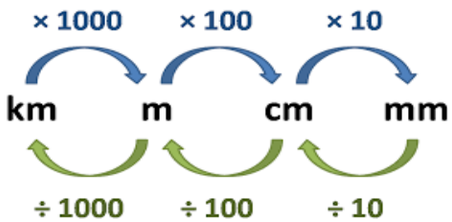
A 3D shape can be defined as a solid figure or an object or shape that has three dimensions – length, width and height. Unlike two-dimensional shapes, 3D shapes have thickness or depth.



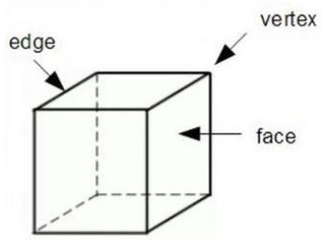




**Perimeter** is the distance around the outside of a shape. **Area** measures the space inside a shape.

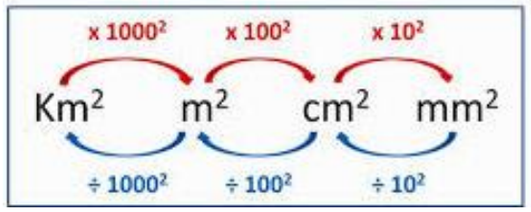



A **vertex** is a corner. An **edge** is a line segment between faces. A **face** is a single flat surface.



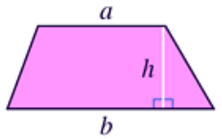

To convert centimetres to millimetres, multiply by 10 , centimetres x 10 = millimetres.

1 Square centimetre is equal to 100 square millimetres.




| | | |
|---|---|---|
| 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 | $10^8$ |

To find the **area** of any **trapezium**, add together the parallel sides and multiply by the height. Then halve your answer.



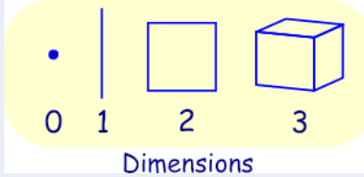
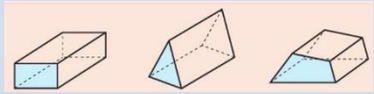
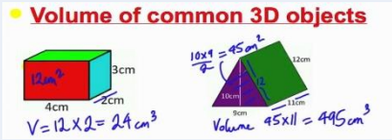
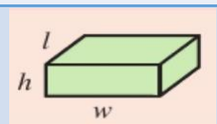
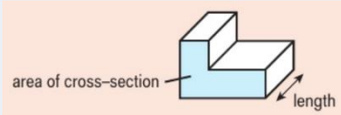
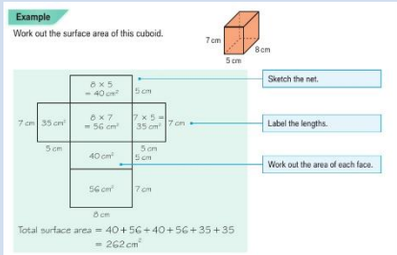
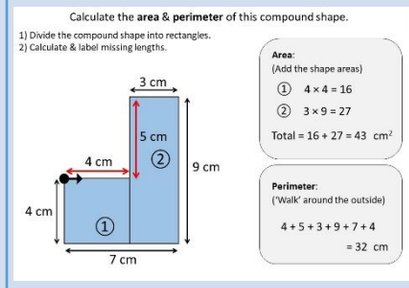

Area of trapezium = $\frac{1}{2}h(a+b)$

This may be written as Area of trapezium = $\frac{(a+b)}{2} \times h$

A **power of 10** is any of the integer **powers** of the number **ten**; in other words, **ten** multiplied by itself a certain number of times (when the **power** is a positive integer).

Key Concepts

# Foundation – Unit 8 – Perimeter, Area and Volume 1

| | | |
|---|---|---|
| Dimensions | Rectangle: length and width. Cuboid: length, width and height. |   |
| Prism | A 3D solid that has the same cross-section all through its length. |  |
| Volume | Volume of a 3D solid is the amount of space inside it. Measure in cubic units, $mm^3$, $cm^3$, $m^3$. |   |
| Volume of a cuboid | Length x width x height *lwh* |   |
| Volume of a prism | Area of cross-section x length |   |
| Surface Area | Surface Area of a 3D solid it the total area of all its faces. Sketch the net and work out all the face. |   |
| Capacity | The amount of liquid a 3D object can hold.. It is measure in litres and ml. |   |
| Compound Shape | Made up of simple shapes. To find the area, split it into simple shapes like rectangles and triangles, find the areas and add them together. |   |

# Prior Knowledge

$x = 6$

↓ *substitute*

$y = 24 - x$

⇩

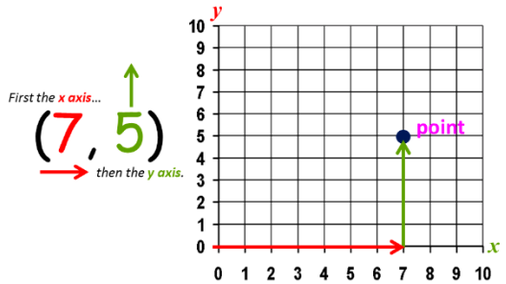
$y = 24 - 6$

⇩

$y = 18$

**Substitution** is the name given to the process of swapping an algebraic letter for its value.

**Coordinates are numbers which determine the position of a point or a shape in a particular space (a map or a graph).**
Points are marked by how far along they are on the x axis (the horizontal axis) and how far up they are on the y axis (the vertical axis).



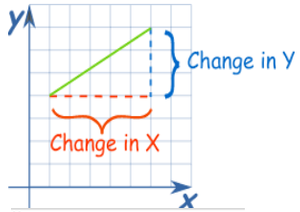

$y = mx + c$

$m$ = gradient  $c$ = $y$–intercept

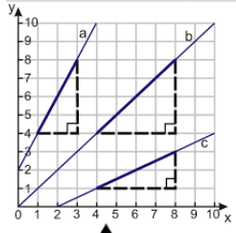
A **linear equation** is an equation that describes a straight line on a graph. You can remember this by the "line" part of the name **linear equation**.

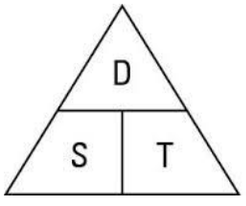
$y = 2x + 5$

The **gradient** tells us how steep **a line** is, therefore the bigger the **gradient** the steeper the **line** is.




**A** positive **gradient** is **a straight line** which slopes up to the right.
**A** negative **gradient** is **a straight line** which slopes down to the right.



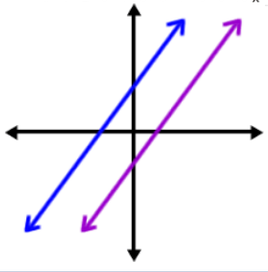

$D = S \times T$

$S = D \div T$

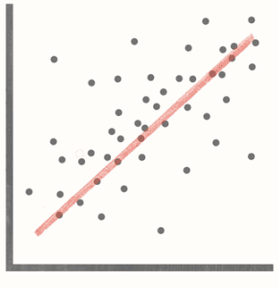
$T = D \div S$

**Distance = speed x time**

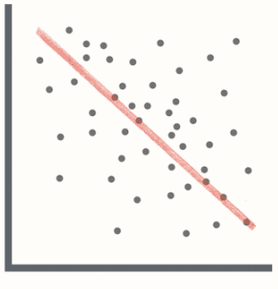
Lines are parallel if they are always the same distance apart (called "equidistant").



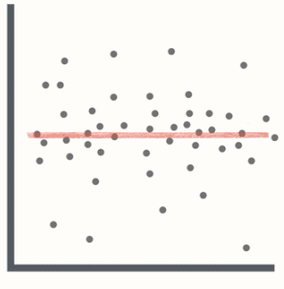
**Correlation** is used to **describe** the linear relationship between two continuous variables (e.g., height and weight).



**Positive Correlation**



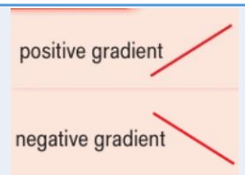
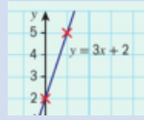
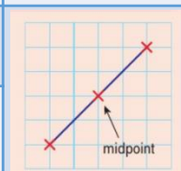
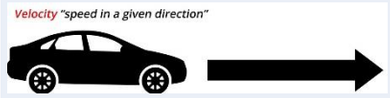
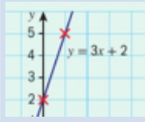
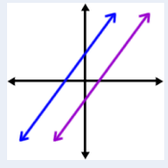
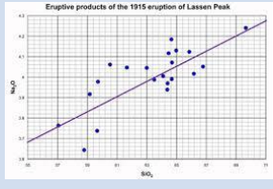
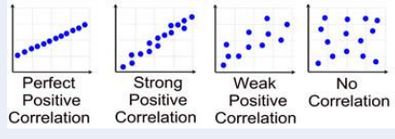
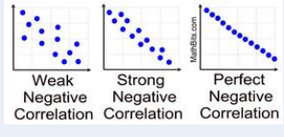
**Negative Correlation**



**No Correlation**

# Foundation – Unit 9 - Graphs

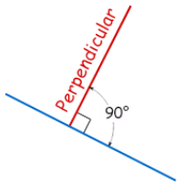
Key Concepts

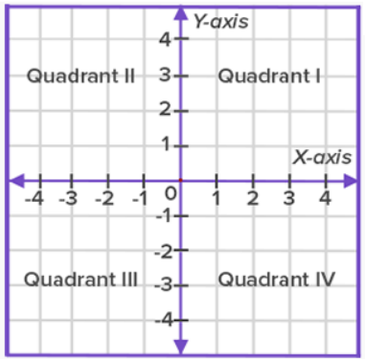
| | | |
|---|---|---|
| Gradient | The steepness of a graph. |   |
| Linear Equation | Produces a straight line graph. |   |
| Average Speed | $\frac{distance\ travelled}{time\ taken}$ | $S = \frac{4800}{100}$  $S = 48mph$ |
| Line Segment | Has a start and end point. |   |
| Midpoint | Exactly in the middle of a line segment. | |
| Rate of Change | Describes how a quantity changes over time. | $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$ |
| Velocity | Speed in a particular direction. |   |
| Y-intercept | Where the graph crosses the y-axis. |   |
| Parallel Lines | Same distance apart and will never cross each other. They have the same gradient. |  |
| Line of best fit | Refers to a **line** through a scatter plot of data points that **best** expresses the relationship between those points. |  |
| Trend | A pattern in a set of results displayed in a graph. |   |
| Correlation | Refers to the degree of correspondence or relationship between two variables. |   |

# Prior Knowledge

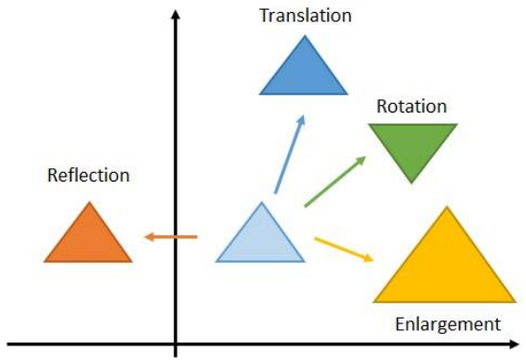
There are 4 types of transformations: reflection, rotation, enlargement and translation.

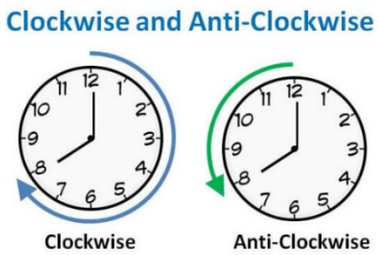
**Perpendicular lines** cross each other at right angles.

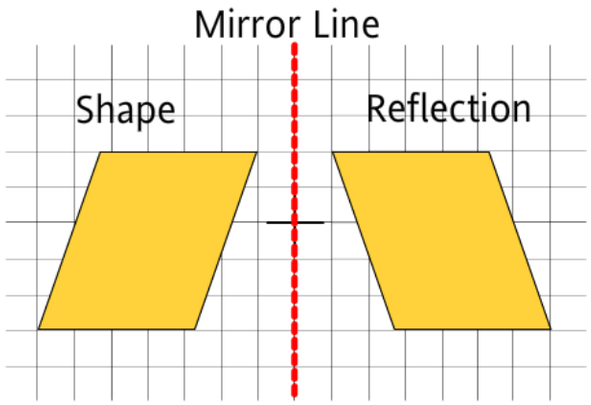


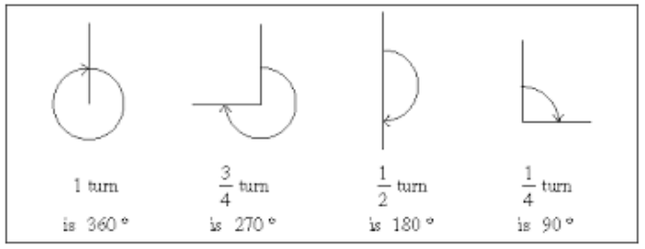

Coordinates can be plotted in all four quadrants.



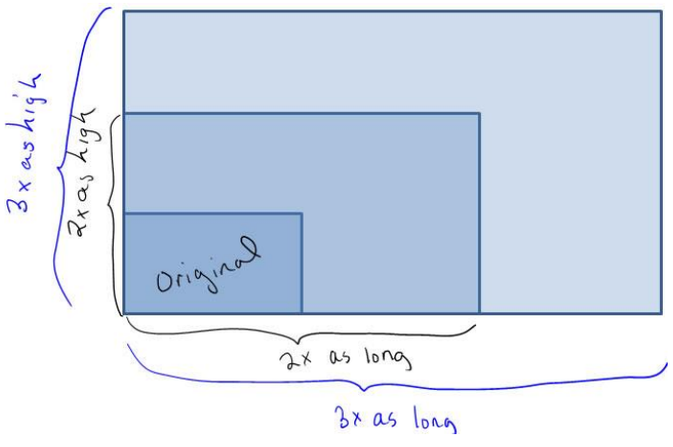



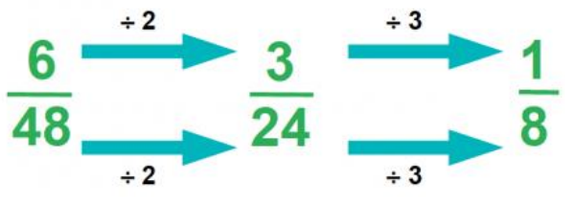

Rotations require an angle and centre. Aside from 180º (1/2 turn), they should also have a direction – clockwise or anticlockwise.




When completing a reflection, make sure each vertex of the image is the same distance from the mirror line as its corresponding vertex on the object.

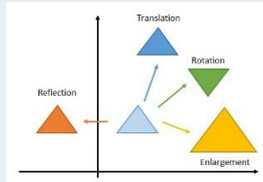
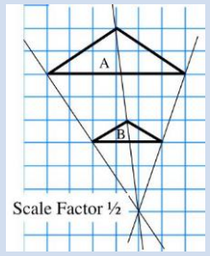
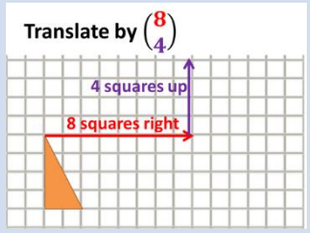
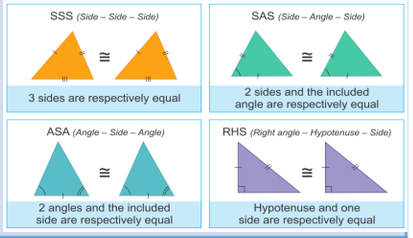
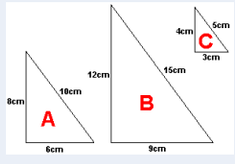
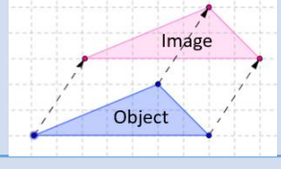
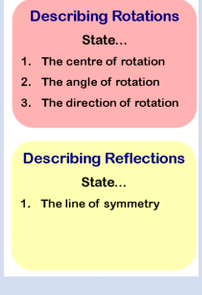
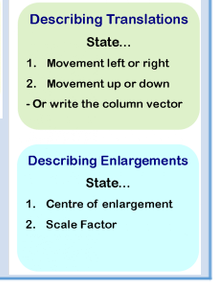
You can **simplify** a **fraction** if the numerator (top number) and denominator (bottom number) can both be divided by the same number.




As long as you know that the two shapes are similar, you can use one dimension on both figures to calculate the **scale factor**.

# Key Concepts Foundation – Unit 10 – Transformations

| | | |
|---|---|---|
| Transformation | A **transformation** is a way of changing the size or position of a shape. |  |
| Enlargement | An increase or decrease in size. Multiply all the side lengths by the same number (scale factor). |  |
| Scale Factor | Describes the size of an enlargement or reduction. | |
| Translation | Slide/move – all the point on the shape move the same distance in the same direction. |  |
| Column Vector | Used to describe a translation. Gives direction and magnitude. | |
| Congruent | Two figures or objects are **congruent** if they have the same shape and size, or if one has the same shape and size as the mirror image of the other. |  |
| Similar | When two figures are similar, the ratios of the lengths of their corresponding **sides** are equal. |  |
| Object | An original shape. |  |
| Image | When the object is transformed, the resulting shape is the image. | |
| Describing an enlargement | State it is an enlargement and give the scale factor and coordinates of the centre of enlargement. |   |
| Describing a reflection | State is it a reflection and include the mirror line. The mirror line may require an equation. | |
| Describing a rotation | State it is a rotation, give the coordinate of the centre of rotation, and the angle and direction. | |

# Prior Knowledge

$$y = mx + c$$

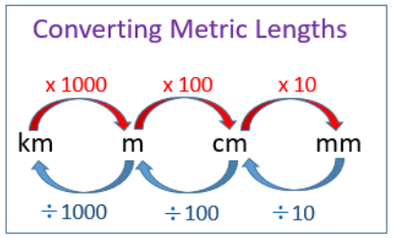
gradient  y-intersect

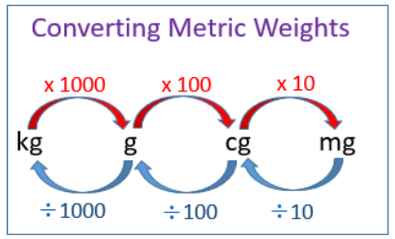
The equation of a straight line uses (x,y) coordinates with the gradient and y-intercept.

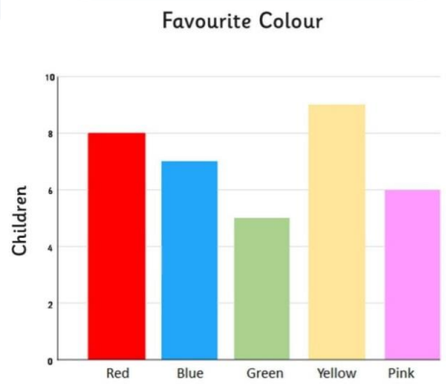
| x | y = 2x +1 | y | Ordered Pairs |
|---|---|---|---|
| -2 | 2(-2)+1 | -3 | (-2,-3) |
| 0 | 2(0)+1 | 1 | (0,1) |
| 2 | 2(2)+1 | 5 | (2,5) |

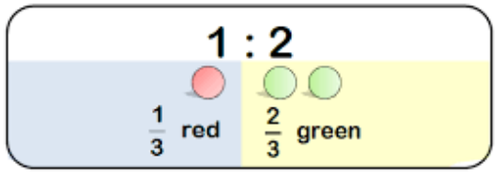
A table of values is used to graph a line according to its equation. The x value is substituted into the equation, then the equation is solved for y.

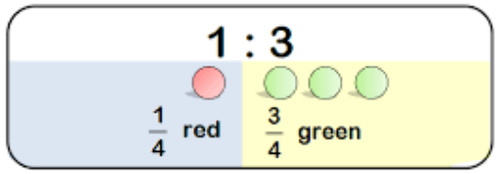
A **bar chart** or **bar graph** is a chart or graph that presents categorical data with rectangular bars with heights or lengths pro portional to the values that they represent. The bars can be plotted vertically or horizontally.



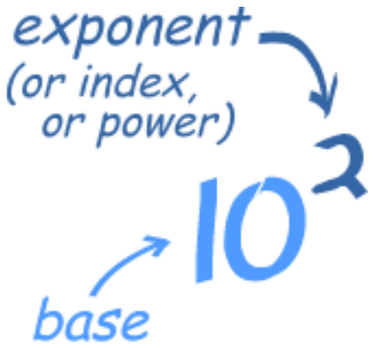




A **ratio** compares values. A **ratio** says how much of one thing there is compared to another thing.

**Index notation** is the short way of writing repeated multiplications by the same number.




**Rule 1: Multiplication Rule of Indices**

$$a^n \times a^m = a^{n+m}$$

Ex 1: $2^3 \times 2^{11}$  Ex 3: $p^5 \times p^3$

Ex 2: $3^3 \times 3^6$  Ex 4: $3^3 \times 2^6$

**Rule 2: Division Rule of Indices**

$$a^n \div a^m = a^{n-m} \qquad \frac{a^n}{a^m} = a^{n-m}$$

Ex 5: $2^{11} \div 2^3$

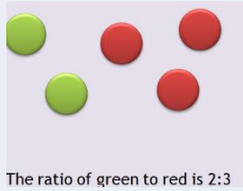
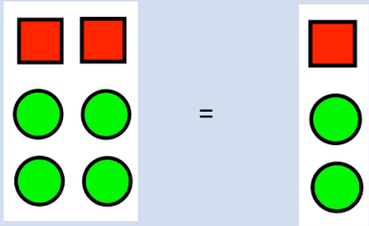
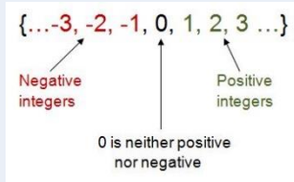
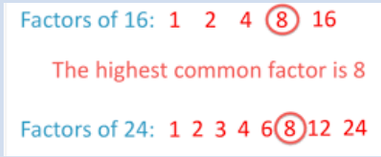
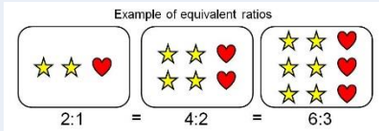
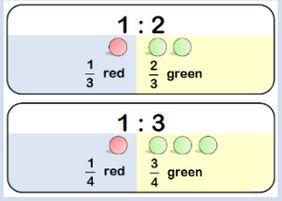
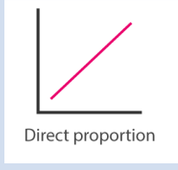
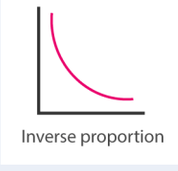
Ex 6: $3^3 \div 3^6$

Ex 7: $\frac{p^5}{p^3}$

The exponent (or index or power) of a number says how many times to use the number in a multiplication.

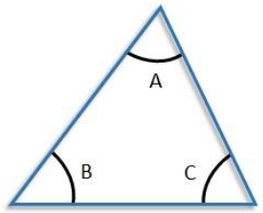
Key Concepts

# Foundation – Unit 11 – Ratio and Proportion

| | | |
|---|---|---|
| Ratio | A way to compare two or more quantities. |   |
| Simplest Form | You cannot divide the values any further and have them still be integers.. |   |
| Integers | Whole numbers. |   |
| Highest Common Factor | The largest integer which is a factor of both. |   |
| Equivalent Ratios | Represent the same quantities, or have the same simplest form. |   |
| Proportion | Compares a part with a whole. |   |
| Unit Ratios | One of the numbers is n. This makes it easier to compare ratios. |   |
| Direct Proportion | When one is a multiple of the other. |   |
| Indirect/Inverse Proportion | When one value increases and the other decreases. |   |

# Prior Knowledge

Angles in a triangle add to 180°.




**A + B + C = 180°**

You can simplify a **fraction** if the numerator (top number) and denominator (bottom number) can both be divided by the same number.

$$\frac{24 \div 2}{40 \div 2} = \frac{12}{20}$$

$$\text{or } \frac{24 \div 4}{40 \div 4} = \frac{6}{10}$$

$$\text{or } \frac{24 \div 8}{40 \div 8} = \frac{3}{5}$$

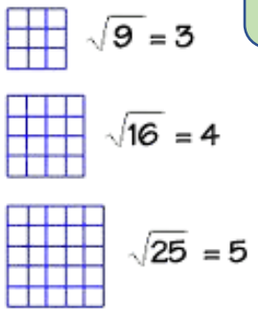
$1^2 = 1$ $\sqrt{1} = 1$

$2^2 = 4$ $\sqrt{4} = 2$

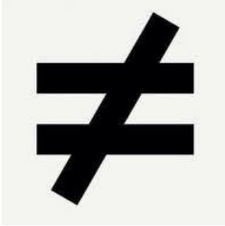
$3^2 = 9$ $\sqrt{9} = 3$

$4^2 = 16$ $\sqrt{16} = 4$

$5^2 = 25$ $\sqrt{25} = 5$



Finding the **square root** of a number is the inverse operation of squaring that number. Remember, the **square** of a number is that number times itself.



The **not equal sign** (≠) is used to denote items where they don't **equal** to each other, for example 1 ≠ 2.

To convert a fraction to a decimal, divide the numerator by the denominator.

Surds are numbers left in square root form that are used when detailed accuracy is required in a calculation. They are numbers which, when written in decimal form, would go on forever.

$\sqrt{11}$ is a surd.

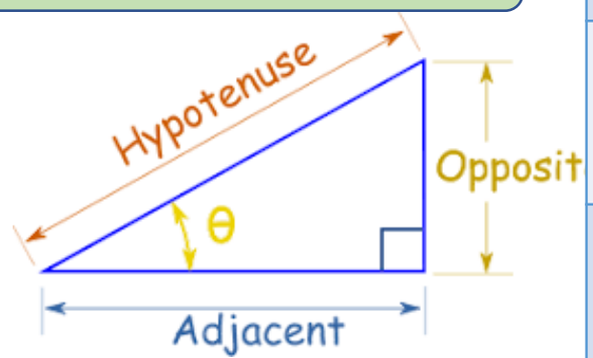
4 is not a surd.

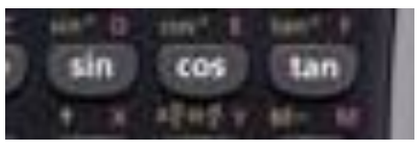
$\sqrt{9}$ is not a surd. $(\because \sqrt{9} = 3)$

$\sqrt{18}$ is a surd.

$\sqrt{81}$ is not a surd. $(\because \sqrt{81} = 9)$

The hypotenuse is the longest side of a right triangle.

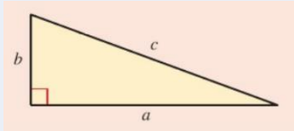
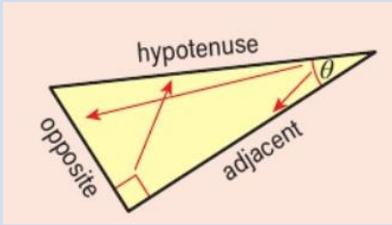
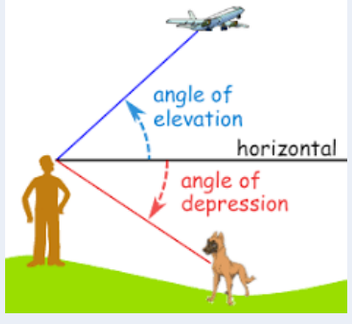
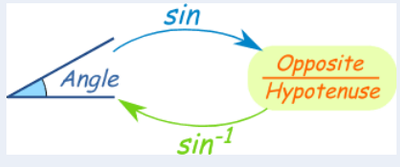



An "**opposite**" side is the one across from a given angle, and an "**adjacent**" side is next to a given angle.

Sin, Cos and Tan buttons are on scientific calculators. Press shift then the button to access the inverse functions.

# Foundation – Unit 12 – Right-angled Triangles

| | | |
|---|---|---|
| Right-angled triangle | Contains an angle which is 90 degrees. |  |
| Hypotenuse | The longest side, opposite the right angle. |  |
| Opposite Side | The side opposite the angle θ. (does not touch the right angle) | |
| Adjacent Side | The side next to the angle θ. (joins the right angle to θ) | |
| Theta | Θ, used to represent the angle. |  |
| Sine (sin) | The ratio of the opposite side to the hypotenuse. | The sine of angle $\theta$ is written as **sin$\theta$**. $\sin\theta = \frac{\text{opp}}{\text{hyp}}$ |
| Cosine (cos) | The ratio of the adjacent side to the hypotenuse. | The cosine of angle $\theta$ is written as **cos$\theta$**. $\cos\theta = \frac{\text{adj}}{\text{hyp}}$ |
| Tangent (tan) | The ratio of the adjacent side to the hypotenuse. | The tangent of angle $\theta$ is written as **tan$\theta$**. $\tan\theta = \frac{\text{opp}}{\text{adj}}$ |
| Angle of elevation | The angle measured upwards from the horizontal. |  |
| Angle of depression | The angle measured downwards from the horizontal. | |
| Inverse functions | $\text{Sin}^{-1}$, $\cos^{-1}$ and $\tan^{-1}$ are the inverse functions, used to calculate missing angles. |  |

# Prior Knowledge

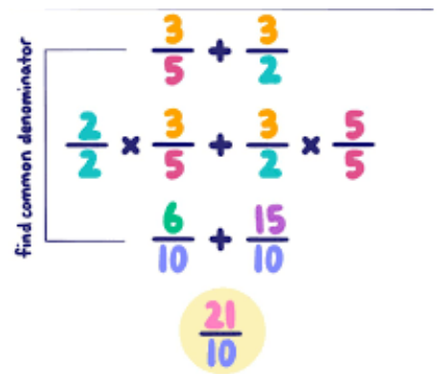
$$\frac{24 \div 2}{40 \div 2} = \frac{12}{20}$$

You can simplify a fraction if the numerator (top number) and denominator (bottom number) can both be divided by the same number.

$$\text{or } \frac{24 \div 4}{40 \div 4} = \frac{6}{10}$$

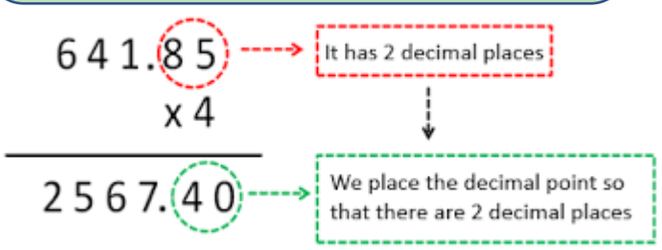
$$\text{or } \frac{24 \div 8}{40 \div 8} = \frac{3}{5}$$

**To add fractions there are Three Simple Steps:** Make sure the bottom numbers (the denominators) are the same. **Add** the top numbers (the numerators), put that answer over the denominator. Simplify the **fraction** (if needed)


**Probabilities** can be written as fractions, decimals or percentages on a **scale** from 0 to 1.

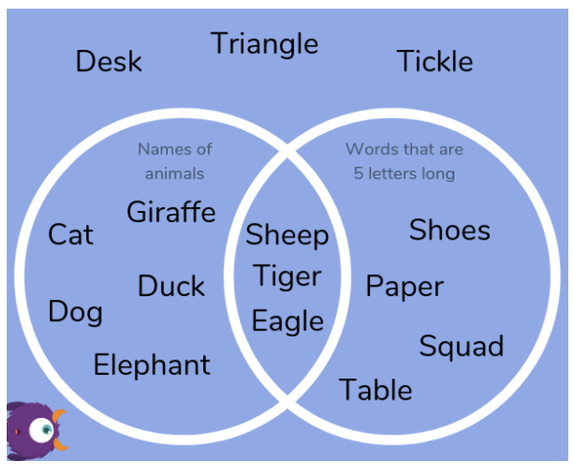
To **multiply decimals**, first **multiply** as if there is no **decimal**. Next, count the number of digits after the **decimal** in each factor. Finally, put the same number of digits behind the **decimal** in the product.




Gender compared to handedness

| | Handed | | |
|---|---|---|---|
| | Left | Right | |
| Female | 7 | 46 | 53 |
| Male | 5 | 63 | 68 |
| | 12 | 109 | 121 |

A **two-way table** is a way to organise data about two specific variables.




A **Venn diagram** shows the relationship between a group of different things (a set) in a visual way.

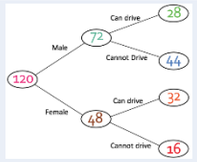
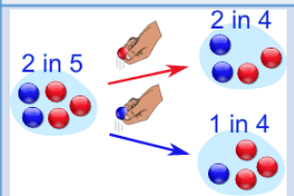
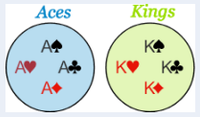
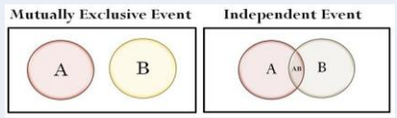
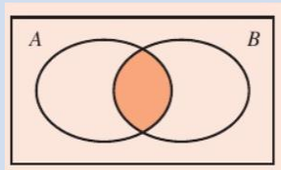
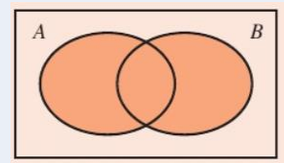
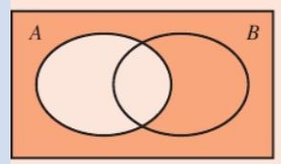
**PRIME NUMBERS**

2,3,5,7,11,13,17,19,23,
29,31,37,41,43,47,53,59,
61,67,71,73,79,83,89,97

**Prime numbers** are whole numbers greater than 1, that have only two factors – 1 and the number itself.

Key Concepts

# Foundation – Unit 13 - Probability

| | | |
|---|---|---|
| Frequency tree | Show the number of options for different choices. |   |
| Dependent Events | When the outcome of one event changes the possible outcomes of the next event. The second event is dependent on the first. |   |
| Mutually Exclusive | Events which cannot happen at the same time. |   |
| Relative Frequency | An estimate of the probability. | $= \frac{\text{number of successful trials}}{\text{total number of trials}}$ |
| Exhaustive List | All the possible outcomes. Probabilities of an exhaustive set of mutually exclusive events sum to 1. | Example: Collectively exhaustive list: Throwing 2 dice<br>(1,1) (1,2) (1,3) (1,4) (1,5 (1,6)<br>(2,1) (2,2) (2,3) (2,4) (2,5) (2,6)<br>(3,1) (3,2) (3,3) (3,4) (3,5) (3,6)<br>(4,1) (4,2) (4,3) (4,4) (4,5) (4,6)<br>(5,1) (5,2) (5,3) (5,4) (5,5) (5,6)<br>(6,1) (6,2) (6,3) (6,4) (6,5) (6,6) |
| Sample Space Diagram | Shows all the possible outcomes. You can use it to find a theoretical probability, based on equally likely outcomes. | Dice: 1 2 3 4 5 6<br>Coin: H H1 H2 H3 H4 H5 H6<br>T T1 T2 T3 T4 T5 T6 |
| Independent Events | When the results of one do not affect the results of the other. |   |
| A ∩ B | The intersection of A and B. This is the elements that are in A and in B. |   |
| A U B | The union of A and B. This is the elements that are in A or in B or in both. |   |
| A' | The elements not in A. |   |

# Prior Knowledge

**Substitution** is the name given to the process of swapping an algebraic letter for its value.

$x + \frac{x}{2}$

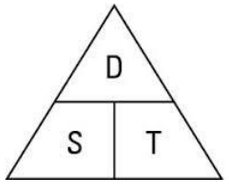
$x = 5$

$5 + \frac{5}{2}$

10% (Divide by 10)

5% (Divide 10% by 2)

1% (Divide 10% by 10) or (Divide by 100)



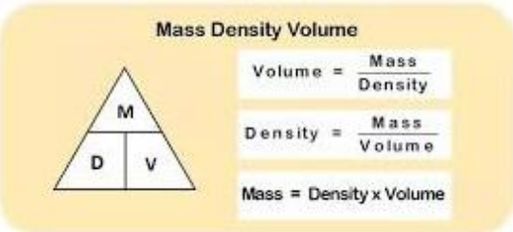

$D = S \times T$

$S = D \div T$

$T = D \div S$

Distance = speed x time.
To work out what the units are for speed, you need to know the units for distance and time.

To calculate a percentage of an amount, use combinations of simple calculations.



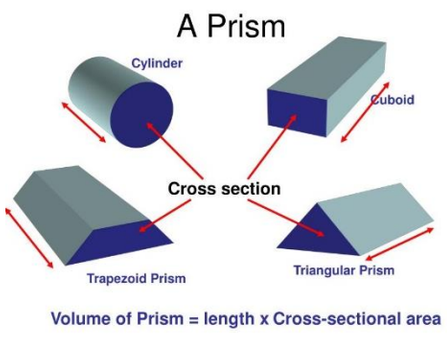

Mass = density x volume.
Density is normally measured using units of g/cm³ for smaller amounts, and kg/m³ for larger amounts.

In a linear equation (equation of a straight line) the gradient is the coefficient of x.

$y = mx + c$

gradient y-intersect

A prism has the cross section the same all along its length.
Volume = area of cross section x length




Index notation is a way of representing repeated multiplications of the same number, by writing the number as a base with the number of repeats.

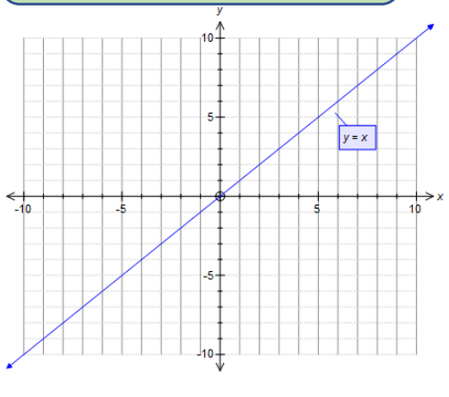
exponent (or index, or power)

$10^2$

base

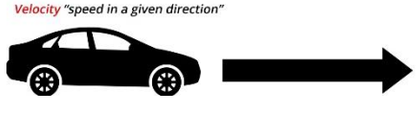
A **ratio** shows how much of one thing there is compared to another. **Ratios** are usually written in the form a:b.

Y=x
Direct Proportion

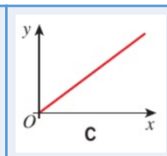
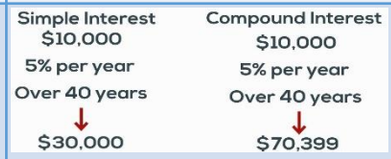
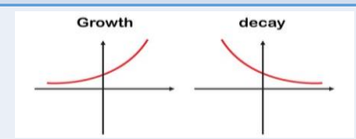
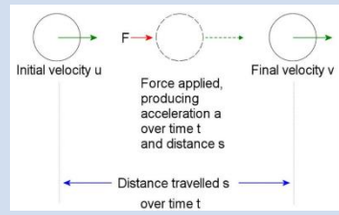
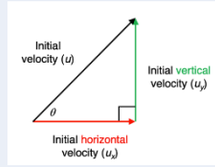
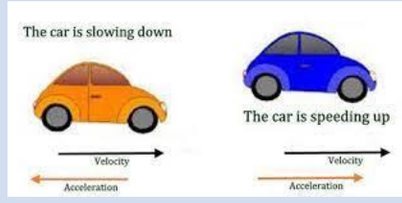



Velocity and initial velocity are vector quantities.


Velocity is the speed in a given direction. Possible units are m/s.

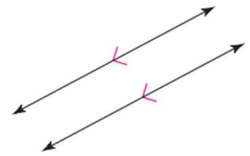



# Foundation – Unit 14 – Multiplicative Reasoning

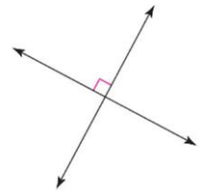
| | | |
|---|---|---|
| Direct Proportion | Pairs of values in the same ratio. When one value is 0, so it the other (passes through (0,0). |   |
| Compound Interest | The interest earned each year is added to money in the account and earns interest the next year. |   |
| Growth | Increases in quantity. |   |
| Decay | Decreases in quantity. | |
| Density | The mass of a substance contained in a certain volume. It is usually measure in grams per cubic centimetre g/cm³. | $\text{Density} = \frac{\text{mass}}{\text{volume}}$ or $D = \frac{M}{V}$ |
| Pressure | The force of newtons applied over an area in cm² or m². It is usually measure in newtons N per square metre N/m² or square centimetre N/cm². | $\text{Pressure} = \frac{\text{force}}{\text{area}}$ or $P = \frac{F}{A}$ |
| Kinematic Formulae | The features or properties of motion in an object. | These are kinematics formulae: $v = u + at$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$ |
| Final Velocity, v | The velocity which the object has at the end of the given time period. |   |
| Initial velocity, u | Speed in a given direction at the start of the motion. |   |
| Acceleration, a | Rate of change of velocity, m/s² |   |

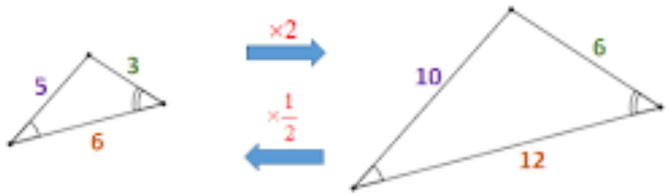
# Prior Knowledge

Parallel lines are in the same plane that never intersect. They are always the same distance apart.



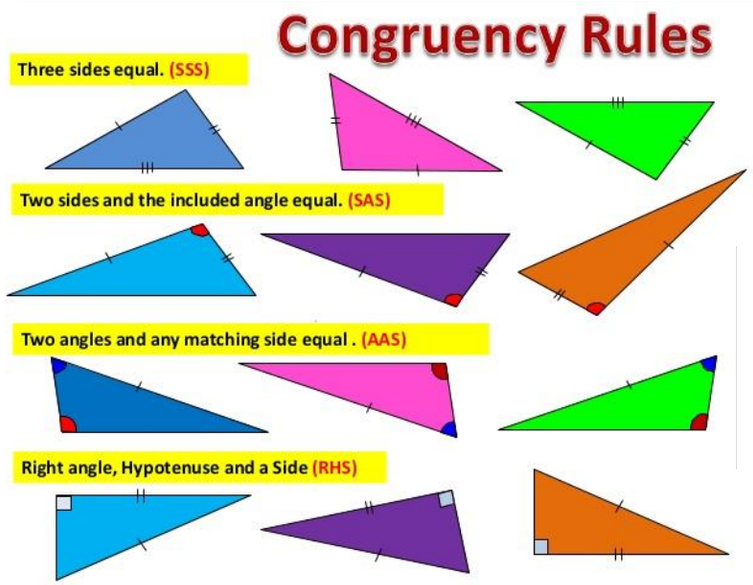
Perpendicular lines are lines that meet at a right angle, that is, at an angle that measures 90°.





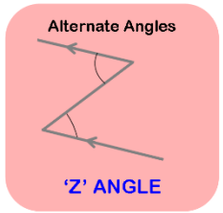

A scale factor is the number by which all the dimensions of an object are multiplied in order to create a proportion enlargement or reduction.

If one shape can become another using Turns, Flips and/or Slides, then the shapes are Congruent.



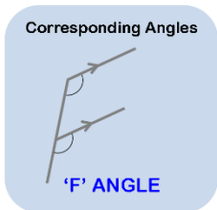

A line which intersects a pair of parallel lines is called a **transversal**.

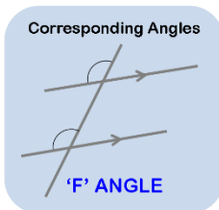
On parallel lines, alternate (or Z) angles are equal.



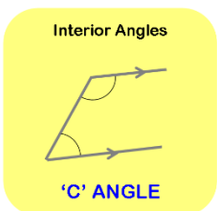


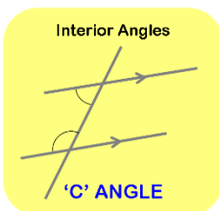
On parallel lines, corresponding (or F) angles are equal.



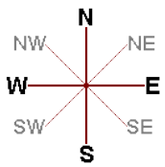



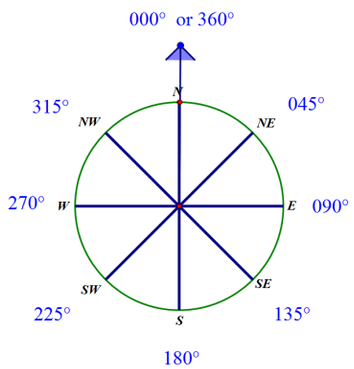

On parallel lines, interior (or C) angles add up to 180°.



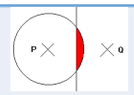
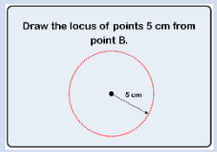
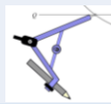
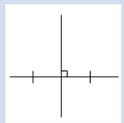
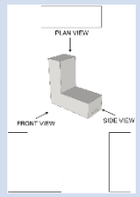
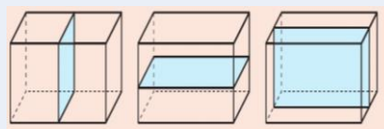
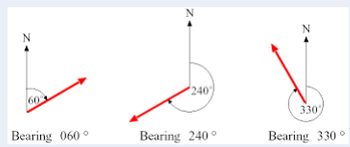
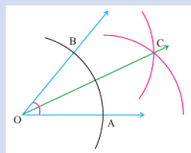

**8-point compass** includes the four cardinal directions (N, E, S, W) plus the four "intercardinal" or "ordinal directions" (NE, SE, SW, NW), at angles of difference of 45°.




Key Concepts

# Foundation – Unit 15 – Constructions, Loci and Bearings

| | | |
|---|---|---|
| Region | An area bounded by loci. |  |
| Net | A 2D shape that folds to make a 3D shape. |  |
| Scale | A ratio that shows the relationship between a length on a map or drawing and the actual length. | 1 cm = 13 km |
| Locus (Loci) | A set of points the obey a given rule. This produces a path followed by the points. |   |
| Construct | Means to draw accurately using a ruler and compasses. |  |
| Bisect a line | Cut a line exactly in half. |  |
| Perpendicular bisector | Cuts a line in half at right angles. | |
| Plan View | View from above an object. |  |
| Front Elevation | View of the front of an object. | |
| Side Elevation | View of the side of an object. | |
| Plane | A flat 2D surface. |  |
| Plane of Symmetry | When a plane cuts the shape in half so that the part of the shape on one side of the plane is an identical reflection of the part on the other side of the plane. | |
| Bearing | An angle measured in degrees clockwise from North. A bearing is always written using three digits. |   |
| Angle Bisector | Cuts an angle exactly in half. |  |

# Prior Knowledge

Substitution – replace the letter with a value and complete the calculation.

Factor – a number that does into another number. Eg Factors of 12: 1, 12, 2, 6, 3, 4

Multiple – a number that is in the times table. Eg multiples of 3: 3, 6, 9, 12, 15.....

Work out the value of the expression

$5x + y$

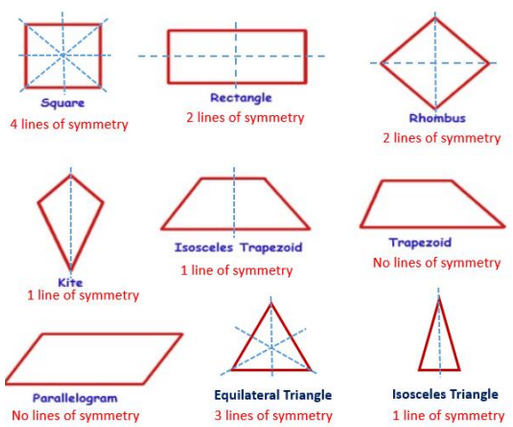
If $x = 4$ and $y = 3$

$5 \times 4 + 3$

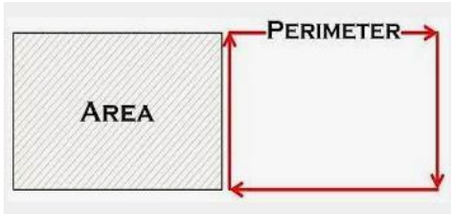
$20 + 3$

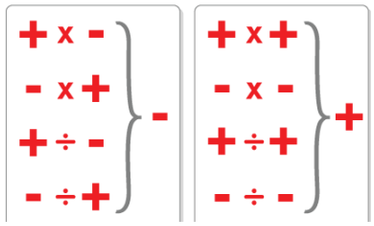
$23$

$\sqrt{1} = 1$ since $1^2 = 1$
$\sqrt{4} = 2$ since $2^2 = 4$
$\sqrt{9} = 3$ since $3^2 = 9$
$\sqrt{16} = 4$ since $4^2 = 16$
$\sqrt{25} = 5$ since $5^2 = 25$
$\sqrt{36} = 6$ since $6^2 = 36$
$\sqrt{49} = 7$ since $7^2 = 49$
$\sqrt{64} = 8$ since $8^2 = 64$
$\sqrt{81} = 9$ since $9^2 = 81$
$\sqrt{100} = 10$ since $10^2 = 100$

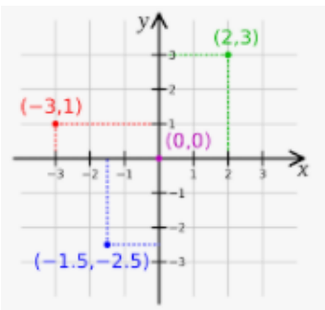



A **line** of **symmetry** is a **line** that cuts a shape exactly in half. This means that if you were to fold the shape along the **line**, both halves would match exactly.




Coordinates display the position of a certain point. These positions are marked according to numbers of the horizontal axis (x-axis) and the vertical axis (y-axis).




Expand the brackets

multiply

$2(x + 8)$

$2x + 16$

**Factorising** is the reverse of expanding brackets.

$4x+16$

4 is a factor of both 4 and 16.

$4(x+4)$

To solve an equation, use inverse operations (and the balancing method) to find the value of 1 unknown variable.

$$20a + 10 = 70$$
$$-10 \quad -10$$
$$20a = 60$$
$$\div 20 \quad \div 20$$
$$a = 3$$

$$y = mx + c$$

**m**

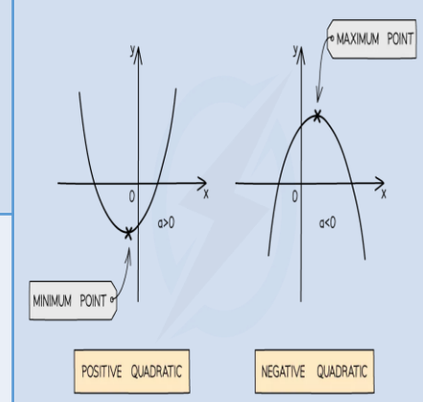
- This number tells you the gradient/steepness of the line
- The bigger the number, the steeper the line
- If the number is positive, the line slopes upwards
- If it is negative, the line slopes downwards
- Parallel lines have the same gradient

**+ c**

- This number tells you where the line crosses the y axis
- Its posh name is the y intercept

Key Concepts

# Foundation – Unit 16 – Quadratic equations and graphs

| | | |
|---|---|---|
| **Expand Double Brackets** | Multiply each term in one bracket by each term in the other. | Expand and simplify... $(x+4)(x+3)$ $x^2 + 3x + 4x + 12$ $x^2 + 7x + 12$ |
| **Square a bracket** | Multiply it by itself. | $(5x+2)^2$ $(5x+2)(5x+2)$ $25x^2 + 10x + 10x + 4$ $25x^2 + 20x + 4$ |
| **Quadratic Expression** | Always has a squared term. It cannot have a power higher than 2. It may also have a term with a power of 1. It may also have a constant. | $ax^2 + bx + c$ |
| **Quadratic Function** | Has a symmetrical U shape curve called a parabola. A ($-x^2$) term has a symmetrical n-shaped curve. |   |
| **Turning Point** | A quadratic curve always has a maximum or minimum turning point. This is where the graph changes direction. | |
| **Factorise quadratics** | To factorise a quadratic $ax^2+bx+c$, you need two numbers whose product is c and whose sum is b. | $x^2+4x+4$ $(x+\ )(x+\ )$ Factors of 4: 1,2,4 $(x+1)(x+4)$ Gives us 1x4=4 and 1x+4x=5x (wrong) $(x+2)(x+2)$ Gives us 2x2=4 and 2x+2x=4x |
| **Difference of Two Squares** | A quadratic expression with two squared terms, and one is subtracted from the other. | $a^2 - b^2 = (a+b)(a-b)$ $a^2 - b^2$ $x^2 - 25$ $x^2 - 16$ $a^2 - 100$ $(ab)^2 - (xy)^2$ |

# Prior Knowledge

Numbers can be rounded to 1,2, 3 or more significant figures. We count the number of figures from the first non-zero digit.

Rounding to 1 s.f

First non-zero digit.

| 4.3325 | 5.7425 | 0.0425 |
|---|---|---|
| 5 or bigger ? No | 5 or bigger ? Yes | 5 or bigger ? No |
| 4 | 6 | 0.04 |

Substitution – replace the letter with a value and complete the calculation.

Work out the value of the expression

$5x + y$

If $x = 4$ and $y = 3$

$5 \times 4 + 3$

$20 + 3$

$23$

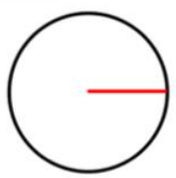
1 L = 1,000 mL
= 1,000 cm³

1 mL = 1cm³

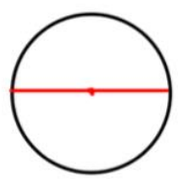
Rearranging formulae / changing the subject: use inverse operations to rearrange.

$s = t + 10$
$-10 \quad -10$
$s - 10 = t$
$t = s - 10$

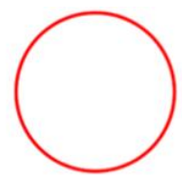
$s = 2t - 3$
$+3 \quad +3$
$s + 3 = 2t$
$\div 2 \quad \div 2$
$\frac{s+3}{2} = t$



Radius



Diameter



Circumference

First 10 square numbers

$1 \times 1 = 1$
$2 \times 2 = 4$
$3 \times 3 = 9$
$4 \times 4 = 16$
$5 \times 5 = 25$
$6 \times 6 = 36$
$7 \times 7 = 49$
$8 \times 8 = 64$
$9 \times 9 = 81$
$10 \times 10 = 100$

$15^2 = 15 \times 15 = 225$
$25^2 = 25 \times 25 = 625$

First 10 cube numbers

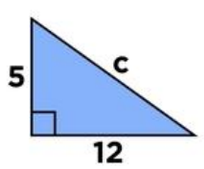
$1 \times 1 \times 1 = 1$
$2 \times 2 \times 2 = 8$
$3 \times 3 \times 3 = 27$
$4 \times 4 \times 4 = 64$
$5 \times 5 \times 5 = 125$
$6 \times 6 \times 6 = 216$
$7 \times 7 \times 7 = 343$
$8 \times 8 \times 8 = 512$
$9 \times 9 \times 9 = 729$
$10 \times 10 \times 10 = 1000$

$22^3 = 22 \times 22 \times 22 = 10648$
$15^3 = 15 \times 15 \times 15 = 3375$

## The Pythagorean Theorem

given two sides we can calculate the third

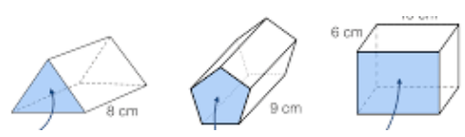
$a^2 + b^2 = c^2$




| Shape | Name | Formula for Area |
|---|---|---|
| Height, Base | Square | Base x Height |
| Height, Base | Rectangle | Base x Height |
| Height, Base | Triangle | Base x Perpendicular Height ÷ 2 |
| Height, a, b | Trapezium | (a + b) x height / 2 |
| Height, Base | Parallelogram | Base x Perpendicular Height |
| Height, Length | Rhombus | Length x Height ÷ 2 |
| Height, Length | Kite | Length x Height ÷ 2 |

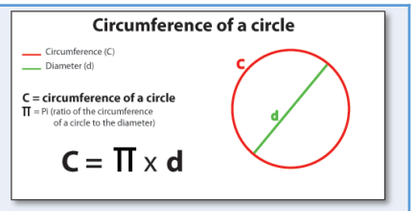
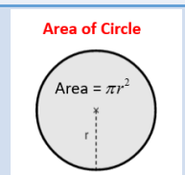
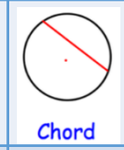
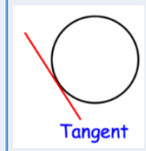
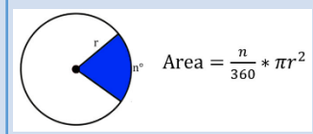
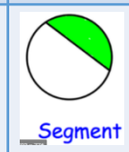
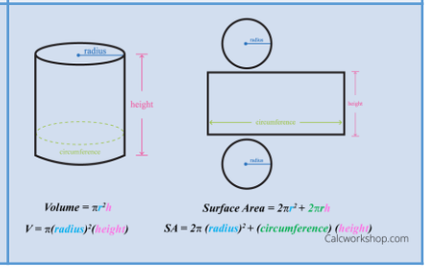
Surface area of an object is the total area of all of the 2D face.

Volume of prisms: area of cross section x length




Key Concepts

# Foundation – Unit 17 – Perimeter, Area and Volume 2

| | | |
|---|---|---|
| **Circumference of a circle** | The perimeter of a circle. |   |
| **Area of a circle** | The space inside a circle. |   |
| **Chord** | A line through a circle that touches the circumference at each end. |   |
| **Arc** | A part of the circumference. |   |
| **Tangent** | A line outside a circle that touches the circle at only one point. |   |
| **Sector** | A slice of a circle between an arc and two radii. |   |
| **Segment** | A part of a circle between an arc and a chord. |   |
| **Cylinders** | Volume = $\pi r^2 h$<br>Surface Area = $2\pi r^2 + \pi d$ |   |