

Key Definitions in Numeracy

Published in 2010 by
Junior Certificate School Programme Support Service
Curriculum Development Unit
Captains Road
Crumlin
Dublin 12
Phone: 01 453 5487
Fax: 01 402 0435
Email: jcsp@iol.ie

Copyright © Junior Certificate School Programme

The Junior Certificate School Programme Support Service is funded by the Teacher Education Section, Department of Education and Skills and the European Social Fund.

The Junior Certificate School Programme Literacy and Numeracy Strategy and the Demonstration Library Project are funded by the Early Literacy Initiative and the Delivering Equality of Opportunity in Schools (DEIS) Action Plan within the Teacher Education Section of the Department of Education and Skills.

The Junior Certificate School Programme is a national programme sponsored by the Department of Education and Skills and the National Council for Curriculum and Assessment.

The Support Service for the Junior Certificate School Programme is based in the
CDVEC Curriculum Development Unit
Captains Road
Crumlin
Dublin 12

Written by Jerry McCarthy

Edited by Mary Clare Higgins and Denise O'Flanagan

Designed by:  WWW.RAYMADETHIS.COM/ART



Introduction

The “Key Definitions in Numeracy” resource book has been planned and developed to support the teaching and learning of numeracy and numerical literacy in JCSP schools. Concise and student-friendly definitions of key concepts, processes and terminology of numeracy are provided in this resource book. An additional suite of key measurement formulae is also provided.

In order to provide teachers and students with convenient checklists of the key definitions associated with each specific numerical theme, the extensive suite of 271 definitions and formulae has been arranged and sub-divided into the major categories and strands of numeracy, namely:

- **Number:**
 - Computation and Operations
 - Structure and Properties
- **Measures and Measurement:**
 - Length
 - Weight / Mass
 - Area
 - Capacity / Volume
- Temperature
- Angles
- Time
- Speed
- **Space and Shape**
- **Data, Data Handling and Probability**
- **Patterns, Symmetries and Basic Algebra**

A supplementary resource book for students – “Sticky Maths Facts Resource Book for Students” - has also been developed to help students to learn, remember and revise key definitions and formulae of numeracy. In the “Sticky Maths Facts Resource Book for Students”, a selection of key definitions and formulae - from this resource book - has been printed onto sticky-labels. These printed sticky-labels have also been arranged and assembled into the major themes of numeracy.

We expect that this workbook of sticky-labels will be well received by JCSP students because it provides a fun, creative and novel approach to the learning and study of definitions and formulae of numeracy. When a specific numerical topic has been taught in class, e.g. Measurement, the student can peel-off the sticky-labels on Measurement and “stick” them, as visual stimuli or as an aide-mémoire in a variety of suitable locations e.g.: in the JCSP Student Portfolio folder, in the JCSP Keyword Notebook, on bookmarks, on the homework copy, on the homework journal or on the study-planner chart etc.

The Appendix section of this “Key Definitions in Numeracy” resource book contains master-templates of the “Sticky Maths Facts” sheets. There are eleven master-templates in total in the Appendix; eight of these master-templates have been selected and used to produce the content of the “Sticky Maths Facts Resource Book for Students”. The eleven master-templates are:

- Number: Computation and Operations (one page)
- Number: Structure and Properties (two pages)
- Measures and Measurement (two pages)
- Space and Properties of Space (one page)
- Shape and Properties of Shape (two pages)
- Data, Data Handling and Probability (one page)
- Patterns, Symmetries and Basic Algebra (one page)
- Key Measurement Formulae (one page)

The twenty-one entries, on each master-template, are arranged into a three by seven grid so as to correspond exactly with the layout and dimensions of commercially-produced, A4 size, blank sticky-label sheets. This precise correlation and synchronisation will enable teachers to photocopy and produce additional copies of “Sticky Maths Facts” sticky-labels when required.

Please note that this suite of “Sticky Maths Facts” master-templates is not exhaustive and teachers may add to and extend the suite as required. Electronic versions of the “Sticky Maths Facts Resource Book for Students” and “Key Definitions in Numeracy” resource book are available on-line on the JCSP websites (www.jcsp.ie) (www.jcspliteracy.ie). Teachers can use the electronic master-templates to create additional or alternative suites of definitions and formulae, as required.

Please remind students that “Sticky Maths Facts” labels are not permitted in the exam hall during state exams.

Computation and Operations

Number

Addition:

To get the total or sum. To join two or more numbers together to get one number.

Approximation:

An estimation of the value of a number, amount or total.

Brackets (in calculations):

A pair of brackets () is used to indicate the order in which mathematical calculations are to be carried out.

Cubed:

To raise a number to the power of three. Example: “4 cubed” is written as $4^3 = 4 \times 4 \times 4 = 64$

Difference:

The result got by subtracting one number or quantity from another.

Divison:

To separate into equal groups. To subdivide into equal groupings.

Double:

Multiply by two. Twice as much.

Estimate:

A rough calculation or approximation.

Evaluate:

Work it out! Do the calculations to find the answer.

Flow chart:

A diagram showing the order of the steps to be taken to solve a problem.

Inverse operation:

The reverse operation. Examples: Addition is the inverse of subtraction. Division is the inverse of multiplication.

Mental calculation:

Calculating the exact answer in your head without using pen and paper or calculator.

Minus:

To subtract. To take one quantity or number away from another. To find the difference.

Multiplication:

To find the product. A shorter way of adding a set of equal numbers together.

Example: $5 + 5 + 5 + 5 + 5 = 5 \times 5$

Power of (a number):

The number of times a base number or quantity is to be multiplied by itself. Example: “5 to the power of 3” is written as $5^3 = 5 \times 5 \times 5 = 125$

Product:

The result when two (or more) numbers are multiplied together.

Rounding off:

A way of approximating an answer or number.

Squared:

To raise a number to the power of two. Example: “4 squared” is written as $4^2 = 4 \times 4 = 16$

Square root:

A number that when multiplied by itself gives the original number.

Subtraction:

To take one number from another. To get the difference.

Sum:

The addition of numbers together. The total or whole amount.

Take away:

To subtract. To take one quantity or number away from another.

Total:

The sum or whole amount. The total is got by addition.



Associative law:

In addition and multiplication, 3 numbers may be added or multiplied together in any order and you will get the same answer.

Average:

The total of all scores or items \div by how many scores or items there were.

Billion:

A thousand million (1,000,000,000).

Cardinal number:

The number of elements in a set.

Common denominator:

A whole number into which the denominators of two or more fractions will divide exactly.

Commutative law:

In addition and multiplication, 2 numbers may be added or multiplied together in any order and you will get the same answer.

Decimal number:

A number that contains a decimal point.

Decimal point:

A dot separating the ones and tenths places in a decimal number.

Decrease:

To get smaller in size or number.

Denominator:

The bottom number of a fraction. The number below the line in a fraction.

Diagram:

A drawing that represents a mathematical situation.

Element:

A member of a set.

Equal:

Having the same measure or value.

Equation:

A mathematical statement that contains an = sign to show that two expressions are equal.

Equivalent:

Having the same value.

Even numbers:

Numbers that have 2 as a factor.

Factor:

A whole number which divides exactly into another number (with no remainder).

Finite:

Countable. Is not infinite. Does not go on forever.

Formula:

A general equation or rule.

Fraction:

A part of a whole.

Function:

A relation between two sets called the domain and range in which each member of the domain is related to precisely one member of the range.

Golden ratio:

A ratio of 1: 1.618

Greater than:

Bigger than. More than. Larger than.

Highest common factor (hcf):

The largest number that divides evenly into two or more numbers.

Improper fraction:

A fraction whose numerator (number on top line) is greater than its denominator (number on bottom line).

Increase:

Gets bigger in size or number.

Inequality:

A mathematical sentence that compares two unequal expressions using one of these symbols: $> < \leq \geq \neq$

Least common multiple (lcm):

The smallest number that is a common multiple of two or more numbers.

Structure and Properties (cont.)

Number

Mixed number:

A number written as a whole number with a fraction.

Multiple:

The product of a whole number and any other whole number.

Natural number:

A whole number, from 1 to infinity. These numbers are used for counting.

Negative integer:

A whole number that is less than 0.

Null set:

A set which contains no members.

Number line:

A line marked and graduated with numbers.

Numerator:

The top number of a fraction. The number above the line in a fraction.

Odd numbers:

Numbers that 2 will not divide exactly into.

Per:

For each. Out of. Divided by.

Percent (%):

Out of 100. A ratio that compares a number to 100 using the symbol %.

Pi (π):

The ratio of the circumference of any circle to its diameter. Approximately equal to 3.14 or $\frac{22}{7}$.

Place value:

The value of the position of a digit within a number.

Positive integer:

A whole number that is greater than 0.

Prime number:

A number that has exactly two factors, 1 and the number itself.

Product:

The result when two (or more) numbers are multiplied together.

Proportion:

A comparison between a part and the whole.

Ratio:

A comparison of two amounts, measures or numbers.

Recurring decimal:

A decimal which has repeating digits or a repeating pattern of digits.

Example: $\frac{1}{3} = 0.3333\dots$

Reduce a fraction:

To put a fraction into its simplest form.

Example: $\frac{4}{8} = \frac{1}{2}$

Rounding off:

A way of approximating a number.

Set:

A collection of distinct objects.

Squared:

To the power of two. The base number is multiplied by itself once. Example: $3^2 = 3 \times 3$

Square root:

A number that when multiplied by itself gives the original number.

Sum:

The addition of numbers together. The total amount.

Total:

The sum or whole amount. The total is got by addition.

Universal set:

The set which contains all the elements of all the sets that are being considered in a problem.

Venn diagram:

A diagram showing the relationships between sets.

Zero:

The number 0. Nil, nought, nothing.

Length

Breadth:

The width or distance from side to side.

Centimetre:

A unit of length. There are 100 centimetres in 1 metre.

Circumference:

The distance around the outer edge of a circle.

Dimensions:

The lengths of the sides of a shape. Refers to length, breadth and height.

Height:

The measurement from top to bottom.

Weight / Mass

Gram:

A unit of mass (weight). There are 1000 grams in 1 kilogram.

Kilogram:

A unit of mass (weight). In 1 kilogram there are 1000 grams.

Mass:

A measure of the amount of matter in an object.

Area

Area:

The size of space a surface takes up.

Square centimetre (cm²):

A unit of area. There are 10,000 square centimetres in 1 square metre.

Capacity / Volume

Capacity:

The amount a container can hold.

Volume:

The amount of space occupied by a 3-dimensional object.

Cubic metre (m³):

A unit of volume (capacity). In 1 cubic metre there are 1,000,000 cubic centimetres.

Measures and Measurement

Interval:

The distance between two points.

Length:

The distance from one end to the other.

Metre:

A unit of length. In 1 metre there are 100 centimetres.

Perimeter:

The distance around the boundary of a shape.

Width:

The distance from side to side. Also called the breadth.

Weight:

A measure of the heaviness of an object.

Total surface area:

The total area of all the faces (and curved surfaces) of a solid figure.

Square metre (m²):

A unit of area. In 1 square metre there are 10,000 square centimetres.



Temperature

Centigrade or celsius:

In this metric scale, at sea level the freezing temperature of water is 0°C and the boiling temperature is 100°C .

Degree:

A unit of temperature. There are two temperature scales: centigrade and fahrenheit.

Fahrenheit:

In this scale, at sea level the freezing temperature of water is 32°F and the boiling temperature is 212°F .

Measures and Measurement



Angles

Acute angle:

An angle that measures between 0° and 90° .

Angle:

The measure of the space between two straight lines that extend from a common point.

Complementary angles:

Two angles whose sum is 90° .

Conjugate angles:

Two angles whose sum is 360° .

Degree:

A unit for measuring the size of angles.

Exterior angle:

The angle found outside a polygon when one side is extended.

Interior angle:

An angle inside a polygon.

Obtuse angle:

An angle that is greater than 90° and less than 180° .

Opposite angles:

Angles that are vertically opposite.

Protractor:

An instrument used for measuring angles.

Reflex angle:

An angle that is greater than 180° but less than 360° .

Right angle:

An angle which measures 90° .

Straight angle:

An angle which measures 180° .

Supplementary angles:

Two angles whose sum is 180° .



Time

A.m.:

Ante meridiem. Any time between midnight and midday (noon).

Fortnight:

A unit of time. There are 14 days in a fortnight.

Hour:

A unit of time. There are 24 hours in one day. There are 60 minutes in one hour.

Interval:

The amount of time that has passed between two events.

Leap year:

Occurs every fourth year and has 366 days.

Minute:

A unit of time. There are 60 minutes in one hour. There are 60 seconds in one minute.

Month:

A unit of time. There are 12 months in a year.

P.m.:

Post meridiem. Any time between midday (noon) and midnight.

Second:

A unit of time. There are 60 seconds in one minute.

Measures and Measurement

Year:

A unit of time. There are 365 days in one year. There are 12 months in one year.



Speed

Speed:

A measure of how fast something is moving. To calculate speed: distance travelled ÷ time taken.

Kph:

Kilometres per hour.

Mph:

Miles per hour.

Per:

For each. Out of. Divided by.



Space and Properties of Space

Axis (axes):

A reference line (or pair of lines) from which distances are measured on a coordinate grid.

Clockwise:

In the same direction as the rotation of the hands of a clock.

Collinear:

A set of points lying in a straight line.

Coordinate grid:

A 2-dimensional grid in which location is described by its distances from the X and Y axes.

Coordinates:

An ordered pair of numbers that gives the location of a point in a coordinate grid.

Coplanar:

In the same plane.

Congruent:

Having exactly the same size and shape.

Counter-clockwise:

In a direction opposite to the direction that the hands of a clock rotate.

Horizontal:

Parallel to the horizon.

Intersect:

To cross over one another.

Latitude:

Distance north and south of the equator. Measured in degrees from 0° at the equator to 90° at each pole.

Line:

A straight path of points that has no end points. A line goes on forever in two directions.

Line segment:

A section of a line. A line segment has two end points.

Longitude:

The distance around the earth from a line running north and south through Greenwich, England. Measured in degrees from 0° at Greenwich.

Mid-point:

The middle point of a line segment.

Origin:

The intersection of the X-axis and the Y-axis in a coordinate plane. Its coordinates are (0,0).

Parallel lines:

Lines that never meet no matter how far they are extended.

Perpendicular:

Forming right angles.

Perpendicular bisector:

A line that divides a line segment in half and meets the segment at right angles.

Plane:

A flat surface. A plane extends indefinitely in all directions.

Point:

An exact location in space.

Quadrant:

(1) Any of the four sections of a coordinate grid that are separated by the X and Y axes. (2) A quarter of a circle or its circumference.

Three dimensional:

A shape having length, width and height.

Transformation:

A rule for moving every point in a figure to a new location.

Two dimensional:

A shape having length and width.

Vertical:

Perpendicular to the horizon.

X-axis:

The horizontal axis of the graph.

Y-axis:

The vertical axis of the graph.

Shape and Properties of Shape

Adjacent:

Immediately next to each other.

Altitude of a triangle:

The perpendicular distance from the highest point of a triangle ("vertex") to the opposite side.

Apex:

The point on a geometric shape that is farthest from the base.

Arc:

A part of the circumference of a circle.

Bisect:

To cut in half.

Centre of a circle:

A point which is equal distance from all points on the circumference.

Chord:

A straight line joining any two points on the circumference of a circle.

Circle:

A shape bounded by a continuous line which is always the same distance from the centre.

Circumference:

The distance around the outer edge of a circle.

Congruent:

Having the same shape and the same size.

Cube:

A solid shape with six square faces which are all equal in size.

Curve:

A line that is continuously bending.

Diagonal:

A line joining two non-adjacent vertices of a polygon.

Diameter:

A chord that passes through the centre of a circle.

Equilateral triangle:

A triangle that has three equal sides and three equal angles.

Exterior angle:

The angle formed outside a polygon when one side is extended.

Hemisphere:

Half of a sphere.

Hypotenuse:

The longest side in a right-angled triangle. The hypotenuse is always opposite the right angle.

Interior angle:

An angle inside a polygon.

Isosceles triangle:

A triangle that has two equal sides and two equal angles.

Line segment:

A part of a straight line.

Line of symmetry:

A line that divides a figure into two halves that are mirror images of each other.

Line symmetry:

If a figure can be folded along a line so that the two halves match exactly, then the figure has line symmetry.

Opposite angles:

Angles that are vertically opposite.

Parallelogram:

A four-sided shape whose opposite sides are equal and parallel.

Perimeter:

The distance around the boundary of a shape.

Perpendicular:

At right angles.

Polygon:

A shape which has three or more sides.

Pythagoras' theorem:

In any right angled triangle, the area of the square on the hypotenuse is equal to the sum of the areas of the squares on the other two sides.

Shape and Properties of Shape (cont.)

Quadrant:

(1) Any of the four sections of a coordinate grid that are separated by the X and Y axes. (2) A quarter of a circle or its circumference.

Radius:

The distance from the centre of a circle to any point on its circumference. Half the length of the diameter.

Rectangle:

A four-sided shape whose opposite sides are equal and parallel and whose interior angles are all 90° .

Right angled triangle:

A triangle that has an interior angle of 90° .

Scalene triangle:

A triangle where no two sides or angles are equal in measure.

Sector:

A part of a circle enclosed by an arc and two radii.

Segment:

A part of a circle cut off by a chord.

Semicircle:

Half a circle.

Square:

A four sided shape whose sides are equal in length and whose interior angles are all 90° .

Tangent:

A straight line that touches a circle at one point only.

Triangle:

A polygon with 3 angles and 3 sides.

Vertex:

A point at which lines meet.

Vertical:

At right angles to the horizon.



Data and Data Handling

Array:

An arrangement of objects in equal rows.

Bar chart:

A graph that uses parallel bars of equal width to display information.

Column:

Items arranged in a vertical line.

Data:

Numerical information that is used in statistics.

Frequency:

The number of times a particular item appears in a set of data.

Graph:

A drawing that shows a relationship between sets of data.

Mean:

The average of a number of different amounts. To calculate the mean: $\text{sum of numbers} \div \text{number of numbers}$.

Median:

When numbers are arranged from least to greatest, the middle number is the median.

Mode:

The number that occurs most often in a set of numbers.

Pictogram (Pictograph):

A graph that uses pictures or symbols to represent quantities or frequencies of data.

Pie chart:

A circular diagram which is used to display data as sectors or sections of a circle (360°).

Range:

The difference between the greatest and the least value in a set of data.

Row:

Items arranged in a horizontal line.

Tally:

Keeping count or score. To record by making marks.

Probability

Certain event:

An event that will definitely happen. A certain event has a probability of one.

Chance:

The likelihood that a particular outcome will happen.

Equally likely:

Events that have the same chance or probability.

Event:

A possible outcome. Something that may happen.

Experiment:

An investigation in probability.

Favourable outcome:

In probability, the outcome you are interested in measuring.

Frequency:

The number of times that an event has occurred.

Impossible event:

An event that will definitely not happen. An event with a probability of zero.

Odds:

The ratio of favourable outcomes to unfavourable outcomes.

Outcome:

One of the possible results in a probability experiment.

Probability:

The measure of how likely an event is. Its value lies between 0 (impossible event) and 1 (certain event).

Random selection:

A chance pick from a number of items.

Tree diagram:

A diagram shaped like a tree. Helps in showing possible outcomes of an event.



Patterns and Symmetries

Arithmetic progression:

A sequence (series) of numbers in which there is a common difference between any two adjacent elements of the sequence. Example: 2, 4, 6, 8

Consecutive:

Numbers that follow each other in an unbroken sequence.

Fibonacci sequence:

A series of numbers in which each number is the sum of the two numbers before it. Example: 1, 1, 2, 3, 5, 8, 13.....

Half turn:

A rotation of 180° about a point.

Line of symmetry:

A line that divides a figure into two halves that are mirror images of each other.

Line symmetry:

If a figure can be folded along a line so that the two halves match exactly, then the figure has line symmetry.

Point (central) symmetry:

A figure that can be turned exactly 180° about a point and fit exactly onto itself has point symmetry.

Quarter turn:

A rotation of 90° about a point.

Reflection (flip):

A transformation creating a mirror image of a figure on the opposite side of a line.

Basic algebra

Algebra:

An area of mathematics where numbers are represented by letters.

Constant:

Anything that has a fixed value. Its value never changes or varies. Example: 7

Equation:

A mathematical sentence that contains an = sign to show that two expressions are equal.



Repeating decimal:

A decimal which has repeating digits or a repeating pattern of digits. Example: $\frac{1}{3} = 0.3333....$

Revolution:

A rotation of 360° about a point.

Rotation (turn):

A transformation in which a figure is turned a given angle and direction around a point.

Sequence (Series):

A set of numbers arranged in a special order or pattern.

Symmetry:

An object is symmetrical when one half is a mirror image of the other half.

Transformation:

A rule for moving every point in a figure to a new location.

Translation:

A transformation that slides a figure a given distance in a given direction.

Turn centre:

The point around which a figure is rotated.

Expression:

A combination of signs, variables, numbers and symbols that represents a mathematical relationship. Example: $3x + 2y$

Inequality:

A mathematical sentence that compares two unequal expressions using one of these symbols: $< > \leq \geq \neq$

Variable:

A letter used to represent an unknown number. Anything that does not have a fixed value.

Length

Perimeter of a rectangle:

$$2l + 2w \quad (l: \text{length})(w: \text{width})$$

Perimeter of a square:

$$4s \quad (s: \text{length of side})$$

Circumference of a circle:

$$2\pi r \text{ or } \pi d \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right)(r: \text{radius}) \\ (d: \text{diameter})$$

Perimeter of a triangle:

$$S1 + s2 + s3 \quad (s1: \text{length of one side}) \\ (s2: \text{length of another side}) \\ (s3: \text{length of third side})$$

Area

Area of a triangle:

$$\frac{1}{2}bh \quad (b: \text{length of base}) \\ (h: \text{length of the perpendicular line segment from the base to the opposite vertex})$$

Area of a rectangle:

$$Lb \quad (l: \text{length})(b: \text{breadth})$$

Area of a square:

$$S^2 \quad (s: \text{length of a side})$$

Area of a parallelogram:

$$Bh \quad (b: \text{length of base}) \\ (h: \text{length of the perpendicular line segment from the base to the opposite vertex})$$

Area of a disc:

$$\pi r^2 \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right) \\ (r: \text{radius})$$

Volume

Volume of a rectangular prism:

$$Lwh \quad (l: \text{length}) \\ (w: \text{width}) \\ (h: \text{height})$$

Volume of a cube:

$$S^3 \quad (s: \text{length of a side})$$

Key Measurement Formulae

Perimeter of a quadrilateral:

$$S1 + s2 + s3 + s4 \quad (s1: \text{length of one side}) \\ (s2: \text{length of another side}) \\ (s3: \text{length of third side}) \\ (s4: \text{length of fourth side})$$

Perimeter of a parallelogram:

$$s1 + s2 + s3 + s4 \quad (s1: \text{length of one side}) \\ (s2: \text{length of another side}) \\ (s3: \text{length of third side}) \\ (s4: \text{length of fourth side})$$

Surface area of a rectangular prism:

$$2lw + 2lh + 2wh \quad (l: \text{length}) \\ (w: \text{width}) \\ (h: \text{height})$$

Surface area of a cube:

$$6s^2 \quad (s: \text{length of a side})$$

Curved surface area of a cylinder:

$$2\pi rh \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right) \\ (r: \text{radius}) \\ (h: \text{height})$$

Total surface area of a cylinder:

$$2\pi rh + 2\pi r^2 \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right) \\ (r: \text{radius})(h: \text{height})$$

Curved surface area of a sphere:

$$4\pi r^2 \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right) \\ (r: \text{radius})$$

Volume of a cylinder:

$$\pi r^2h \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right) \\ (r: \text{radius}) \\ (h: \text{height})$$

Volume of a sphere:

$$\frac{4}{3}\pi r^3 \quad \left(\pi : \frac{22}{7} \text{ or } 3.14\right)(r: \text{radius})$$

Appendix

Master-Templates

The Appendix section of this “Key Definitions in Numeracy” resource book contains master-templates of the “Sticky Maths Facts Resource Book for Students” sheets. There are eleven master-templates in total in the Appendix; eight of these master-templates have been selected and used to produce the content of the “Sticky Maths Facts Resource Book for Students”.

Number: Computation and Operations

Addition:

To get the total or sum. To join two or more numbers together to get one number.



Cubed:

To raise a number to the power of three. Example: "4 cubed" is written as $4^3 = 4 \times 4 \times 4 = 64$



Difference:

The result got by subtracting one number or quantity from another.



Division:

To separate into equal groups. To subdivide into equal groupings.



Double:

Multiply by two. Twice as much.



Estimate:

A rough calculation or approximation.



Evaluate:

Work it out! Do the calculations to find the answer.



Flow chart:

A diagram showing the order of the steps to be taken to solve a problem.



Inverse operation:

The reverse operation. Examples: Addition is the inverse of subtraction. Division is the inverse of multiplication.



Mental calculation:

Calculating the exact answer in your head without using pen and paper or calculator.



Minus:

To subtract. To take one quantity or number away from another. To find the difference.



Multiplication:

To find the product. A shorter way of adding a set of equal numbers together. Example: $5 + 5 + 5 + 5 + 5 = 5 \times 5$



Power of (a number):

The number of times a base number or quantity is to be multiplied by itself. Example: "5 to the power of 3" is written as $5^3 = 5 \times 5 \times 5 = 125$



Product:

The result when two (or more) numbers are multiplied together.



Rounding off:

A way of approximating an answer or number.



Squared:

To raise a number to the power of two. Example: "4 squared" is written as $4^2 = 4 \times 4 = 16$



Square root:

A number that when multiplied by itself gives the original number.



Subtraction:

To take one number from another. To get the difference.



Sum:

The addition of numbers together. The total or whole amount.



Take away:

To subtract. To take one quantity or number away from another.



Total:

The sum or whole amount. The total is got by addition.



Number: Structure and Properties

Average:

The total of all scores or items \div by how many scores or items there were.



Decrease:

To get smaller in size or number.



Denominator:

The bottom number of a fraction. The number below the line in a fraction.



Equation:

A mathematical statement that contains an = sign to show that two expressions are equal.



Factor:

A whole number which divides exactly into another number (with no remainder).



Finite:

Countable. Is not infinite. Does not go on forever.



Formula:

A general equation or rule.



Function:

A relation between two sets called the domain and range in which each member of the domain is related to precisely one member of the range.



Highest common factor (hcf):

The largest number that divides evenly into two or more numbers.



Improper fraction:

A fraction whose numerator (number on top line) is greater than its denominator (number on bottom line).



Inequality:

A mathematical sentence that compares two unequal expressions using one of these symbols: $<$ $>$ \leq \geq \neq



Least common multiple (lcm):

The smallest number that is a common multiple of two or more numbers.



Mixed number:

A number written as a whole number with a fraction.



Multiple:

The product of a whole number and any other whole number.



Natural number:

A whole number, from 1 to infinity. These numbers are used for counting.



Numerator:

The top number of a fraction. The number above the line in a fraction.



Prime number:

A number that has exactly two factors, 1 and the number itself.



Proportion:

A comparison between a part and the whole.



Ratio:

A comparison of two amounts, measures or numbers.



Recurring decimal:

A decimal which has repeating digits or a repeating pattern of digits.

Example: $\frac{1}{3} = 0.3333\dots$



Square Root:

A number that when multiplied by itself gives the original number.



Number: Structure and Properties (cont.)

Associative law:

In addition and multiplication, 3 numbers may be added or multiplied together in any order and you will get the same answer.



Commutative law:

In addition and multiplication, 2 numbers may be added or multiplied together in any order and you will get the same answer.



Decimal number:

A number that contains a decimal point.



Decimal point:

A dot separating the ones and tenths places in a decimal number.



Diagram:

A drawing that represents a mathematical situation.



Equal:

Having the same measure or value.



Equivalent:

Having the same value.



Even numbers:

Numbers that have 2 as a factor.



Fraction:

A part of a whole.



Greater than:

Bigger than. More than. Larger than.



Increase:

Gets bigger in size or number.



Negative integer:

A whole number that is less than 0.



Number line:

A line marked and graduated with numbers.



Odd numbers:

Numbers that 2 will not divide exactly into.



Percent (%):

Out of 100. A ratio that compares a number to 100 using the symbol %.



Pi (π):

The ratio of the circumference of any circle to its diameter. Approximately equal to 3.14 or $\frac{22}{7}$.



Place value:

The value of the position of a digit within a number.



Positive integer:

A whole number that is greater than 0.



Reduce a fraction:

To put a fraction into its simplest form. Example: $\frac{4}{8} = \frac{1}{2}$



Rounding off:

A way of approximating a number.



Zero:

The number 0. Nil, nought, nothing.



Measures and Measurement

Acute angle:

An angle that measures between 0° and 90° .

**Angle:**

The measure of the space between two straight lines that extend from a common point.

**Area:**

The size of space a surface takes up.

**Capacity:**

The amount a container can hold.

**Circumference:**

The distance around the outer edge of a circle.

**Complementary angles:**

Two angles whose sum is 90° .

**Degree:**

A unit for measuring the size of angles.

**Dimensions:**

The lengths of the sides of a shape. Refers to length, breadth and height.

**Interval:**

(1) The distance between two points.
(2) The amount of time that has passed between two events

**Mass:**

A measure of the amount of matter in an object.

**Minute:**

A unit of time. There are 60 minutes in one hour.
There are 60 seconds in one minute.

**Obtuse angle:**

An angle that is greater than 90° and less than 180° .

**Opposite angles:**

Angles that are vertically opposite.

**Perimeter:**

The distance around the boundary of a shape.

**Reflex angle:**

An angle that is greater than 180° but less than 360° .

**Right angle:**

An angle which measures 90° .

**Straight angle:**

An angle which measures 180° .

**Supplementary angles:**

Two angles whose sum is 180° .

**Total surface area:**

The total area of all the faces (and curved surfaces) of a solid figure.

**Volume:**

The amount of space occupied by a 3-dimensional object.

**Year:**

A unit of time. There are 365 days in one year. There are 12 months in one year.



Measures and Measurement (cont.)

A.m.:

Ante meridiem. Any time between midnight and midday (noon).



Breadth:

The width or distance from side to side.



Centimetre:

A unit of length. There are 100 centimetres in 1 metre.



Conjugate angles:

Two angles whose sum is 360° .



Cubic metre (m³):

A unit of volume (capacity).
In 1 cubic metre there are 1,000,000 cubic centimetres.



Exterior angle:

The angle found outside a polygon when one side is extended.



Gram:

A unit of mass (weight).
There are 1000 grams in 1 kilogram.



Height:

The measurement from top to bottom.



Hour:

A unit of time. There are 24 hours in one day. There are 60 minutes in one hour.



Interior angle:

An angle inside a polygon.



Kilogram:

A unit of mass (weight).
In 1 kilogram there are 1000 grams.



Length:

The distance from one end to the other.



Metre:

A unit of length. In 1 metre there are 100 centimetres.



P.m.:

Post meridiem. Any time between midday (noon) and midnight.



Protractor:

An instrument used for measuring angles.



Second:

A unit of time. There are 60 seconds in one minute.



Speed:

A measure of how fast something is moving. To calculate speed:
distance travelled \div time taken.



Square centimetre (cm²):

A unit of area. There are 10,000 square centimetres in 1 square metre.



Square metre (m²):

A unit of area. In 1 square metre there are 10,000 square centimetres.



Weight:

A measure of the heaviness of an object.



Width:

The distance from side to side.
Also called the breadth.



Space and Properties of Space

Axis (axes):

A reference line (or pair of lines) from which distances are measured on a coordinate grid.

**Clockwise:**

In the same direction as the rotation of the hands of a clock.

**Collinear:**

A set of points lying in a straight line.

**Coordinate grid:**

A 2-dimensional grid in which location is described by its distances from the X and Y axes.

**Coordinates:**

An ordered pair of numbers that gives the location of a point in a coordinate grid.

**Coplanar:**

In the same plane.

**Congruent:**

Having exactly the same size and shape.

**Counter-clockwise:**

In a direction opposite to the direction that the hands of a clock rotate.

**Horizontal:**

Parallel to the horizon.

**Intersect:**

To cross over one another.

**Mid-point:**

The middle point of a line segment.

**Origin:**

The intersection of the X-axis and the Y-axis in a coordinate plane. Its coordinates are (0,0).

**Parallel lines:**

Lines that never meet no matter how far they are extended.

**Perpendicular:**

Forming right angles.

**Perpendicular bisector:**

A line that divides a line segment in half and meets the segment at right angles.

**Plane:**

A flat surface. A plane extends indefinitely in all directions.

**Point:**

An exact location in space.

**Quadrant:**

(1) Any of the four sections of a coordinate grid that are separated by the X and Y axes. (2) A quarter of a circle or its circumference.

**Vertical:**

Perpendicular to the horizon.

**X-axis:**

The horizontal axis of the graph.

**Y-axis:**

The vertical axis of the graph.



Shape and Properties of Shape

Arc:

A part of the circumference of a circle.

**Chord:**

A straight line joining any two points on the circumference of a circle.

**Circle:**

A shape bounded by a continuous line which is always the same distance from the centre.

**Circumference:**

The distance around the outer edge of a circle.

**Cube:**

A solid shape with six square faces which are all equal in size.

**Diameter:**

A chord that passes through the centre of a circle.

**Equilateral triangle:**

A triangle that has three equal sides and three equal angles.

**Hypotenuse:**

The longest side in a right-angled triangle. The hypotenuse is always opposite the right angle.

**Isosceles triangle:**

A triangle that has two equal sides and two equal angles.

**Line segment:**

A part of a straight line.

**Parallelogram:**

A four-sided shape whose opposite sides are equal and parallel.

**Perpendicular:**

At right angles.

**Pythagoras' theorem:**

In any right angled triangle, the area of the square on the hypotenuse is equal to the sum of the areas of the squares on the other two sides.

**Radius:**

The distance from the centre of a circle to any point on its circumference. Half the length of the diameter.

**Right angled triangle:**

A triangle that has an interior angle of 90° .

**Scalene triangle:**

A triangle where no two sides or angles are equal in measure.

**Sector:**

A part of a circle enclosed by an arc and two radii.

**Segment:**

A part of a circle cut off by a chord.

**Tangent:**

A straight line that touches a circle at one point only.

**Triangle:**

A polygon with 3 angles and 3 sides.

**Vertical:**

At right angles to the horizon.



Shape and Properties of Shape (cont.)

Adjacent:

Immediately next to each other.

**Altitude of a triangle:**

The perpendicular distance from the highest point of a triangle ("vertex") to the opposite side.

**Apex:**

The point on a geometric shape that is farthest from the base.

**Bisect:**

To cut in half.

**Centre of a circle:**

A point which is equal distance from all points on the circumference.

**Congruent:**

Having the same shape and the same size.

**Curve:**

A line that is continuously bending.

**Diagonal:**

A line joining two non-adjacent vertices of a polygon.

**Exterior angle:**

The angle formed outside a polygon when one side is extended.

**Hemisphere:**

Half of a sphere.

**Interior angle:**

An angle inside a polygon.

**Line of symmetry:**

A line that divides a figure into two halves that are mirror images of each other.

**Line symmetry:**

If a figure can be folded along a line so that the two halves match exactly, then the figure has line symmetry.

**Opposite angles:**

Angles that are vertically opposite.

**Perimeter:**

The distance around the boundary of a shape.

**Polygon:**

A shape which has three or more sides.

**Quadrant:**

(1) Any of the four sections of a coordinate grid that are separated by the X and Y axes. (2) A quarter of a circle or its circumference.

**Rectangle:**

A four-sided shape whose opposite sides are equal and parallel and whose interior angles are all 90° .

**Semicircle:**

Half a circle.

**Square:**

A four sided shape whose sides are equal in length and whose interior angles are all 90° .

**Vertex:**

A point at which lines meet.



Data, Data Handling and Probability

Bar chart:

A graph that uses parallel bars of equal width to display information.



Column:

Items arranged in a vertical line.



Data:

Numerical information that is used in statistics.



Frequency:

(1) The number of times a particular item appears in a set of data.

(2) The number of times that an event has occurred.



Graph:

A drawing that shows a relationship between sets of data.



Mean:

The average of a number of different amounts. To calculate the mean: $\text{sum of numbers} \div \text{number of numbers}$.



Median:

When numbers are arranged from least to greatest, the middle number is the median.



Mode:

The number that occurs most often in a set of numbers.



Pie chart:

A circular diagram which is used to display data as sectors or sections of a circle (360°).



Range:

The difference between the greatest and the least value in a set of data.



Certain event:

An event that will definitely happen. A certain event has a probability of one.



Chance:

The likelihood that a particular outcome will happen.



Equally likely:

Events that have the same chance or probability.



Event:

A possible outcome. Something that may happen.



Favourable outcome:

In probability, the outcome you are interested in measuring.



Impossible event:

An event that will definitely not happen. An event with a probability of zero.



Odds:

The ratio of favourable outcomes to unfavourable outcomes.



Outcome:

One of the possible results in a probability experiment.



Probability:

The measure of how likely an event is. Its value lies between 0 (impossible event) and 1 (certain event).



Random selection:

A chance pick from a number of items.



Tree diagram:

A diagram shaped like a tree. Helps in showing possible outcomes of an event.



Patterns, Symmetries and Basic Algebra

Arithmetic progression:

A sequence (series) of numbers in which there is a common difference between any two adjacent elements of the sequence. Example: 2, 4, 6, 8



Consecutive:

Numbers that follow each other in an unbroken sequence.



Half turn:

A rotation of 180° about a point.



Line of symmetry:

A line that divides a figure into two halves that are mirror images of each other.



Line symmetry:

If a figure can be folded along a line so that the two halves match exactly, then the figure has line symmetry.



Point (central) symmetry:

A figure that can be turned exactly 180° about a point and fit exactly onto itself has point symmetry.



Quarter turn:

A rotation of 90° about a point.



Reflection (flip):

A transformation creating a mirror image of a figure on the opposite side of a line.



Repeating decimal:

A decimal which has repeating digits or a repeating pattern of digits. Example: $\frac{1}{3} = 0.3333....$



Revolution:

A rotation of 360° about a point.



Rotation (turn):

A transformation in which a figure is turned a given angle and direction around a point.



Sequence (Series):

A set of numbers arranged in a special order or pattern.



Symmetry:

An object is symmetrical when one half is a mirror image of the other half.



Transformation:

A rule for moving every point in a figure to a new location.



Translation:

A transformation that slides a figure a given distance in a given direction.



Turn centre:

The point around which a figure is rotated.



Algebra:

An area of mathematics where numbers are represented by letters.



Equation:

A mathematical sentence that contains an = sign to show that two expressions are equal.



Expression:

A combination of signs, variables, numbers and symbols that represents a mathematical relationship. Example: $3x + 2y$



Inequality:

A mathematical sentence that compares two unequal expressions using one of these symbols: $< > \leq \geq \neq$



Variable:

A letter used to represent an unknown number. Anything that does not have a fixed value.



Key Measurement Formulae

Perimeter of a rectangle:

$$2l + 2w$$

(l: length)(w: width)



Perimeter of a square:

$$4s$$

(s: length of side)



Circumference of a circle:

$$2\pi r \text{ or } \pi d$$

($\pi : \frac{22}{7}$ or 3.14)(r: radius)

(d: diameter)



Perimeter of a triangle:

$$s1 + s2 + s3$$

(s1: length of one side)

(s2: length of another side)

(s3: length of third side)



Perimeter of a quadrilateral:

$$s1 + s2 + s3 + s4$$

(s1: length of one side)

(s2: length of another side)

(s3: length of third side)

(s4: length of fourth side)



Perimeter of a parallelogram:

$$s1 + s2 + s3 + s4$$

(s1: length of one side)

(s2: length of another side)

(s3: length of third side)

(s4: length of fourth side)



Area of a triangle:

$$\frac{1}{2}bh$$

(b: length of base)

(h: length of the perpendicular line segment from the base to the opposite vertex)



Area of a rectangle:

$$lb$$

(l: length)

(b: breadth)



Area of a square:

$$s^2$$

(s: length of a side)



Area of a parallelogram:

$$bh$$

(b: length of base)

(h: length of the perpendicular line segment from the base to the opposite vertex)



Area of a disc:

$$\pi r^2$$

($\pi : \frac{22}{7}$ or 3.14)

(r: radius)



Surface area of a rectangular prism:

$$2lw + 2lh + 2wh$$

(l: length)

(w: width)

(h: height)



Surface area of a cube:

$$6s^2$$

(s: length of a side)



Curved surface area of a cylinder:

$$2\pi rh$$

($\pi : \frac{22}{7}$ or 3.14)

(r: radius)

(h: height)



Total surface area of a cylinder:

$$2\pi rh + 2\pi r^2$$

($\pi : \frac{22}{7}$ or 3.14)

(r: radius)(h: height)



Curved surface area of a sphere:

$$4\pi r^2$$

($\pi : \frac{22}{7}$ or 3.14)

(r: radius)



Volume of a rectangular prism:

$$lwh$$

(l: length)

(w: width)

(h: height)



Volume of a cube:

$$s^3$$

(s: length of a side)



Volume of a cylinder:

$$\pi r^2h \quad (\pi : \frac{22}{7} \text{ or } 3.14)$$

(r: radius)

(h: height)



Volume of a sphere:

$$\frac{4}{3}\pi r^3$$

($\pi : \frac{22}{7}$ or 3.14)(r: radius)



Key units of measurement:

Length: Metre (m)

Area: Square metre (m²)

Volume: Cubic metre (m³)



Key Definitions in **Numeracy**