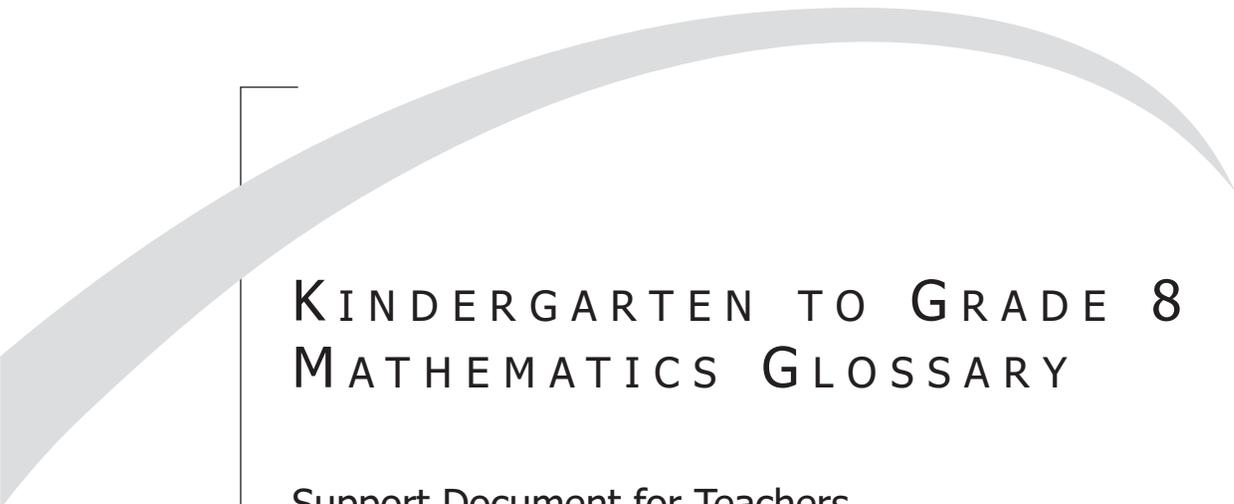


# Kindergarten to Grade 8 Mathematics Glossary

Support Document for Teachers





KINDERGARTEN TO GRADE 8  
MATHEMATICS GLOSSARY

Support Document for Teachers

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# KINDERGARTEN TO GRADE 8 MATHEMATICS

## GLOSSARY: SUPPORT DOCUMENT FOR TEACHERS

### Introduction

#### Audience and Purpose

This glossary, intended for Manitoba teacher use only, provides an understanding of the mathematical terms used in Kindergarten to Grade 8 mathematics, as reflected in the following curriculum document:

Manitoba Education, Citizenship and Youth. *Kindergarten to Grade 8 Mathematics: Manitoba Curriculum Framework of Outcomes*. Winnipeg, MB: Manitoba Education, Citizenship and Youth, 2008. Available online at [www.edu.gov.mb.ca/k12/cur/math/framework\\_k-8/index.html](http://www.edu.gov.mb.ca/k12/cur/math/framework_k-8/index.html).

All teachers are encouraged to become familiar with these mathematical terms and use them consistently throughout a student's educational programming.

The mathematical terms are listed in alphabetical order. Illustrative examples are provided for some terms.

### Mathematical Terms

#### **abstract**

The symbolic representation of a concrete idea.

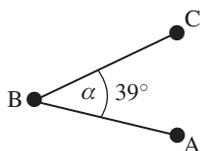
#### **accurate**

How close a numerical measure or calculation is to its actual value.

#### **acute angle**

An angle whose measure is greater than  $0^\circ$  and less than  $90^\circ$ .

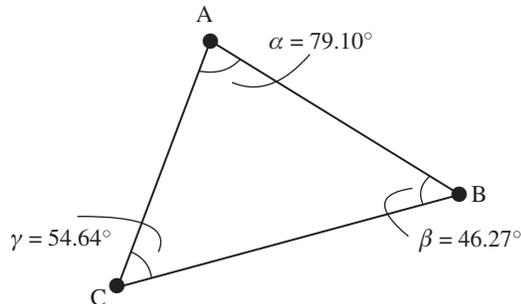
*Example*



**acute triangle**

A triangle in which all three angles are acute.

*Example*

**add**

To combine two or more quantities to find one quantity called a **total** or a **sum**.

**addend**

Any of the numbers in a designated sum of two or more numbers (e.g., in  $3 + 5 + 1 = 9$ , the numbers 3, 5, and 1 are addends).

**addition**

A mathematical operation of combining two or more numbers into a sum.

**addition fact**

An addition of two single-digit addends producing sums to 18.

**addition sentence**

An equation showing the sum of two or more numbers (e.g.,  $13 + 8 = 21$ ).

**additive inverse**

A number that, when added to a given number, results in a sum of 0; the opposite of a number (e.g.,  $-3$  is the additive inverse of 3 because  $-3 + 3 = 0$ ). (See **opposite integers**.)

**algebra**

The branch of mathematics that uses letters, symbols, and/or characters to represent numbers and express mathematical relationships.

**algebraic expression**

A mathematical phrase that is written using one or more variables and constants, but does not contain a relation symbol ( $<$ ,  $>$ ,  $=$ ,  $\neq$ ) (e.g.,  $3y + 6$ ).

### algebraic term

The addends of an algebraic expression involving constant(s) and at least one variable.

*Examples*

$3xy$  contains one algebraic term:  $3xy$

$5x^2 - 3y$  contains two algebraic terms:  $5x^2$  and  $-3y$

$2x^2 - 4xy + 7 + 6y$  contains four terms, three of which are algebraic:  $2x^2$ ,  $-4xy$ , and  $6y$

### algorithm

An explicit step-by-step procedure for performing a mathematical computation or for solving a mathematical problem.

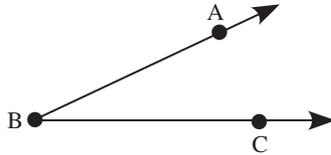
### analog clock

A clock with a minute hand and an hour hand.

### angle

A geometric figure formed by two rays or line segments (also called **arms**) with a common endpoint (called a **vertex**). The measure of an angle is a number representing the spread of the two rays of the angle.

*Example*

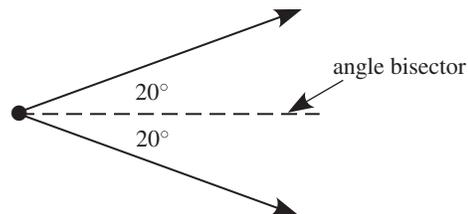


$\angle ABC$  has its vertex at point B.  
 $\overrightarrow{BA}$  and  $\overrightarrow{BC}$  are rays.

### angle bisector

A line segment or ray that divides an angle into two congruent angles.

*Example*



**annexing**

The process, within the context of mental mathematics strategies, of adding zeros when one factor is a multiple of a power of 10 (e.g., in  $3 \times 400$ , think  $3 \times 4$ , and then add two zeros).

**ante meridiem (ante meridian) (a.m.)**

Before noon; the time between midnight (12:00 a.m.) and noon (12:00 p.m.).

**apex**

The point on a figure relative to some baseline or plane. The apex of a cone is also called the **vertex**.

**approximation**

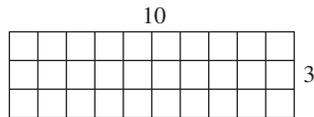
A mathematical quantity that estimates a desired quantity.

**area**

The measure of the interior surface of a closed region or figure; area is measured in square units.

*Example*

The area of the following rectangle is 30 square units.

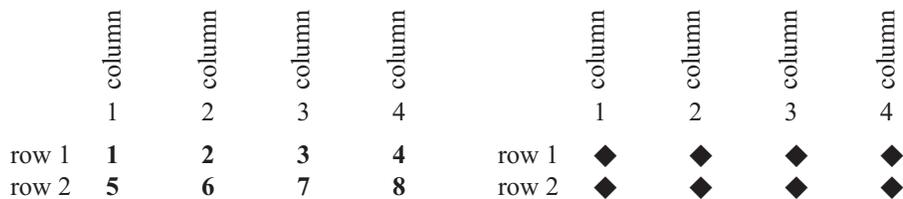


**arithmetic expression (See numerical expression.)**

**array**

A set of objects or numbers arranged in an order, usually in rows and/or columns.

*Examples*



**ascending order**

Arranged in order from least to greatest or from smallest to largest.

**associative property**

A property of real numbers that states that the sum or product of a set of numbers is the same, regardless of how the numbers are grouped.

*Examples*

**Addition**

$$2 + (3.5 + 1.3) = (2 + 3.5) + 1.3$$

**Multiplication**

$$-6 \times (18 \times 7) = (-6 \times 18) \times 7$$

**attribute(s)**

The characteristic(s) of a set of items that allow(s) them to be sorted, classified, and interpreted.

Mathematical attributes include size and shape, number of sides, and size of angles.

Non-mathematical attributes include colour and purpose.

Graphical attributes include title, axes, intervals, and legend.

**axes**

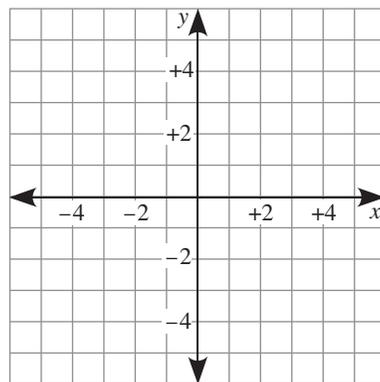
The plural form of axis; the horizontal and vertical lines dividing a coordinate plane into four quadrants.

**axis**

A horizontal line or a vertical line used in the Cartesian coordinate system to locate a point on the Cartesian (coordinate) plane.

*Example*

The figure below illustrates the horizontal axis ( $x$ ) and the vertical axis ( $y$ ).



## balance

Can be used in the following ways:

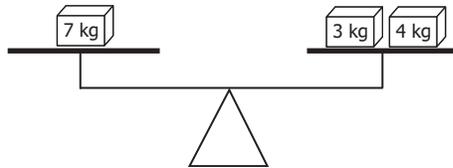
A balance is a scale with a beam. It is used to compare weights placed on each side of the beam.

When the weights placed on each side of the beam are equal, there is balance, or balance has been achieved.

When the two sides on an equation are equivalent, there is balance, or balance has been achieved.

### Example

In the illustration below, the scale has a 7 kg weight on the left and a 3 kg and a 4 kg weight on the right. Since  $3 + 4 = 7$ , the weights on each side of the scale are equal and there is balance.



Similarly, in the equation  $7 = 3 + 4$ , both sides of the equation are balanced.

## bar graph

A graph that uses horizontal or vertical bars to display data.

### Example

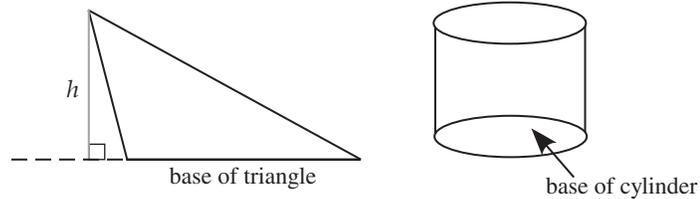


**base**

Can be used in the following ways:

A particular side or face of a geometric figure.

*Examples*



A number that is raised to an exponent.

*Example*

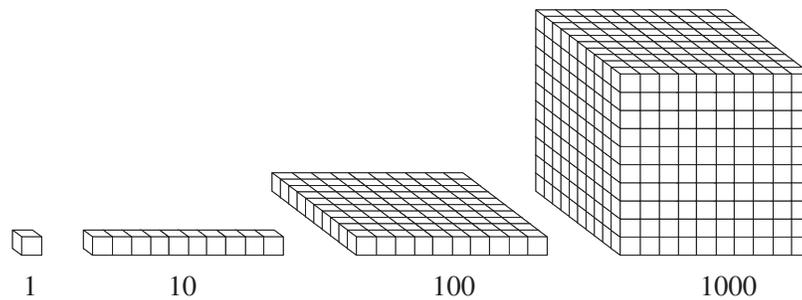
In  $2^3$ , 2 is the base and 3 is the exponent.

**base-10 materials**

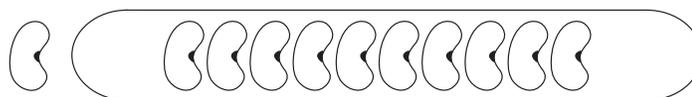
Materials used to represent numbers (whole numbers or decimal); different materials represent different place value units of numbers.

*Examples*

**Base-10 Blocks**



**Beans and Popsicle Sticks**



## base ten number system

A place value number system in which ten digits, 0 through 9, are used to represent a number, and the value of each place is ten times the value of the place to its right; the value of any digit in the number is the product of that digit and its place value.

*Example*

Hundred billions	Ten billions	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones	.	and	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths	Ten-millionths	Hundred-millionths
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10 ones = 1 ten

10 tens = 1 hundred

10 hundreds = 1 thousand

10 thousands = 1 ten thousand

10 ten thousands = 1 hundred thousand

10 hundred thousands = 1 million

10 tenths = 1 one

10 hundredths = 1 tenth

10 thousandths = 1 hundredth

10 ten-thousandths = 1 thousandth

10 hundred-thousandths = 1 ten-thousandth

10 millionths = 1 hundred-thousandth

## benchmark

Something (e.g., a number) that serves as a reference to which something else (e.g., another number) may be compared (e.g., In the question, “Is the number 4 closer to the number 1 or to the number 5?” the numbers 1 and 5 are benchmarks.).

## between

Given two numbers, another number is said to be between those two numbers if it is greater than the first but less than the second (e.g., the whole numbers between 1 and 5 are 2, 3, and 4).

## bisect

To divide a geometric figure into two congruent parts.

## bisector

A line segment, ray, line, or plane that divides a geometric figure into two congruent halves.

## calculate

To compute; to perform the indicated operation(s).

## capacity

Can be used in the following ways:

In general, capacity refers to an amount a container can, should, or does hold.

In science, capacity refers to the amount of liquid a container can hold, expressed in units (e.g., litres [L], millilitres [mL]).

In mathematics, capacity means the same thing as **volume**. In mathematics, both capacity and volume are represented by the number of cubes (and parts of cubes) of a given size it takes to fill an object.

## cardinal number

A number that indicates how many objects are in a set.

## cardinality

A counting principle stating that the last (cardinal) number counted represents the number of objects in that set.

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**Note:** If students need to recount, they don't understand the principle.

## Carroll diagram

A chart used to sort and display items by attributes of two categories.

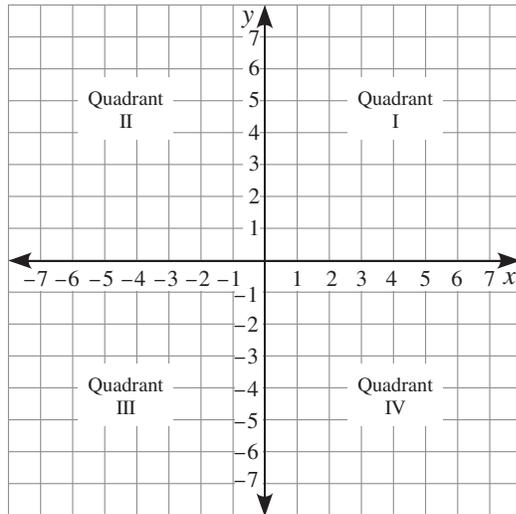
*Example*

	Blue	Not Blue
Triangle		
Rectangle		

## Cartesian plane

The plane formed by a horizontal axis and a vertical axis, often labelled the  $x$ -axis and  $y$ -axis respectively; contains quadrants 1 to 4 (the quadrants are often labelled using Roman numerals I to IV).

*Example*



## centimetre (cm)

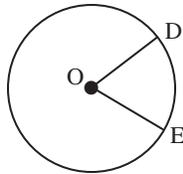
A metric unit of length that is equal to one-hundredth of a metre; 1 cm equals 0.01 m.

## central angle

An angle whose vertex is at the centre of a circle and whose sides contain radii of the circle.

*Example*

$\angle DOE$  is a central angle of circle O.



## certain event

An event that has a 100% chance of occurring (e.g., drawing an odd number when selecting one number from a bag containing six slips of paper with the numbers 1, 3, 5, 7, 9, and 11 on them).

**characteristic**

A distinguishing trait, quality, property, or attribute.

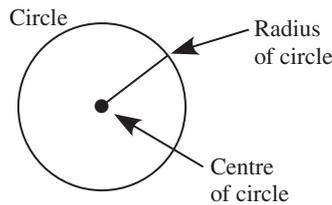
**chart**

A diagram that illustrates information in the form of a table, graph, or picture.

**circle**

All points on a flat surface that are the same distance from a fixed point. The fixed point is called the centre of the circle. The distance from the centre of the circle to any point on the circle is called the radius of the circle.

*Example*



**circle graph (pie graph)**

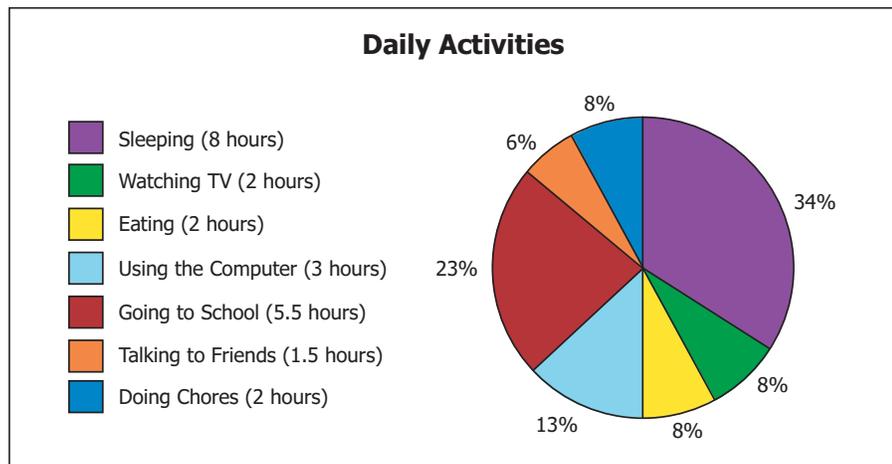
A graph in which the data is represented by sectors (parts) of a circle (whole); the total of all the sectors should be 100% of the data.

Each section of the circle represents a part or percentage of the whole.

Note that circle graphs

- show the ratio of each part to the whole, not quantities
- are almost always made from data converted to percentage of the total
- show ratios; therefore, comparisons can be made between different-sized quantities

*Example*



**circumference**

The distance around (perimeter of) a circle, calculated by multiplying the length of the diameter ( $d$ ) of the circle by pi ( $\pi$ ) (i.e.,  $C = \pi d$ ).

**classify**

To sort into categories or to arrange into groups by attribute(s).

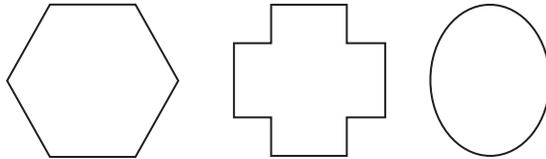
**clockwise**

In the same direction of rotation as the hands of an analog clock.

**closed figure**

A figure that starts and ends at the same point without crossing or retracing any part of the figure.

*Examples*

**coefficient**

A constant that multiplies a variable (e.g., in  $3x + 4y = 14$ , 3 is the coefficient of  $x$  and 4 is the coefficient of  $y$ ).

**collinear**

Lying on the same straight line.

*Example*

In the illustration below, A, B, and C are collinear.

**common denominator**

A natural number that is a common multiple of each denominator in two or more fractions; sometimes used when adding and subtracting fractions (e.g., common denominators for  $\frac{1}{2}$  and  $\frac{2}{5}$  are 10, 20, 30, . . .). (See **like denominator**.)

**common multiple**

A whole number that is a multiple of two or more given numbers (e.g., common multiples of 2, 3, and 4 are 12, 24, 36, 48, . . .).

**commutative property**

A property that states that an operation (addition or multiplication) is unaffected by the order in which the terms are added or multiplied.

*Examples*

***Addition***

The sum remains the same (e.g.,  $2 + 3.5 = 3.5 + 2$ ).

***Multiplication***

The product remains the same (e.g.,  $3 \times 5 = 5 \times 3$  and  $5 \cdot x = x \cdot 5$ ).

**comparative words**

Words used to compare a number or set of numbers to another number or set of numbers (e.g., more, fewer, as many as, less, more).

**compare**

To state the similarities or differences between two or more numbers, objects, or figures by considering their attributes/characteristics.

**compass**

An instrument used to locate points at a given distance from a fixed point and to describe circles and arcs.

**compatible numbers**

A pair of numbers that is easy to work with mentally (also known as friendly or nice numbers); often used to estimate sums, differences, products, and quotients.

*Examples*

***Compatible Number Pairs***

Compatible number pairs for 100 could be  $28 + 72$ ,  $99 + 1$ ,  $45 + 55$ , and  $50 + 50$ .

***Addition***

$$500 + 300 = 800$$

The numbers 500 and 300 are compatible for addition since the sum of 800 can be easily calculated mentally.

$$513 + 299 = 812$$

The numbers 513 and 299 are not compatible for addition since the sum (812) can't be easily calculated mentally. To estimate  $513 + 299$ , replace 513 and 299 with the compatible numbers 500 and 300. An estimate of  $513 + 299$  is found by mentally calculating  $500 + 300$  to get 800.

$$500 + 300 = 800$$

### ***Subtraction***

$$19.4 - 3.8 = 15.6$$

The numbers 19.4 and 3.8 are not compatible for subtraction since the difference (15.6) can't be easily calculated mentally. To estimate  $19.4 - 3.8$ , replace 19.4 and 3.8 with the compatible numbers 19 and 4. An estimate of  $19.4 - 3.8$  is found by mentally calculating  $19 - 4$  to get 15.

$$19 - 4 = 15$$

### ***Multiplication***

$$19.4 \times 3.8 = 73.72$$

The numbers 19.4 and 3.8 are not compatible for multiplication since the product (73.72) can't be easily calculated mentally. To estimate  $19.4 \times 3.8$ , replace 19.4 and 3.8 with the compatible numbers 20 and 4. An estimate of  $19.4 \times 3.8$  is found by mentally calculating  $20 \times 4$  to get 80.

$$20 \times 4 = 80$$

### ***Division***

$$721 \div 70 = 10.3$$

The numbers 721 and 70 are not compatible for division since the quotient (10.3) can't be easily calculated mentally. To estimate  $721 \div 70$ , replace 721 with 700 so that the numbers involved are compatible. An estimate of  $721 \div 70$  is found by mentally calculating  $700 \div 70$  to get 10.

$$700 \div 70 = 10$$

## **compensation**

A strategy that can be used for addition, subtraction, or estimation.

### ***Examples***

#### ***Addition***

Compensation usually involves increasing one addend while decreasing the other by the same amount (e.g., when adding  $46 + 38$ , add 2 to 38 to make 40 and take two away from 46, resulting in 44; then add  $40 + 44$  to get 84).

#### ***Subtraction***

Compensation involves increasing or decreasing both the minuend and the subtrahend by the same amount (e.g., when subtracting  $300 - 187$ , take one away from each to make  $299 - 186$  to get 113).

#### ***Estimation***

Compensation involves rounding one quantity up and the other down (e.g., when multiplying  $12 \times 28$ , estimate  $10 \times 30$  to get 300).



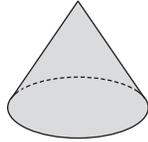
**concretely (represent concretely)**

Representing a situation or solving a problem using actual objects.

**cone**

A geometric figure with a flat (plane) base and a curved surface (curved face).

*Example*

**congruent**

Two figures that have the same shape and size.

*Examples*

Two sides (line segments) are congruent if they are the same length.

Two angles are congruent if they have the same measure.

**consecutive**

Following one right after the other in order.

*Examples*

1, 2, 3 are consecutive positive integers.

-2, 0, 2, 4 are consecutive even integers.

**conservation**

A counting principle indicating that the count for a set of objects stays the same, regardless of whether the objects are spread out or close together. The only way the count can change is to add objects to the set or to remove objects from the set.

**construction (using compass and straightedge)**

A precise way of drawing that allows only two tools: the straightedge and compass; the compass establishes equidistance, and the straightedge establishes collinearity.

**continuous data**

Data that is connected by a line on a line graph (e.g., a graph of height vs. age is considered continuous data).

**convert**

To change the form, but not the value, of a particular number or quantity.

*Examples*

The improper fraction  $\frac{8}{3}$  converts to  $2\frac{2}{3}$  as a mixed number.

3 cm converts to 30 mm.

**coordinate axes**

The two intersecting perpendicular lines in a plane that form the four quadrants for locating points, given the ordered pair of the points; the axes are referred to as the *x*-axis and the *y*-axis.

**coordinate graph** (*See Cartesian plane.*)

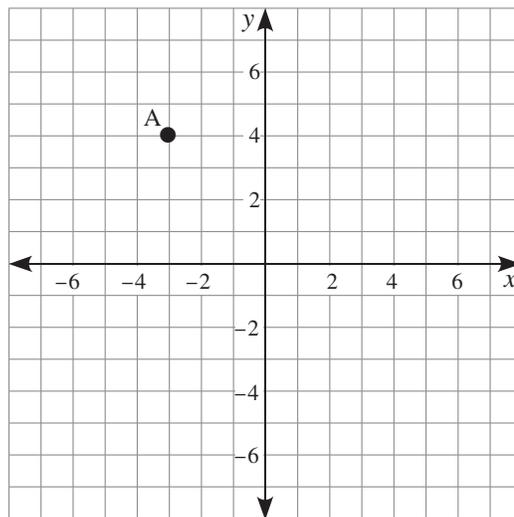
**coordinate plane** (*See Cartesian plane.*)

**coordinates**

An ordered pair of numbers that identifies, or is used to locate, a point on a coordinate plane, written as  $(x, y)$ . (*See ordered pair.*)

*Example*

On the coordinate plane below, point A has coordinates  $(-3, 4)$ .

**core**

The shortest string of elements that repeats in a repeating pattern.

*Example*

In the pattern ABCABCABC . . . , the core is ABC.

**count**

To name the numbers in order up to and including a given number (e.g., count to 10); to determine the total number or amount, as in money.

**counter-clockwise**

In the direction of rotation opposite to that of the hands of an analog clock.

**counting back**

A subtraction strategy of starting with the minuend and counting backward an amount equal to the amount of the subtrahend to arrive at the difference.

*Example*

For  $10 - 6$ , count 9, 8, 7, 6, 5, 4, so the answer is 4.

**counting numbers**

All whole numbers greater than 0; also called **natural numbers**.

**counting on**

An addition strategy of starting with one addend (usually the larger) and counting forward an amount equal to the other addend to arrive at the sum.

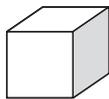
*Example*

For  $3 + 6$ , count 7, 8, 9 (or 4, 5, 6, 7, 8, 9), so the answer is 9.

**cube**

A regular 3-D object with 6 congruent square faces, 12 congruent edges, and 8 vertices.

*Example*

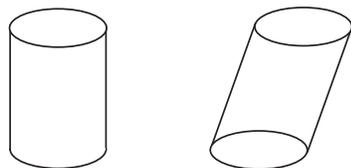
**cubic unit**

A unit for measuring volume.

**cylinder**

A geometric figure with two parallel and congruent, flat (plane) surfaces connected by one curved surface (curved face).

*Examples*



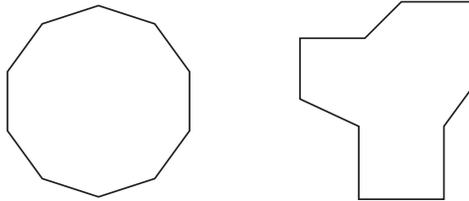
**data**

Information that is collected first or second hand. Data are usually numerical, organized in charts and displayed by graphs. (The singular of data is **datum**.)

**decagon**

A polygon with ten sides.

*Examples*

**decimal**

A fractional number written in base ten form; a mixed decimal number has a whole number part as well (e.g., 0.32 is a decimal number and 3.5 is a mixed decimal number).

**decimal point**

A period or dot separating the ones place from the tenths place in decimal numbers, or dollars from cents in money. When numbers are spoken, the decimal point is read as “and” (e.g., 3.2 is read as three and two tenths).

**decreasing pattern**

A pattern in which one or more elements of the sequence or arrangement decrease.

*Examples*



6, 4, 2, 0, -2, -4, ...

**degree (°)**

The unit of measurement for angles;  $1^\circ$  is the measure of an angle that forms  $\frac{1}{360}$  of a circle.

**denominator**

The number below the line in a fraction that can state one of the following:

The number of elements in a set.

The number of equal parts into which the whole is divided.

*Example*

$\frac{2}{3}$  ← denominator

**dependent events**

Two events in which the outcome of the first event affects the outcome of the second event (e.g., drawing two marbles from a bag of red, green, and blue marbles without replacement).

**descending order**

Arranged in order from greatest to least or from largest to smallest.

**diagonally**

Along the path of an oblique line.

*Example*

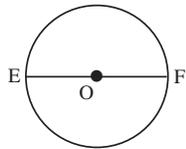
When you translate a figure diagonally, you are sliding it along a line that is neither horizontal nor vertical.

**diameter**

A line segment of a circle passing through the centre of the circle.

*Example*

In the diagram below,  $\overline{EF}$  is the diameter of circle O.

**difference**

The amount remaining after one quantity is subtracted from another (e.g., in  $5 - 3 = 2$ , 2 is the difference).

**digit**

Any one of the ten numerals: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.

**digital clock**

A clock on which the time is displayed numerically (e.g., the time is displayed as 12:22).

**dimensions**

Measurements of a figure (e.g., the length, width, and height of a 3-D object).

**discrete element**

A series of points not connected in a line graph (e.g., a graph of the number of students in the school for the last 10 years would be represented by a series of points).

**distance**

The length of the line segment joining two points.

**distributive property**

A property of real numbers that states that the product of the sum or difference of two numbers is the same as the sum or difference of their products.

*Examples*

***Multiplication over Addition***

$$2(15 + 4) = 2 \times 15 + 2 \times 4$$

$$2(2y + 3) = 4y + 6$$

***Multiplication over Subtraction***

$$4(12 - 8) = 4 \times 12 - 4 \times 8$$

$$3(5t - 3) = 15t - 9$$

**divide**

To share or group quantities to find a quotient.

**dividend**

A number to be divided by another number (divisor) (e.g., in  $12 \div 3 = 4$ , 12 is the dividend).

**divisible**

Capable of being divided evenly without leaving a remainder;  $x$  is divisible by  $y$  if and only if  $x = qy$  where  $q$ ,  $x$ , and  $y$  are all integers.

**division**

A mathematical operation involving two numbers that tells how many groups there are or how many are in each group.

**divisor**

The number by which the dividend is divided (e.g., in  $12 \div 3 = 4$ , 3 is the divisor).

**dot pattern**

An arrangement of dots. A regular dot pattern is any pattern composed of a usual placement of dots like those found on a six-sided number cube or a domino. An irregular dot pattern is any pattern composed of an unusual placement of dots. A five or ten frame may be a regular dot pattern or an irregular dot pattern, depending on how the frame is filled in. (See **five frame** and **ten frame**.)

**double-bar graph**

A graph that uses pairs of bars to compare and show the relationship between data.

**doubles**

Addition facts with two addends that are the same.

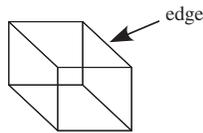
**doubling**

Making twice as great or as many; increasing by adding an equal amount; amounting to twice the number.

**edge**

A line segment where two faces of a 3-D figure intersect.

*Example*

**element**

One of the objects or numbers belonging in a set or pattern.

**endpoint**

A point at either end of a line segment or the beginning point of a ray.

**equal grouping (quotative division)**

A process of division in which a given number of items is repeatedly taken away from a given quantity. The number of equal groups taken away is the answer to the division problem.

*Example*

**Question**

You have 24 pictures to paste into a book. If 4 pictures fit on one page, how many pages will be needed for the pictures?

**One Possible Solution Process**

Ask yourself: How many groups of 4 are there in 24?

Repeatedly remove 4 objects from 24 objects until you can no longer remove a complete set of 4 objects.

**Solution**

You will need 6 pages.

### equal sharing (partitive division)

A process of division in which a given quantity of items is separated into a given number of groups so that each of the groups has the same number of items. The number of items in each group is the answer to the division problem.

*Example*

#### *Question*

You have 24 pictures to paste into a 6-page book. Each page has to have the same number of pictures. How many pictures will be pasted on each page?

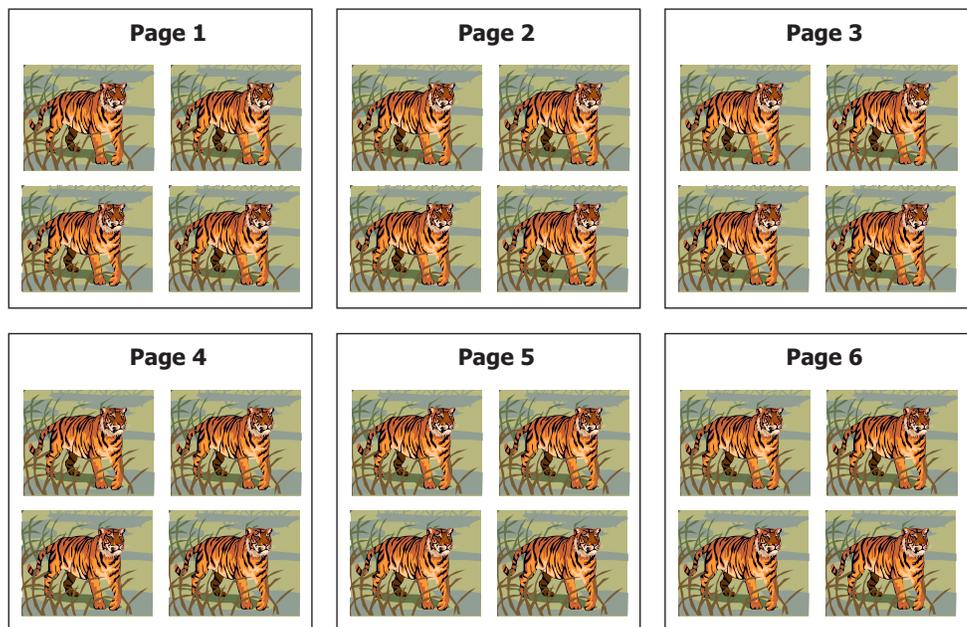
#### *One Possible Solution Process*

Ask yourself: In 24 there are 6 groups of how many?

Place 24 objects into 6 groups by putting 1 object into each of the 6 groups, then another into each of the 6 groups, and so on until all 24 objects are distributed evenly.

#### *Solution*

Each page will end up with 4 pictures.



### equal sign (=)

A symbol that means two things have the same amount, size, number, or value.

### equality

A mathematical statement indicating that two quantities (or expressions) are in balance; two expressions that are equivalent (e.g.,  $2 + 5 + 1 = 4 + 4$ ).

### equally likely events

Events that have the same theoretical probability (or likelihood) of occurring (e.g., each numeral on a number cube is equally likely to occur when it is tossed).

### equation

A mathematical sentence stating that two expressions are equal. An equation contains an equal sign (=).

*Examples*

$$3 + 4 = 7$$

$$x + 4 = 7$$

$$3x = 12$$

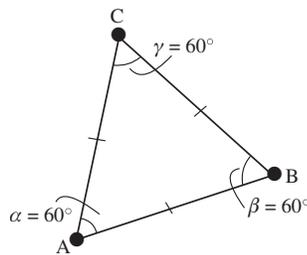
### equidistant

Having equal distances.

### equilateral triangle

A triangle with three congruent sides and three congruent angles.

*Example*



### equivalent

Equal in value.

*Examples*

$3 + 3$  is equivalent to  $2 \times 3$  (equivalent numerical expressions)

2.9 is equivalent to 2.90 (equivalent decimals)

1 metre is equivalent to 100 centimetres (equivalent lengths)

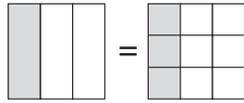
$\frac{2}{3}$  is equivalent to  $\frac{8}{12}$  (equivalent fractions)

**equivalent fractions**

Fractions that represent the same amount.

*Examples*

$$\frac{1}{3} = \frac{3}{9}$$

**equivalent ratios**

Two ratios that are equal (*see* **equivalent fractions**).

**estimate**

An answer that is an approximation.

**evaluate**

To find the value of a mathematical expression.

*Example*

Evaluate the expression  $2y - 7$  when  $y = 5$

$$2(5) - 7 = 10 - 7 = 3$$

**even number**

A whole number that is divisible by 2; a number that has 0, 2, 4, 6, or 8 in the ones place (e.g., 2, 4, 6, 8, 10, 12, 14, 16, 18, . . .).

**event**

A set of one or more outcomes in a probability experiment (e.g., given a number cube with the numbers 1 to 6 on the faces, the rolling of an even number is an event).

**expanded notation**

A way to write a number that shows the value of each digit

(e.g.,  $4556 = 4000 + 500 + 50 + 6$  or  $4556 = [4 \times 1000] + [5 \times 100] + [5 \times 10] + [6 \times 1]$ ).

**experimental probability**

The ratio of success to the number of trials during an experiment.

*Example*

If you toss a coin 10 times and it lands tails up 7 times, the experimental probability is  $\frac{7}{10}$  for tails, or  $P(\text{tails}) = \frac{7}{10}$ .

$$P(E) = \frac{\text{number of successful outcomes}}{\text{total number of outcomes}}$$

**exponent**

A number placed to the top right of another number (base) to indicate the number of times the base is multiplied by itself (e.g., in  $2^3$ , 3 is the exponent and 2 is the base).

**expression**

A mathematical representation containing numbers, variables, and/or operation symbols; an expression does not include a relational symbol ( $<$ ,  $>$ ,  $=$ ,  $\neq$ ).

*Examples*

$$(5 + 2) - 27 \div 3 \quad (\text{arithmetic/numerical expression})$$

$$2a + 3b \quad (\text{algebraic/symbolic expression})$$

**extrapolate**

Interpreting information from outside the set of data.

**face**

A flat surface of a solid.

*Example*

**fact family**

A set of facts, each of which relates the same three numbers through addition and subtraction or through multiplication and division.

*Examples*

***Addition and Subtraction***

$$3 + 4 = 7, 4 + 3 = 7$$

$$7 - 4 = 3, 7 - 3 = 4$$

***Multiplication and Division***

$$2 \times 5 = 10, 5 \times 2 = 10$$

$$10 \div 5 = 2, 10 \div 2 = 5$$

**factor**

Can be used in the following ways:

A number or expression that is multiplied by another to yield a product (e.g., a factor of 24 is 8 because  $8 \times 3 = 24$ , and a factor of  $3n$  is  $n$  because  $3 \cdot n = 3n$ ).

To express as a product of two or more factors (e.g., if the question is, factor 36, the answer could be  $2 \times 18$  or  $2 \times 3 \times 6$ ).

**fair share**

The amount for each group when something is divided equally.

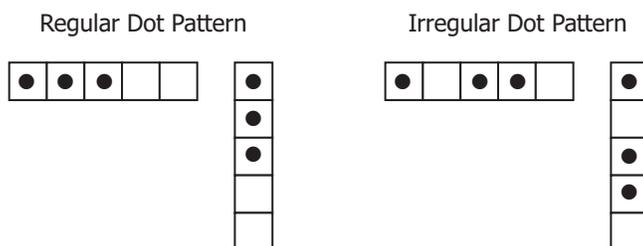
**first-hand data**

Data that people collect on their own by counting, conducting polls, conducting experiments, or using measuring devices.

**five frame**

A table with dots used to represent numbers from 0 to 5 consisting of either one column and five rows or five columns and one row.

*Example*

**flip** (See **reflection**.)**formula**

A mathematical statement, equation, or rule that shows a relationship between two or more quantities.

*Examples*

$$P = 3s \quad (\text{perimeter of an equilateral triangle with side length } s)$$

$$d = r \times t \quad (\text{distance} = \text{rate} \times \text{time})$$

**fraction**

A number that represents part of a whole, part of a set, or a quotient in the form  $\frac{a}{b}$ , which can be read as  $a$  divided by  $b$ .

**frequency**

The number of times an event occurs.

**front-end estimation** (See **front-end rounding**.)

**front-end rounding**

A method for estimating an answer to a calculation problem by focusing on the front-end or left-most digits of a number.

*Example*

**Question**

You buy a hamburger for \$4.59, a drink for \$1.96, and an ice cream cone for \$0.95. Will a five-dollar bill cover the cost?

**Front-end Strategy Solution Process**

Total the front-end (dollar) amounts:  $\$4 + \$1 + \$0 = \$5$ .

**Solution**

A five-dollar bill will not cover the cost because the front-end estimate, which is always an underestimate, is \$5.

**geometric construction**

Constructing a geometric figure based on its properties. (See **construction [using straightedge and compass]**).

**geometric figure**

Any combination of points, lines, planes, or curves in two or three dimensions.

**geometric shape**

Any regular or irregular polygon, circle, or combination of geometric figures.

*Examples*



**geometry**

The branch of mathematics that deals with the measurement, properties, and relationships of points, lines, angles, planes, 2-D shapes, and 3-D objects.

**gram (g)**

A metric unit used to measure mass; 1000 grams = 1 kilogram.

**graph**

A visual representation used to show a numerical relationship.

**greater than (>)**

A relationship between two quantities where one quantity is larger than another. The > symbol can be used in a mathematical sentence when one amount, quantity, or size is larger than another.

**Note:** Teachers can use the symbol > but students do not have to use it until Grade 6.

The symbols < and > always point to the smaller quantity. Another way to note the direction is to consider that two dots are greater than one dot, so the side with two dots is closer to the larger number.

*Examples*

8  7 (8 is greater than 7)  
10 > 3 (10 is greater than 3)  
5 × 3 > 10 (5 times 3 is greater than 10)  
10 > 3 + 5 (10 is greater than 3 plus 5)

**greatest common divisor (GCD)**

The largest integer that is an exact divisor of each of two or more integers (e.g., 12 is the greatest common divisor of 24 and 36).

**greatest common factor (GCF)**

The greatest number that is a factor of two or more numbers (e.g., 6 is the greatest common factor of 12 and 18).

**Note:** The only difference between GCD and GCF is the terminology of divisor and factor.

**group**

A number of individuals or objects that are assembled together or that have some unifying relationship.

**halving**

Dividing or separating into two equal parts; reducing by one half.

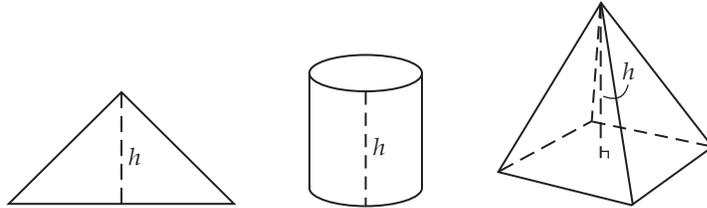
## height

Can be used in the following ways:

The measurement from base to top.

The perpendicular distance from a vertex to the line containing the opposite side of a plane figure; the length of a perpendicular from the vertex to the plane containing the base of a pyramid or cone; the length of a perpendicular between the planes containing the bases of a prism or cylinder.

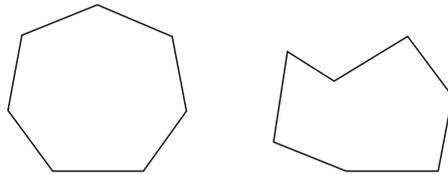
*Examples*



## heptagon

A polygon with seven sides and seven angles.

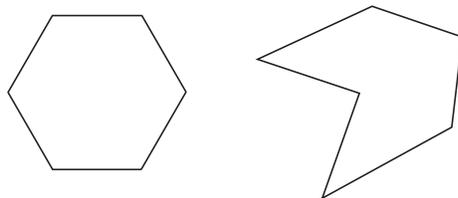
*Examples*



## hexagon

A polygon with six sides and six angles.

*Examples*



## histogram

A bar graph that displays the frequency of data that has been organized into equal intervals; the intervals cover all possible values of data; therefore, there are no spaces between the bars of the graph; the horizontal axis is divided into continuous equal intervals.

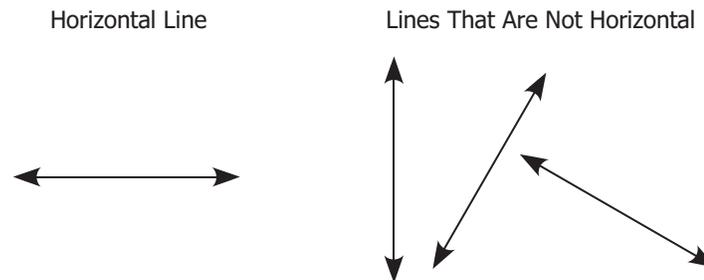
*Example*



## horizontal line

A line extending left and right without extending up and down; a line parallel to the horizon.

*Example*



## hundreds place

The place value located three places to the left of the decimal point in a number; a digit in the hundreds place has a value of 100 times the value of the digit.

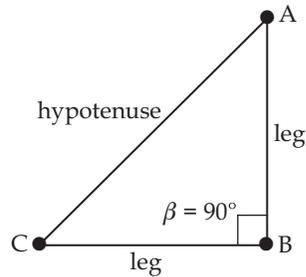
## hundredths place

The place value located two places to the right of the decimal point in a number; a digit in the hundredths place has a value of  $\frac{1}{100}$  the value of the digit.

## hypotenuse

The side of a right triangle opposite the right angle; the longest side of a right triangle.

*Example*



## image

The figure created when another figure, called the pre-image, undergoes a transformation. (**Note:** The pre-image, ABC, would become the image A'B'C' after it has been transformed.)

## imbalance

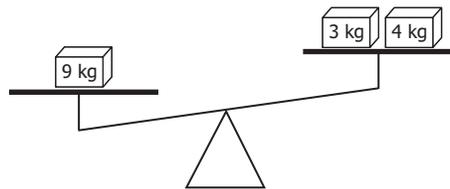
Can be used in the following ways:

When the weights placed on each side of the beam of a scale are not equal, there is an imbalance, or balance has not been achieved.

When the two sides on an equation are not equivalent, there is an imbalance, or balance has not been achieved.

*Example*

In the illustration below, the scale has a 9 kg weight on the left and a 3 kg and a 4 kg weight on the right. Since  $3 + 4 \neq 9$ , the weights on each side of the scale are not equal and there is an imbalance.



Similarly, in the inequality  $9 \neq 3 + 4$ , the sides of the equation are not balanced.

## impossible event

An event that has a 0% chance of occurring (e.g., rolling the number 7 when tossing a six-sided number cube labelled 1 to 6).

### improper fraction

A fraction whose numerator is greater than its denominator; a fraction with a value greater than 1 (e.g.,  $\frac{7}{3}$ ).

### increasing pattern

A pattern in which one or more elements of the sequence or arrangement increases.

*Examples*



1, 4, 9, 16, 25, 36, . . .

### independent events

Two or more events in which the outcome of one event has no effect on the outcome of the other event or events (e.g., rolling a number cube and tossing a coin).

### inequality

A mathematical statement indicating that two quantities (or expressions) are not in balance (e.g.,  $6 - 2 > 4 \div 2$ , and  $7 \neq 2 + 2$ ).

**Note:** The symbols  $>$ ,  $<$ , and  $\neq$  are commonly used to indicate inequality. The symbol  $\neq$  is used by students in Grade 2, and the symbols  $>$  and  $<$  are used by students in Grade 6.

### integers

The set of numbers consisting of the whole numbers (e.g., 1, 2, 3, 4, . . .), their opposites (e.g., -1, -2, -3, -4, . . .), and 0.

### integral

An adjective for integer; an integral solution to a problem cannot be a decimal or a fraction.

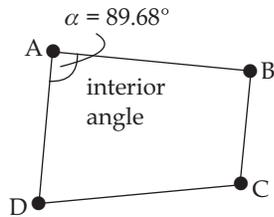
### integral coordinates

An ordered pair containing only integers (e.g., (2, -3)).

### interior angle

An angle on the inside of a polygon formed by two adjacent sides of the polygon.

*Example*



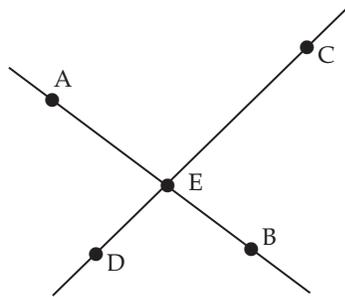
### interpolate

Interpreting information from within the set of data.

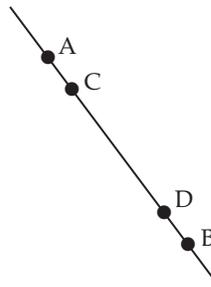
### intersecting lines

Lines that cross one another or fall on top of one another.

*Examples*



Line AB and line CD intersect at point E.



Line AB and line CD intersect at all locations along either line.

### interval

The distance or difference between two numbers or quantities. In graphing, the interval of numbers on one or both axes needs to have equal numerical spacing.

### inverse operation

An operation that is the opposite of, or undoes, another operation; addition and subtraction are inverse operations; multiplication and division are inverse operations.

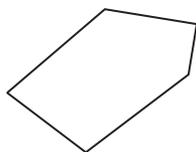
### irrational number

A real number that cannot be represented as an exact ratio of two integers; the decimal form of the number never terminates and never repeats (e.g.,  $\pi$ ,  $\sqrt{2}$ ,  $\sqrt{10}$ , 0.010010001 . . .).

**irregular polygon**

A polygon whose sides and angles are not all congruent.

*Example*



**irregular shape** (*See irregular polygon.*)

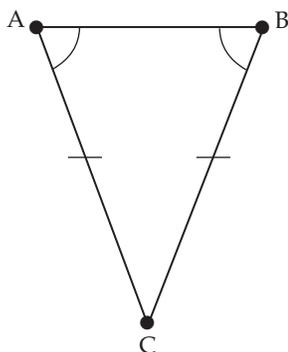
**isometric dot paper**

Dot paper with equally spaced dots.

**isosceles triangle**

A triangle with at least two congruent sides and two congruent angles.

*Example*

**iteration process**

Making repeated measurements with the same device.

**key**

Defines the numerical value assigned to each symbol or picture drawn in a pictograph (*see pictograph*).

**kilogram (kg)**

A metric unit used to measure mass; 1 kilogram = 1000 grams.

**kilometre (km)**

A metric unit of length equivalent to 1000 metres; 1 kilometre = 1000 metres.

**least common denominator (LCD)**

The smallest common multiple of two given denominators (e.g., the LCD of  $\frac{1}{4}$  and  $\frac{1}{6}$  is 12).

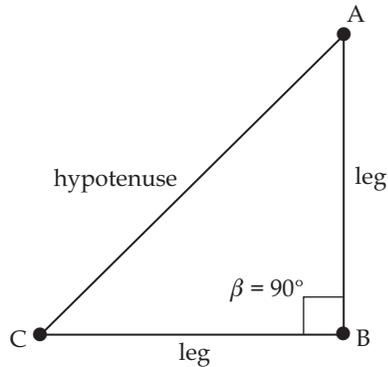
### least common multiple (LCM)

The smallest number, greater than 0, that is a multiple of two or more numbers (e.g., the LCM of 20 and 25 is 100).

### leg of a right triangle

One of the two sides that form the right angle of a right triangle; the sides that are not the hypotenuse.

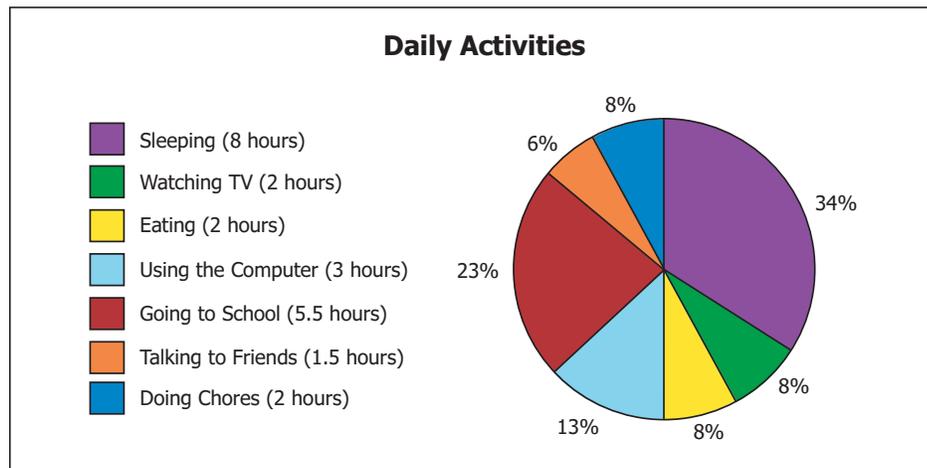
*Example*



### legend

An area of a diagram or graph that identifies categories of information using assigned colours, pictures, or patterns. A legend is usually used when there are many categories.

*Example*



## length

The distance from one end of an object to the other end; commonly measured in units of metres, centimetres, millimetres, and kilometres.

**Note:** In Grade 3 students are expected to measure in centimetres and metres.  
In Grade 5 students are expected to measure in millimetres.

## less likely event

An event (A) that is less likely to occur than another event (B); when the theoretical probability of the event (A) is less than that of the other event (B) (e.g., the probability of rolling a total of 2 with two number cubes is less likely to occur than rolling a total of 7).

## less than (<)

A relationship between two quantities where one quantity is smaller than another. The < symbol can be used in a mathematical sentence when one amount, quantity, or size is smaller than another.

**Note:** Teachers can use the < symbol but students do not have to use it until Grade 6.

The symbols < and > always point to the smaller quantity. Another way to note the direction is to consider that one dot is less than two dots, so the side with one dot is closer to the smaller number.

*Examples*

6 < 7      (6 is less than 7)

3 < 10      (3 is less than 10)

10 < 5 × 3      (10 is less than 5 times 3)

5 + 3 < 10      (5 plus 3 is less than 10)

## like denominator

A natural number that is the denominator of two or more fractions. (*See common denominator.*)

*Example*

The fractions  $\frac{2}{7}$  and  $\frac{3}{7}$  have like (the same) denominators.

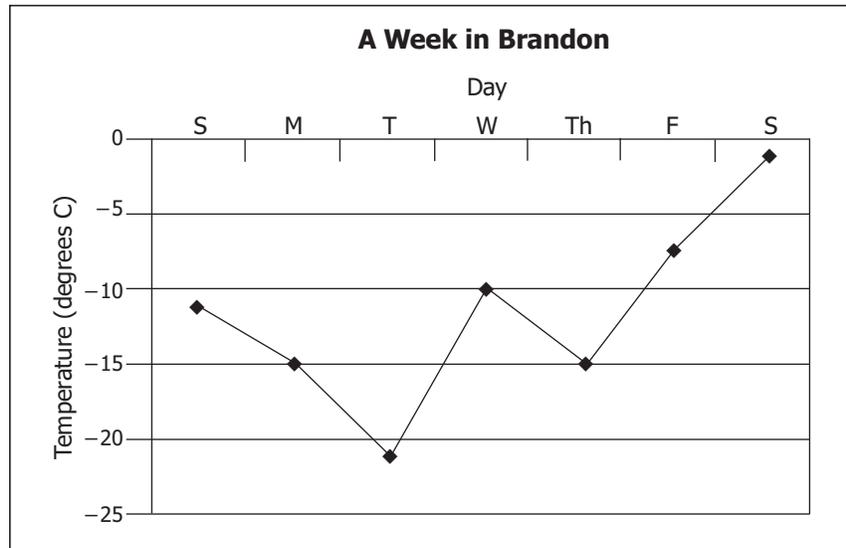
## line

An infinite set of points in opposite directions forming a straight path; it has only one dimension, length (e.g.,  $\overline{AB}$  is read “line AB”).

### line graph (broken line graph)

A graph that uses line segments to show changes in data; the data usually represents trends, relationships, or a quantity changing over time.

*Example*



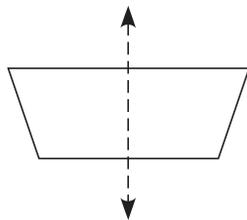
**line of reflection** (See **line of symmetry**.)

### line of symmetry

Can be used in the following ways:

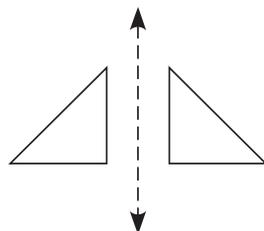
A line that divides a figure into two congruent parts so that they can be matched by folding the shape in half. The two parts are mirror images of each other.

*Example*



A line, in a transformation, in which a pre-image is reflected. The line of symmetry is also a line of reflection for the pre-image and image.

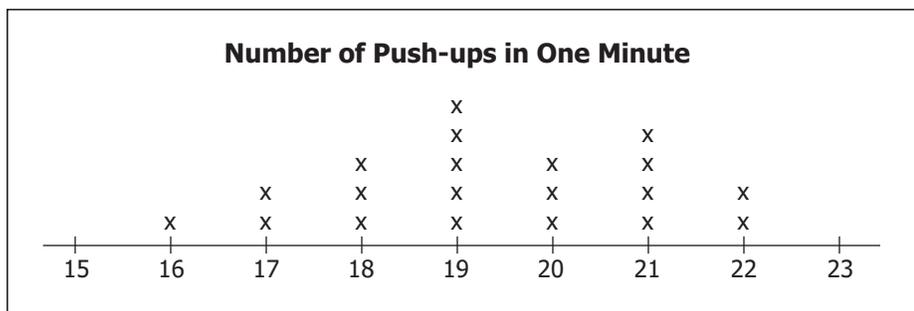
*Example*



### line plot

A number line on which each number in a set of data is plotted by making a mark (usually an “X” or a large dot) above that number on the number line.

*Example*



### line segment

A part of a line between two endpoints along the line. A line segment is named by the endpoints.

*Example*

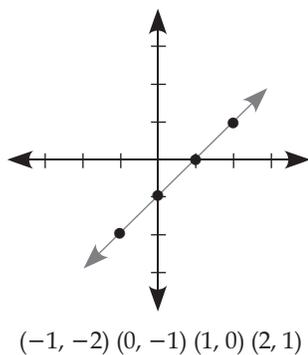


Name: Line segment AB or segment AB or  $\overline{AB}$

### linear relation

A set of ordered pairs that forms a straight line.

*Example*



### litre (L)

A metric unit used to measure capacity; 1 litre = 1000 millilitres.

### lowest terms

The form of a fraction in which the numerator and denominator have no common factor except 1. Also known as **simplest form**.

**manipulatives**

Physical objects that can be used to help solve mathematical problems (e.g., tangrams, base-10 blocks, number cubes, cards, rulers, counters, pattern blocks, cubes).

**many-to-one correspondence**

Representation of many objects by one object or interval in a graph.

*Examples*

In a pictograph, one happy face represents 5 people.

In a bar graph, one space on the graph paper represents 10 years.

**mass**

A measure of how much matter there is in an object. In the international system (SI) of units, the units of mass include grams (g) and kilograms (kg).

In daily life, the terms **mass** and **weight** are virtually interchangeable, but in reality they are not the same thing. An object on the moon weighs less than it does on the earth, and in space is weightless. The mass of the object does not change, regardless of where it is.

**Weight** is a measure comprising a combination of the mass of an object and the pull of gravity on that mass.

**mean**

A measure of central tendency; the quotient obtained when the sum of the numbers in a set is divided by the number of addends; the arithmetic average.

*Example*

For the set of numbers 87, 85, 86, and 90, the mean is 87 and is calculated as follows:

$$\text{Mean} = \frac{87 + 85 + 86 + 90}{4} = 87$$

**measure**

To find the dimensions or quantity (e.g., length, capacity) of an object or figure.

**measure of central tendency**

A single number that represents a typical value for a set of numbers. The three most common measures of central tendency are the **mean**, **median**, and **mode**.

**measurement**

The amount obtained by measuring.

**median**

The middle value in an ordered list. If there is no middle value, the median is the average of the two middle values.

*Examples*

The median of the numbers 1, 1, 2, 4, 5, 6, and 7 is 4.

The median of the numbers 1, 1, 2, 4, 5, 6, 7, and 7 is 4.5.

**mental mathematics**

Computations done “in the head,” either in whole or in part.

**metre (m)**

A metric unit used to measure length; 1 metre = 100 centimetres = 1000 millimetres.

**milligram (mg)**

A metric unit used to measure mass; 1 milligram = 0.001 gram.

**millilitre (mL)**

A metric unit used to measure capacity; 1 millilitre = 0.001 litre.

**millimetre (mm)**

A metric unit used to measure length; 1 millimetre = 0.001 metre, 1000 mm = 1 m.

**minuend**

In a subtraction problem, the number from which another number is to be subtracted (e.g., in  $5 - 3 = 2$ , the 5 is the minuend).

**minus (-)**

Refers to subtraction or the symbol of subtraction.

**misleading graph**

A graph that leads the reader to make an incorrect conclusion or to form a false impression.

**missing value**

A value omitted from an equation that is needed to make the equation true (e.g.,  $(2 \times 3) \times 5 = 2 \times (3 \times \square)$ ).

**mixed number**

A number larger than 1 composed of a whole number and a proper fraction (e.g.,  $2\frac{1}{3}$ ).

**mode**

The number or members of a data set that occur(s) most frequently in the set of data.

*Examples*

In the set 87, 85, 86, 90, and 86, the mode is 86.

In the set 87, 85, 86, and 90, there is no mode.

**model**

Can be used in the following ways:

A visual representation that illustrates or further explains a mathematical principle or concept.

To make or act out a representation of something, usually on a smaller scale or in a simpler way; to use pictures, diagrams, or physical objects to further demonstrate or clarify a problem.

**more likely event**

An event (A) that is more likely to occur than another event (B); when the theoretical probability of the event (A) is greater than that of the other event (B) (e.g., the probability of rolling a total of 7 with two number cubes is more likely to occur than rolling a total of 2).

**multiple**

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

*Examples*

18 is a multiple of 6 (since  $6 \times 3 = 18$ ).

18 is a multiple of 18 (since  $18 \times 1 = 18$ ).

18 is NOT a multiple of 8.

**multiplicand**

The number being multiplied in a multiplication problem (e.g., in  $1.2 \times 3 = 3.6$ , 1.2 is the multiplicand).

**multiplication**

A mathematical operation of combining groups of equal amounts; repeated addition; the inverse of division.

### **multiplicative inverse**

The reciprocal of a number; the number that, when multiplied by a given number, produces the multiplicative identity 1; in the set of real numbers the number a given number needs to be multiplied by to yield 1;  $n \times n\text{-inverse} = 1$  for all  $n$ . (See **reciprocal**.)

*Examples*

$$7 \times \frac{1}{7} = 1 \text{ and } \frac{2}{3} \times \frac{3}{2} = 1$$

### **multiplier**

The number by which the multiplicand is multiplied in a multiplication problem (e.g., in  $1.2 \times 3 = 3.6$ , 3 is the multiplier).

### **multiply**

To combine equal groups to find one quantity called a **product**.

### **natural numbers**

The set of counting numbers. Natural numbers include 1, 2, 3, 4, . . .

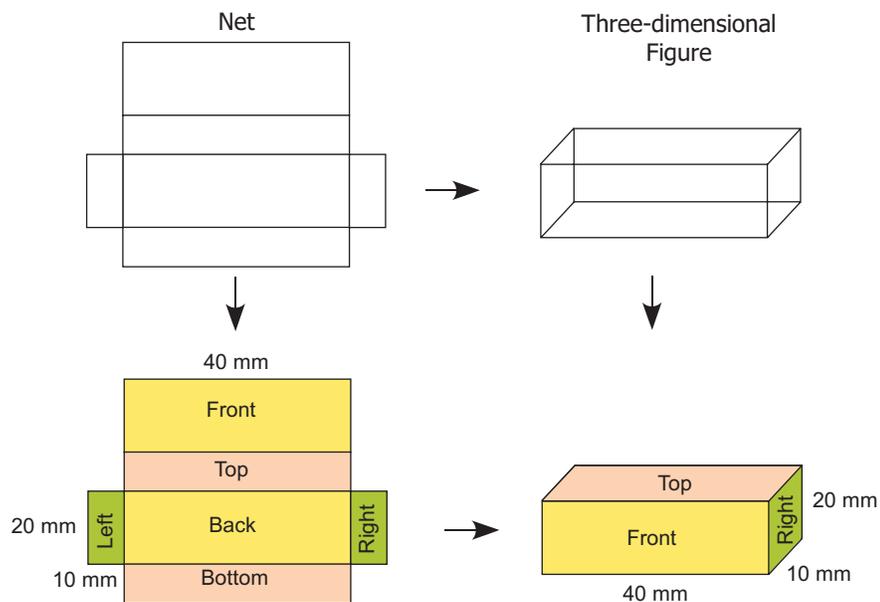
### **negative number**

A number that is less than 0, located to the left of 0 on a horizontal number line, or located below 0 on a vertical number line.

### **net**

The 2-D set of polygons of which a 3-D object is composed.

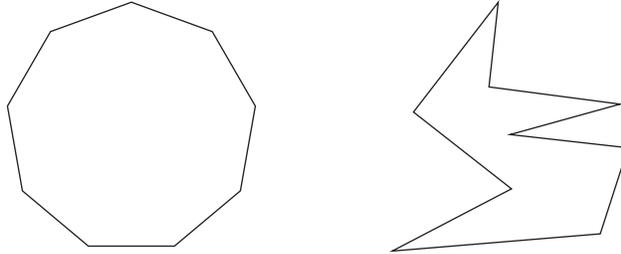
*Example*



**nonagon**

A polygon with nine sides and nine angles.

*Examples*

**non-proportional base-10 materials**

Materials that can be used for representing place value that are not proportional in size. Non-proportional materials do not reflect a ten-to-one relationship. The materials used do not model why 10 ones is the same as 1 ten (e.g., ten-bead abacus, money, coloured chips).

**non-repeating decimal**

A decimal that does not repeat; it either terminates or continues in no discernible pattern.

**non-standard measurement**

The use of items as measurement tools that are not uniform in size (e.g., using fingers to measure something; one person's fingers are not necessarily the same size as another person's fingers).

**non-standard unit**

Any tangible item that can be used to measure something (e.g., paper clips, crayons).

**non-terminating decimal**

A decimal that does not terminate; it either repeats or continues in no discernible pattern.

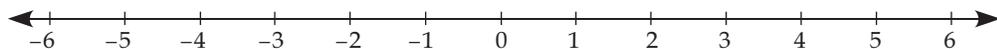
**number**

The concept of an amount, quantity, or how many items there are in a collection.

**number line**

A line (vertical or horizontal) on which each point represents a number.

*Example*



**number sense**

Having a good conceptual understanding of numbers and number concepts.

**number sentence**

A mathematical statement that has numbers, at least one operation sign, and an equal or inequality sign.

**number system**

A system used to represent numbers. (See **base ten number system**.)

**numeracy**

Mathematical literacy; the ability to communicate, connect, use mental mathematics, estimate, reason, problem solve, visualize, and use technology in contexts that involve numbers, patterns, shape and space, and statistics and probability.

**numeral**

The written symbol that represents a number.

**numeration**

The act or process of counting or numbering; a system of counting or numbering.

**numerator**

The number above the line in a fraction that can state one of the following:

The number of equal parts in a set to be considered.

The number of equal parts of a whole to be considered.

*Example*

$$\frac{2}{3} \longleftarrow \text{numerator}$$

**numerical expression**

Any combination of numerals and/or operation symbols (e.g., 35,  $4.5 - 1.2$ ,  $5 \times 4 - 4$ ). Also known as **arithmetic expression**.

**numerical pattern**

An arrangement of numbers that repeat or that follow a specified rule.

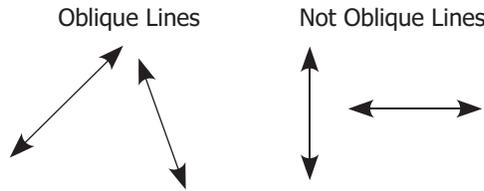
**numerically**

Expressed in or involving numbers or a number system.

**oblique line**

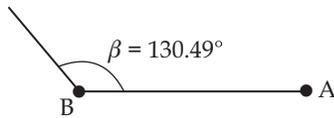
A line that is neither horizontal nor vertical.

*Examples*

**obtuse angle**

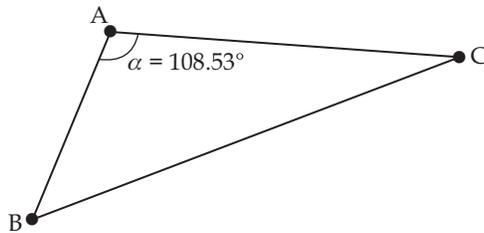
An angle whose measure is greater than  $90^\circ$  and less than  $180^\circ$ .

*Example*

**obtuse triangle**

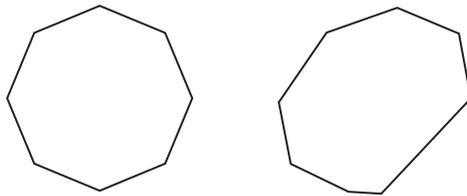
A triangle containing one obtuse angle.

*Example*

**octagon**

A polygon with eight sides and eight angles.

*Examples*

**odd number**

A number that is not divisible by 2; a number that has 1, 3, 5, 7, or 9 in the ones place (e.g., 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, . . .).

**ones place**

The place value located one place to the left of the decimal point in a number; shows how many ones are in a number.

**one-step equation**

An equation that can be solved in one step.

*Examples*

$$2 + 3 = \square$$

$$7 - n = 5$$

$$\square + 3 = 5$$

$$2t = 6$$

$$\frac{x}{2} = 3$$

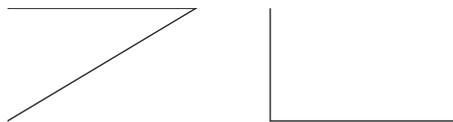
**one-to-one correspondence**

Each object being counted is given one count in the counting sequence.

**open figure**

A figure that is not closed (e.g., it does not start and end at the same point).

*Examples*

**operations**

Procedures used to combine numbers, expressions, or polynomials into a single result (e.g., addition, subtraction, multiplication, division, exponents).

**opposite integers**

The result of taking a number and changing its sign (e.g., the opposite of 5 is  $-5$ , the opposite of  $-12$  is 12). A number and its opposite are equidistant from 0 on a number line, but on opposite sides of 0. (See **additive inverse**.)

**order**

To place numbers or objects in a sequential arrangement (e.g., least to greatest or heaviest to lightest).

## order of operations

A specified sequence in which mathematical operations are expected to be performed. An arithmetic expression is evaluated by following these ordered steps:

1. Simplify within grouping symbols such as parentheses or brackets, starting with the innermost.
2. Apply exponents – powers and roots.
3. Perform all multiplications and divisions in order from left to right.
4. Perform all additions and subtractions in order from left to right.

A common way to remember this is to use the acronym BEDMAS:

Brackets, Exponents, Division, Multiplication, Addition, Subtraction.

Division and multiplication (and addition and subtraction) are to be completed in the order in which they appear from left to right in the expression or equation.

**Note:** In Kindergarten to Grade 8, exponents are not used. Grade 9 students will revisit the order of operations and work with exponents.

## order relevance

The order in which objects are counted does not matter; counting things in a different order still gives the same count.

## ordered pair

A set of two numbers named in a specific order; represented by  $(x, y)$  such that the first number,  $x$ , represents the  $x$ -coordinate and the second number,  $y$ , represents the  $y$ -coordinate when the ordered pair is graphed on the coordinate plane; each point on the coordinate plane has a unique ordered pair associated with it. (See **coordinates**.)

## ordinal numbers

Numbers used to specify position in a sequence (e.g., first, second, third, fourth).

## origin

The point on the coordinate plane where the  $x$ - and  $y$ -axes intersect; has coordinates  $(0, 0)$ .

## outcome

One of the possible events in a probability experiment (e.g., when tossing a coin there are two possible outcomes, heads or tails).

## outlier

In statistics, a point in a data set separated from the main body of the data set; may significantly affect the mean but not the mode or median (e.g., in the data set {28, 40, 43, 45, 47, 49}, 28 is an outlier).

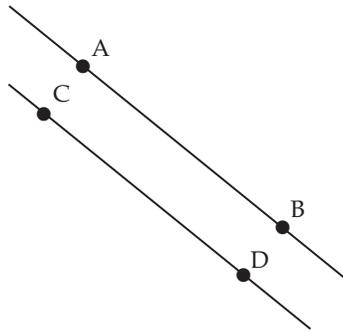
## parallel

Can be used in the following ways:

Lines in the same plane that never intersect no matter how far they are extended; they are equidistant (equal distance) from each other.

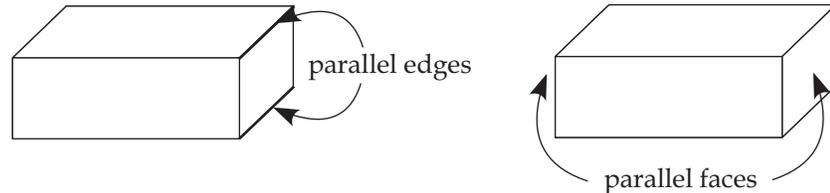
*Example*

Line AB and line CD are parallel.



Faces or edges of a 3-D object that never intersect; they are equidistant (equal distance) from each other.

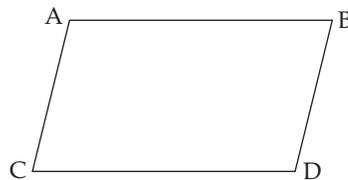
*Examples*



## parallelogram

A quadrilateral with two pairs of parallel sides.

*Example*



$$\overline{AB} \parallel \overline{CD}$$
$$\overline{AC} \parallel \overline{BD}$$

### partial products

A strategy for multi-digit multiplication where the numbers are split into “friendly numbers” to simplify the multiplication.

*Example*

$$16 \times 21$$

The partial products of  $(10 + 6) \times (20 + 1)$  are

$$10 \times 20 + 10 \times 1 + 6 \times 20 + 6 \times 1$$

or  $10 \times 21 + 6 \times 21$

### partitioning (See **equal sharing**.)

Can be used in the following ways:

Division using equal sharing.

Representing numbers in part-part-whole relationships.

Solving a multiplication problem using partial products.

### partitive division (See **equal sharing**.)

### part-part-whole relationships

An understanding that numbers can be composed of other numbers.

*Examples*

25 is

5 groups of 5

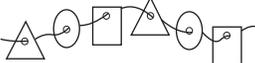
1 ten and 15 ones

$$18 + 7$$

### pattern

A design (geometric) or sequence (numerical or algebraic) that is predictable because some aspect of it repeats.

*Examples*

Geometric pattern: 

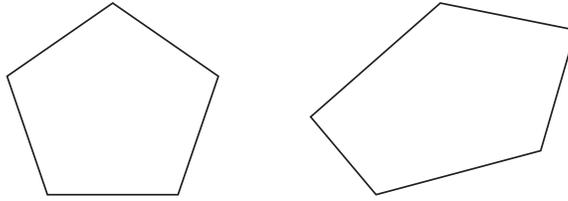
Numerical pattern: 4, 7, 10, 13, ...

Algebraic pattern:  $x, x^2, x^3, \dots$

**pentagon**

A polygon with five sides and five angles.

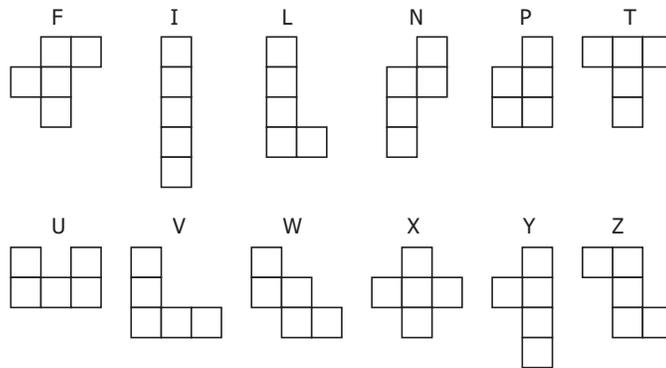
*Examples*



**pentominoes**

A plane figure made from five equal-sized squares so that some sides are shared.

*Examples*



**percent (%)**

A number expressed in relation to 100; represented by the symbol % (e.g., 40 parts out of 100 is 40%).

**perfect square**

A whole number resulting from multiplying an integer by itself;  $a$  is a perfect square if  $a = n \times n$  and  $n$  is an integer (e.g.,  $16 = 4 \times 4$  and  $121 = (-11) \times (-11)$ ).

**Note:** Students will experience whole number perfect squares in Grade 8 and expand their definition to include rational number perfect squares in Grade 9.

**perimeter**

The distance around a closed figure.

## period

In place value, the group of three numbers representing the ones, tens, and hundreds.

*Example*

In number:

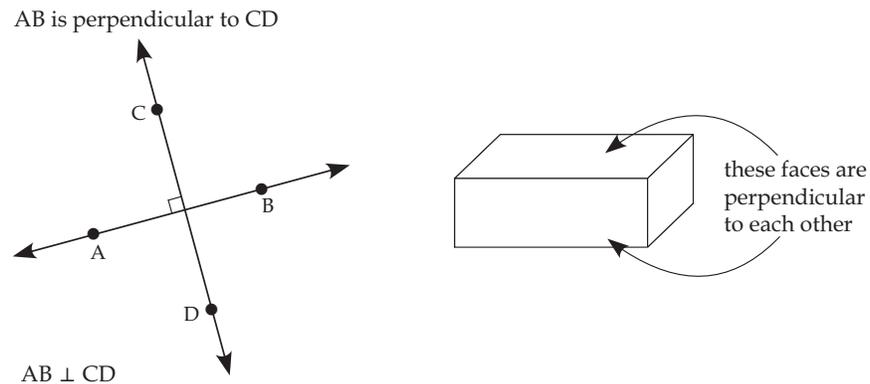
432 786

the thousand period contains	the ones (or unit) period contains
4 hundred thousands,	7 hundreds,
3 ten thousands, and	8 tens, and
2 one thousands	6 ones

## perpendicular

Lines, faces, or edges that intersect at right angles ( $90^\circ$ ) to each other.

*Examples*



## perpendicular bisector

A line, segment, or ray that meets a line segment at a right angle and divides the line segment into two equal pieces.

**personal referent** (*See referent.*)

## physical model

A representation of something using objects.

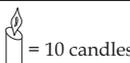
## pi ( $\pi$ )

The ratio of the circumference of a circle to its diameter; an irrational number whose approximate value is 3.141592654 . . . .

## pictograph

A graph that uses pictures or symbols to represent data; an accompanying key indicates the value associated with each picture or symbol.

*Example*

Number of Candles Sold by Mr. Flicker in One Week	
Day	Number of Candles
Sunday	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
	

## pictorially (represent pictorially)

Representing a situation or solving a problem using drawings or representations of actual objects. A visualization of the situation and solution takes place rather than an actual concrete experience of the situation and solution.

## pip

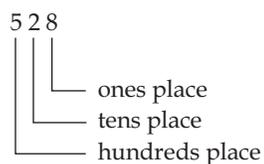
Any of the spots on a playing card, number cube, or domino.

## place value

The value of a digit in a number based on its position.

*Example*

In the number 528, the 5 has a value of 5 hundreds (or 500), the 2 has a value of 2 tens (or 20), and the 8 has a value of 8 ones (or 8).



**plane**

A set of points forming a flat surface that extends without end in all directions.

**plot**

To locate a point on a coordinate plane.

**plus (+)**

Refers to addition or the symbol for addition.

**point**

An exact location in space; a point has no dimension.

**point of rotation**

A fixed point about which an object is rotated.

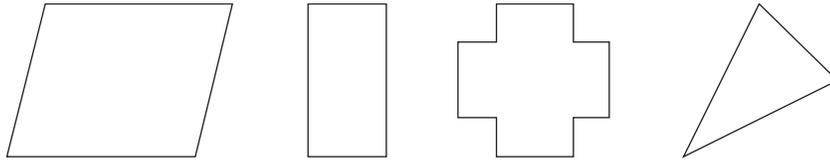
**poll**

The results of a question or questions answered by a group of people.

**polygon**

A closed plane figure formed by three or more line segments.

*Examples*

**polyhedron**

A 3-D figure that is bounded by four or more polygonal faces.

**population**

A group of people, objects, or events that fit a particular description; in statistics, the set from which a sample of data is selected.

**position word**

A word used to describe the placement of numbers or elements of a pattern (e.g., after, between, before, next, beside, more, less).

**positive number**

Any number greater than 0, located to the right of 0 on a horizontal number line, or above 0 on a vertical number line.

**possible event**

An event that has a chance of occurring (e.g., rolling a 3 on a number cube).

**post meridiem (post meridian) (p.m.)**

Afternoon; the time from noon (12:00 p.m.) until midnight (12 a.m.).

**precise**

To be exact in measuring.

*Example*

19 mm is more precise than 2 cm.

**predict**

To determine the next step or value (to make an educated guess), based on evidence or a pattern.

**prediction**

An educated guess about an outcome.

**preservation of equality**

In algebra, equality is maintained when solving for a variable by performing the same operation on both expressions in an equation.

**prime factorization**

A method of writing a composite number as a product of its prime factors (e.g.,  $12 = 2 \times 2 \times 3 = 2^2 \times 3$ ).

**prime number**

A number greater than 1 that has exactly two different factors, 1 and itself (e.g., 3 is a prime number, as its only factors are 1 and 3).

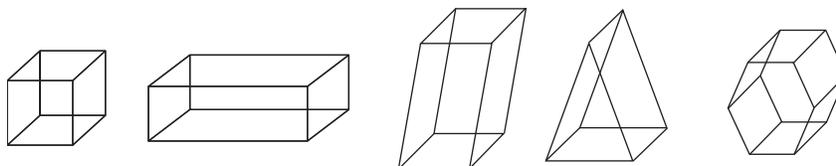
*Examples*

Prime Numbers		Non-Prime Numbers	
Number	Factors	Number	Factors
2	1, 2	6	1, 2, 3, 6
7	1, 7	8	1, 2, 4, 8
11	1, 11	15	1, 3, 5, 15
17	1, 17	25	1, 5, 25

**prism**

A 3-D figure (solid) that has two congruent and parallel faces that are polygons (the bases); the remaining faces are parallelograms.

*Examples*

**probability**

The chance of an event occurring; the ratio of the number of favourable outcomes to the total number of possible outcomes; the probability of an event must be greater than or equal to 0 and less than or equal to 1.

*Example*

$$P(\text{rolling a 3}) = \frac{\text{the number of 3s on the faces}}{\text{the total number of faces}} = \frac{1}{6}$$

**problem-solving strategies**

Various methods used to solve word problems; strategies may include, but are not limited to, acting out the problem, making a model, drawing a picture or graph, using logical reasoning, looking for a pattern, using a process of elimination, creating an organized chart or list, solving a simpler but related problem, using trial and error (guess and check), working backwards, and writing an equation.

**product**

The number obtained when two or more factors are multiplied (e.g., in  $1.2 \times 3 = 3.6$ , 3.6 is the product).

**proper fraction**

A fraction whose numerator is less than its denominator.

**properties**

Characteristics of a shape, object, number, or set of numbers (e.g., size, shape, number of faces, ability to be stacked or rolled).

## properties of real numbers

Rules that apply to the operations with real numbers.

*Examples*

Commutative Property	$a + b = b + a$	$ab = ba$
Associative Property	$a + (b + c) = (a + b) + c$	$a(bc) = (ab)c$
Distributive Property	$a(b + c) = ab + ac$	
Identity	$a + 0 = a$	$a \times 1 = a$
Inverse	$a + (-a) = 0$	$a \cdot \frac{1}{a} = 1$
Zero Property	$a + 0 = a$	$a \cdot 0 = 0$

## proportion

An equation that states two ratios are equivalent (e.g.,  $\frac{5}{10} = \frac{1}{2}$  or  $5:10 = 1:2$ ).

## proportional

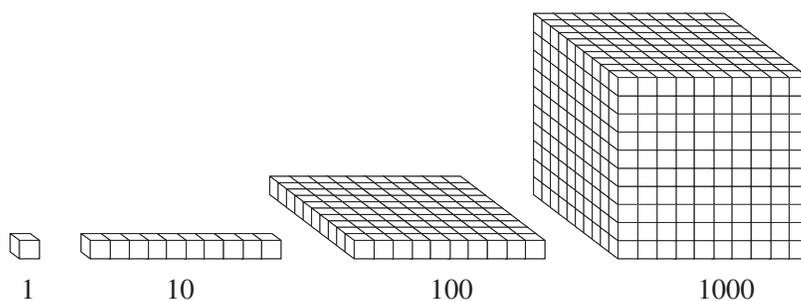
In proportion. One variable is proportional to another if the ratio of corresponding values remains constant.

## proportional base-10 materials

Materials in which the models for the ones, tens, and hundreds are proportional in size. The hundreds model is physically 10 times larger than the tens model, and the tens model is 10 times larger than the ones model. There are two sets of proportional base-10 materials: pre-grouped base-10 models (e.g., base-10 blocks, paper-made strips of base-10 blocks) and materials that can be bundled (e.g., straws, popsicle sticks, interlocking cubes).

*Example*

In the following base-10 materials, the cube that represents the ones model is 10 times smaller than the rod that represents the tens model.



### proportional reasoning

Using the concept of proportions when analyzing and solving a mathematical situation.

*Example*

In your school, the ratio of boys to girls is 4 to 3. If your school has 400 boys, how many girls does it have?

*Solution*

$$\begin{array}{l} 4:3 \\ 400:x \\ 400 \cdot \frac{3}{4} = \frac{x}{400} \cdot 400 \\ x = 300 \end{array}$$

The school has 300 girls.

### proportionality

The quality, character, or fact of being proportional.

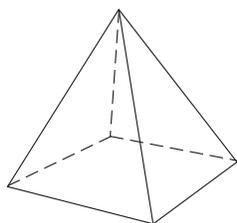
### protractor

An instrument used to measure the degree of an angle.

### pyramid

A polyhedron whose base is a polygon and whose lateral faces are triangles that share a common vertex.

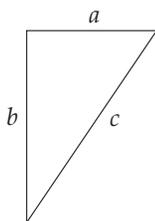
*Example*



### Pythagorean theorem

The mathematical relationship stating that in any right triangle the sum of the squares of the two legs is equal to the square of the hypotenuse; if  $a$  and  $b$  are the lengths of the legs and  $c$  is the length of the hypotenuse, then  $a^2 + b^2 = c^2$ .

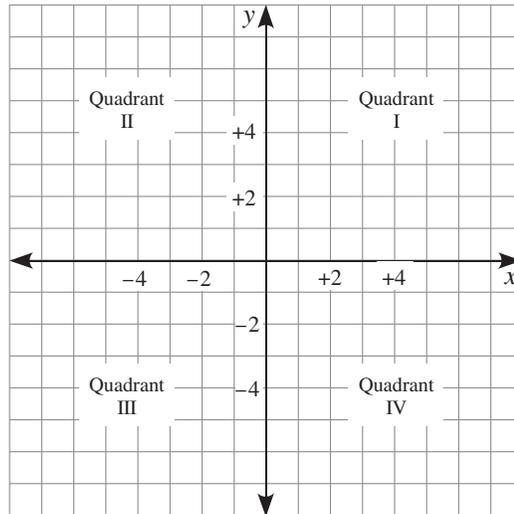
*Example*



## quadrant

One of four sections of a coordinate grid separated by horizontal and vertical axes. Quadrants are numbered counter-clockwise, beginning with the top right-hand quadrant, as 1st, 2nd, 3rd, and 4th (or I, II, III, and IV).

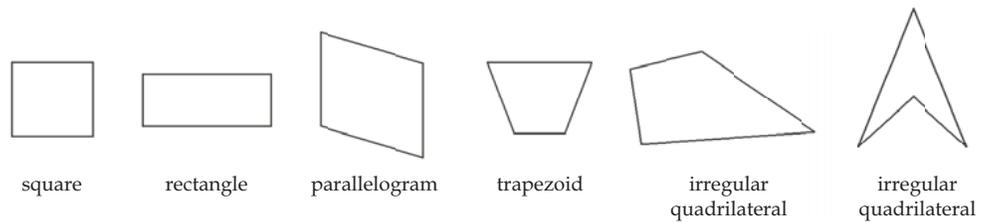
*Example*



## quadrilateral

A polygon with four sides and four angles.

*Examples*



**quotative division** (*See equal grouping.*)

## quotient

The answer to the division of two numbers (e.g., in  $12 \div 3 = 4$ , the quotient is 4).

## radii

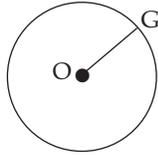
The plural form of radius.

**radius**

A line segment that extends from the centre of a circle to any point on the circle; equal to half the diameter.

*Example*

$\overline{OG}$  is a radius of circle O.

**range (of a data set)**

The difference between the greatest and the least values in a set of numbers.

*Example*

Given the data: 2, 7, -3, 14, -1, 6, 34, 3

The range is:  $34 - (-3) = 37$

**rate**

A ratio that compares quantities of different units (e.g., kilometres per hour, price per kilogram, students per class, heartbeats per minute).

**ratio**

A comparison of two numbers or two like quantities by division (e.g., the ratio of girls to boys is three to five,  $\frac{3}{5}$ , 3 to 5, or 3:5).

**rational number**

Any number that can be expressed as a fraction in the form  $\frac{a}{b}$  where  $a$  and  $b$  are integers and  $b \neq 0$ . All rational numbers can be expressed as a terminating or repeating decimal.

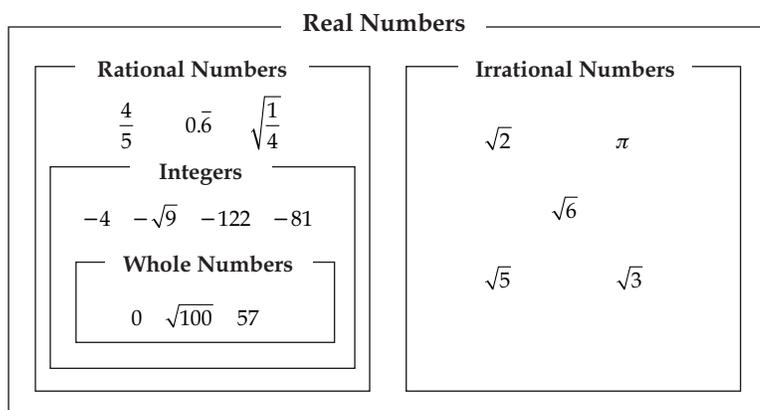
**ray**

Part of a line that has one endpoint and extends infinitely in one direction.

## real numbers

The set of numbers that includes all rational and irrational numbers.

*Example*



## reasonable estimate

An approximation of the result of a given problem or calculation using rational, logical procedures (e.g., rounding).

## reciprocal

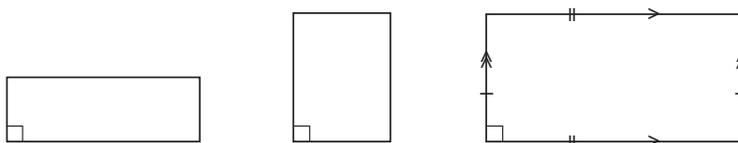
The number that is used to multiply a given number to obtain an answer of 1

(e.g.,  $\frac{2}{3} \times \frac{3}{2} = 1$ , therefore  $\frac{3}{2}$  is the reciprocal of  $\frac{2}{3}$ ) (see **multiplicative inverse**).

## rectangle

A quadrilateral with four right angles; a parallelogram with a right angle. A square is a special rectangle. **Note:** In a rectangle, the opposite sides are congruent (equal in measure).

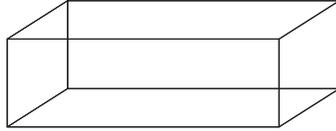
*Examples*



## rectangular prism

A prism whose six faces are rectangles; a prism with a rectangular base (*see* **right rectangular prism**).

*Example*



## referent

A known quantity used to estimate or compare.

*Examples*

Using one layer of marbles from a jar to estimate the number of marbles in the entire jar.

The height of the room is about twice as tall as a student.

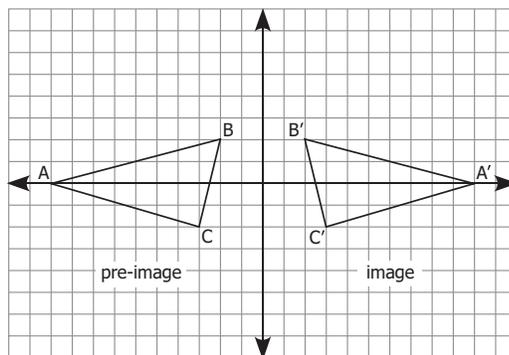
Knowing the width of someone's pinky finger to be approximately 1 cm can help you measure the length of a pencil.

Knowing the length of a piece of paper is approximately 30 cm can help you determine the length of a table.

## reflection (flip)

A transformation in geometry in which an object is reflected in a straight line to form a mirror image. Every point of an object and the corresponding point on the image are equidistant from the line of reflection.

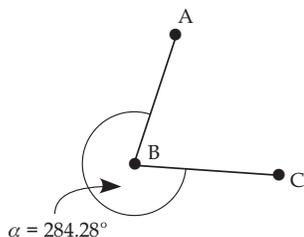
*Example*



**reflex angle**

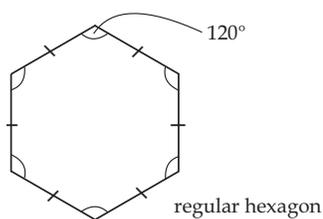
An angle whose measure is greater than  $180^\circ$  and less than  $360^\circ$ .

*Example*

**regular polygon**

A polygon in which all sides and all angles are congruent.

*Example*



**regular shape** (*See regular polygon.*)

**related facts** (*See fact family.*)

**relation**

Any set of ordered pairs.

**relation symbol**

A symbol denoting the relationship in a mathematical sentence (e.g.,  $>$ ,  $<$ ,  $\neq$ ,  $=$ ).

**remainder**

The amount left over when one number is divided by another number. If the remainder is 0, it is usually said that there is no remainder.

*Example*

For  $14 \div 3$ , the answer is 4, with a remainder of 2.

This can be expressed as 4 r 2,  $4\frac{2}{3}$ , or  $4.\bar{6}$ .

**Note:** Remainders first appear in Grade 4; however, students are expected to express these remainders as decimals and fractions beginning in Grade 5.

**repeated addition**

Addition of equal groups; a model or alternative algorithm for multiplication.

**repeated subtraction**

Subtraction of equal groups from a number; a model or alternative algorithm for division.

**repeating decimal**

A decimal in which one or more digits repeat infinitely (e.g.,  $0.3333 \dots$ , or  $0.\overline{3}$ ,  $5.272727 \dots$ , or  $5.\overline{27}$ ).

**repeating pattern**

A repeated sequence or arrangement of items about which predictions can be made.

*Examples*

Square, circle, circle, square, circle, circle, square, circle, circle

7, 4, 7, 4, 7, 4, 7, 4, . . .

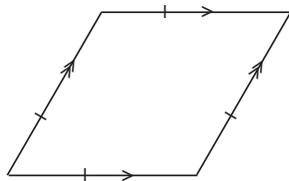


Clap, snap, clap, snap, clap, snap

**rhombus**

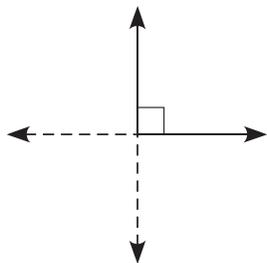
A parallelogram with all four sides congruent. (The plural of rhombus can be either **rhombuses** or **rhombi**.)

*Example*

**right angle**

A  $90^\circ$  angle; an angle formed by two perpendicular lines.

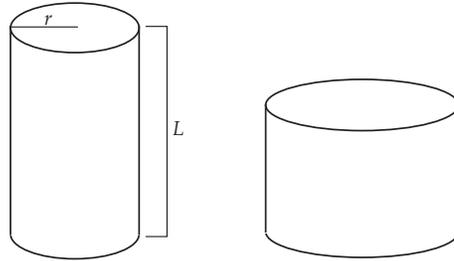
*Example*



### right cylinder

A geometric figure with two parallel and congruent, flat (plane) surfaces connected at a right angle by one curved surface (curved face).

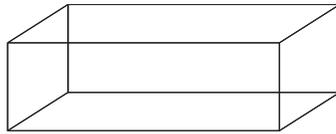
*Examples*



### right rectangular prism

A prism whose six faces are rectangles; a prism with a rectangular base (*see rectangular prism*).

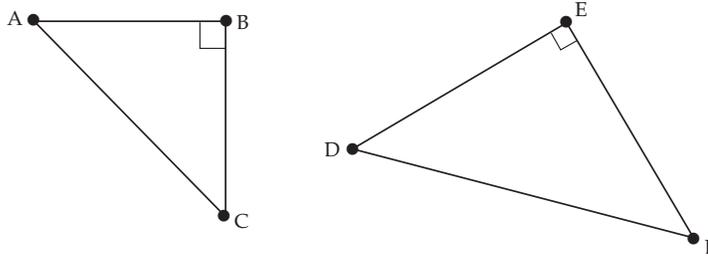
*Example*



### right triangle

A triangle with one right angle.

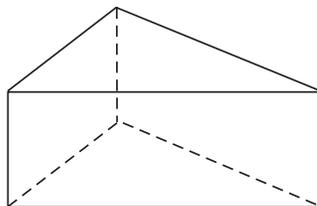
*Examples*



### right triangular prism

A prism with a triangular base whose faces meet the base at right angles.

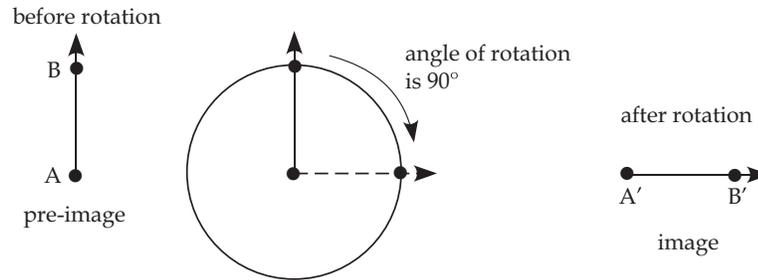
*Example*



## rotation (turn)

In geometry, a transformation in which an object is moved about a fixed point called a **point of rotation**.

*Example*



## rounding

To approximate the value of a whole number or decimal to a specific place value.

*Examples*

Rounded to the nearest **ten**:

126 rounds to 130

162 rounds to 160

Rounded to the nearest **tenth**:

1.251 rounds to 1.3

1.22 rounds to 1.2

## sample

A representative part or a single item from a larger whole or group; a finite part of a statistical population whose properties are studied to gain information about the whole.

## sample space

A list of all possible outcomes in a given situation.

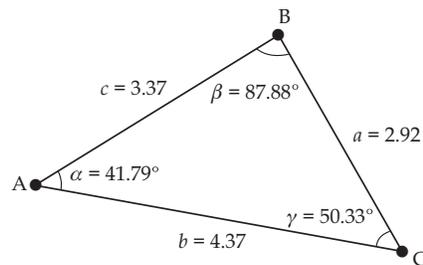
*Example*

The sample space for tossing two coins is: (H,H), (H,T), (T,H), (T,T).

## scalene triangle

A triangle with no congruent sides and no congruent angles.

*Example*



**second-hand data**

Data that is not obtained directly; data obtained from secondary sources (e.g., encyclopedias, newspapers, reference books, the Internet).

**set**

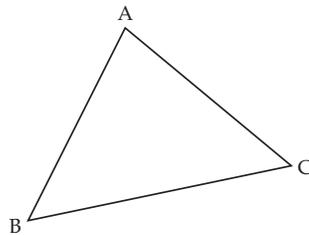
Any collection of things, without regard to their order. The members (or elements) of a set could be numbers, names, shapes, and so on.

**side**

A line segment joining two adjacent vertices of a polygon.

*Example*

$\overline{AB}$  is a side of  $\triangle ABC$ .

**simplest form** (*See lowest terms.*)**simplify fractions**

To rename fractions to lowest terms by dividing the numerator and denominator by the greatest common factor of the numerator and denominator.

**skeleton**

An open 3-D figure constructed from materials (e.g., straws, pipe cleaners).

**skip count**

To count by a given number (e.g., skip count by 2s: 2, 4, 6, 8, 10, . . .).

**slide** (*See translation.*)**solution**

The value or values that make an equation or open sentence true.

**solve**

To find the answer to an equation or a problem.

**sort**

To separate objects into groups according to properties or characteristics.

**sphere**

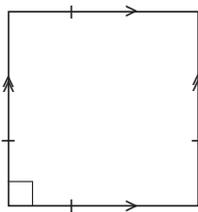
A 3-D figure with a set of points in space that are the same distance from a fixed point called the **centre**.

*Example*

**square**

A rectangle with all sides congruent (equal in measure); a rhombus with a right angle.

*Example*

**square root**

A number (factor) that, when multiplied by itself, produces the given square (e.g.,  $\sqrt{16} = 4$ ).

**square unit**

A unit for measuring area such as square centimetre ( $\text{cm}^2$ ) or square metre ( $\text{m}^2$ ).

**stable order**

The same sequence of words used from one count to the next.

**standard form of a number**

The usual form of a number, where each digit is in its place value (e.g., twenty-nine thousand three hundred four is written as 29 304).

### standard unit of measure

A unit commonly used to indicate the length, area, volume (capacity), mass, or temperature of an object; also used to indicate the passage of time.

*Examples*

- **Length** is commonly measured in units of millimetres, centimetres, metres, kilometres, etc.
- **Area** is commonly measured in units of square millimetres, square centimetres, square metres, square kilometres, etc.
- **Volume** is commonly measured in units of cubic millimetres, cubic centimetres, cubic metres, etc.
- **Capacity** is commonly measured in units of millilitres, litres, etc.
- **Mass** is commonly measured in units of grams, kilograms, etc.
- **Temperature** is commonly measured in units of degrees Celsius, etc.
- **Time** is commonly measured in units of seconds, minutes, hours, days, weeks, months, years, etc.

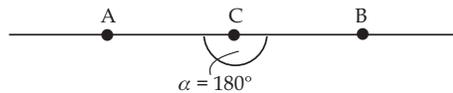
### statistics

The collection, organization, presentation, and analysis of data.

### straight angle

An angle with a measure of  $180^\circ$ .

*Example*



### straightedge

A tool used to make a straight line; can be thought of as a ruler without measurement marks.

### strategy

A method or system of steps used to solve problems (*see* **problem-solving strategies**).

### subitize

To determine the quantity of a small group of objects rapidly without counting.

**substitution**

To replace variables in a given expression or equation with designated values in order to evaluate the expression or equation.

*Example*

Evaluate  $3a - 4bc + d$ , if  $a = -3$ ,  $b = 2$ ,  $c = -6$ , and  $d = 5$

*Solution:*  $3(-3) - 4(2)(-6) + (5) = -9 + 48 + 5 = 44$

**subtract**

To take one or more quantities away from another; to find one quantity known as the **difference**.

**subtraction**

A mathematical operation that finds the difference between two quantities, or how much more one quantity is than a second quantity.

**subtraction fact**

Number fact with minuends to 18 and single-digit subtrahends.

**subtraction sentence**

An equation showing the difference of two numbers (e.g.,  $10 - 7 = 3$ ).

**subtrahend**

In subtraction, the number being subtracted from a given number (e.g., in  $5 - 2 = 3$ , 2 is the subtrahend).

**sum**

The result of adding two or more quantities (e.g., in  $3 + 5 + 1 = 9$ , 9 is the sum).

**surface area**

The sum of the areas of the faces or curved surface of a 3-D object.

**survey**

To ask either written or verbal questions for the purpose of acquiring information/data.

**symbolically (represent symbolically)**

Representing a situation or solving a problem using an abstract representation.

*Example*

For solving  $13 + 8$ , at no time are any actual concrete 13 or 8 objects used to represent the situation, nor are there pictorial representations of objects. 13, 8, and  $13 + 8 = 21$  are symbolic representations leading to the conclusion that

- 13 apples plus 8 apples results in a total of 21 apples
- 13 blocks of concrete plus 8 blocks of concrete results in a total of 21 blocks of concrete
- 13 houses plus 8 houses results in a total of 21 houses

**symmetrical**

Having symmetry. Two sides of a shape are balanced about a line or point; two sides of a shape are mirror images; a shape has one or more lines of symmetry.

**symmetry**

The property of having the same size and shape across a dividing line or around a point.

**table**

A systematic or orderly list of values, usually presented in rows and columns.

**table of values**

An organized list of values from a function, relation, pattern, expression, or equation; shows the relationship between two variables.

*Example*

For the equation  $n + m = 5$

$n$	$m$
-1	6
0	5
1	4
2	3

## tally mark

A recording of the number of items in a set; used to keep track of data being counted; usually consists of strokes grouped in fives.

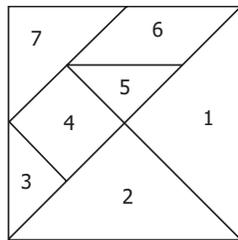
*Example*

Colour of Shirts	Tally	Number of Students
Red	++++ +++++ +++++	17
Blue	++++	5
Orange	++++	9
Other		2

## tangram

An ancient Chinese puzzle consisting of a square card or tile cut into seven pieces (called **tans**), which can be arranged in a variety of shapes.

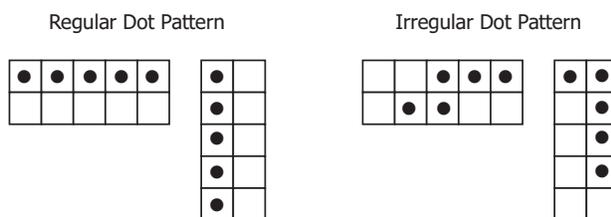
*Example*



## ten frame

A table, consisting of either two rows and five columns or five rows and two columns, with zero to ten dots used to represent numbers.

*Examples*



## tens place

The place value located two places to the left of the decimal point; a digit in the tens place has a value of 10 times the value of the digit.

**tenths place**

The place value located one place to the right of the decimal point; a digit in the tenths place has a value of  $\frac{1}{10}$  the value of the digit.

**term**

An individual element in a pattern, or the addends of an algebraic expression.

*Examples*

In the pattern 3, 5, 7, 9, 11, . . . , 5 is the second term and 11 is the fifth term.

The algebraic expression  $p^2 - 3p + 7$  has three terms:  $p^2$ ,  $-3p$ , and 7.

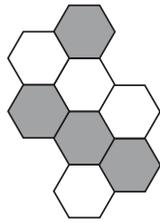
**terminating decimal**

A decimal that has a finite number of decimal places; all terminating decimals are rational numbers (e.g., 0.7355).

**tessellation**

A tiling pattern made with shapes fitted together in a repeated pattern with no gaps or overlaps.

*Example*

**theoretical probability**

The ratio of expected successes to the number of outcomes during an experiment.

*Example*

If you toss a coin, the theoretical probability is  $\frac{1}{2}$  for either heads or tails, or  $P(\text{tails}) = \frac{1}{2}$  and  $P(\text{heads}) = \frac{1}{2}$ . The sum of the theoretical probabilities for all possible outcomes is 1.

$$P(E) = \frac{\text{number of successful outcomes}}{\text{total number of outcomes}}$$

**thousands place**

The place value located four places to the left of the decimal point in a number; a digit in the thousands place has a value of 1000 times the value of the digit.

**thousandths place**

The place value located three places to the right of the decimal point; a digit in the thousandths place has a value of  $\frac{1}{1000}$  times the value of the digit.

**three-dimensional (3-D) object**

An object that has length, width, and height; also called a **solid object** (e.g., prism, pyramid, cylinder, cone).

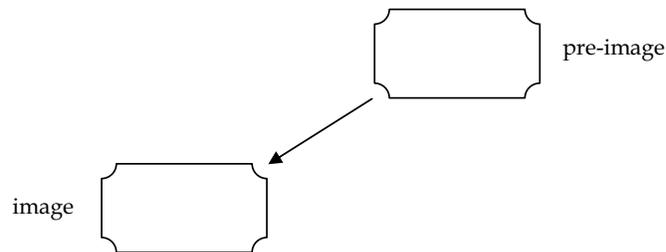
**transformation**

The result of a change made to an object; a collective term referring to translations, rotations, and reflections.

**translation (slide)**

In geometry, a transformation in which an object is moved along a straight line without turning or changing the size or shape. Every point of an object is moved the same distance and in the same direction. A translation arrow indicates the direction and amount of movement.

*Example*



## trapezoid

Can be used in the following ways:

A quadrilateral with at least one pair of parallel sides.

A quadrilateral with exactly one pair of parallel sides.

The definition used will have an impact on the classification of quadrilaterals. For example, using the definition “at least one pair” implies that a parallelogram is a trapezoid, whereas using the definition “exactly one pair” implies a parallelogram is not a trapezoid.

*Examples*

In the trapezoid below,  $\overline{AB} \parallel \overline{CD}$ . This is an example of a trapezoid with exactly one pair of parallel sides.



In the trapezoid below,  $\overline{EF} \parallel \overline{GH}$  and  $\overline{EH} \parallel \overline{FG}$ . This is an example of a trapezoid with at least one pair of parallel sides.

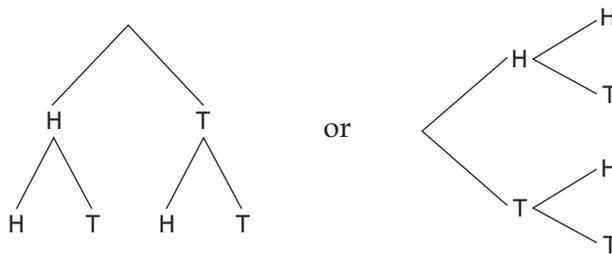


## tree diagram

A branching graph without loops, representing the possible outcomes in a probability experiment. Tree diagrams are also used to sort information.

*Examples*

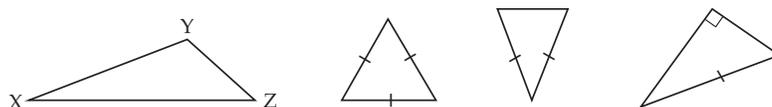
The following represents tree diagrams for tossing two coins.



## triangle

A polygon with three sides and three angles.

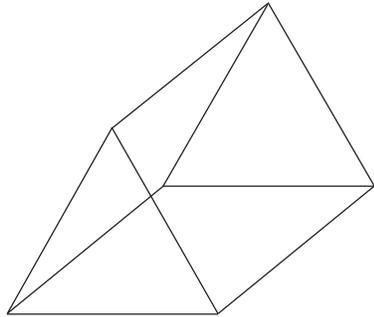
*Examples*



**triangular prism**

A prism with a triangular base.

*Example*



**turn** (*See rotation.*)

**two-dimensional (2-D) shape**

A figure that has two measures, such as length, width, or height (e.g., circle, square, triangle).

**two-step equation**

An equation that can be solved in two steps.

*Examples*

$$2 + 3 = 1 + \square$$

$$7 - 2n = 5$$

$$\square + 3 = 7 - 2$$

$$2t - 4 = 6$$

$$\frac{5x}{2} = 3$$

**unit fraction**

A fraction with a numerator of 1.

**units place** (*See ones place.*)

**unknown** (*See variable.*)

**unlike denominators**

Two or more fractions with unequal denominators.

*Example*

$\frac{3}{10}$  and  $\frac{3}{4}$  are fractions with unlike denominators.

## variable

Can be used in the following ways:

A symbol used to represent a number in an expression (e.g.,  $2n + 3$  [the variable is  $n$ ]).

A symbol used to represent an unknown value in an equation (e.g.,  $a + 3 = 5$  [the variable is  $a$ ]).

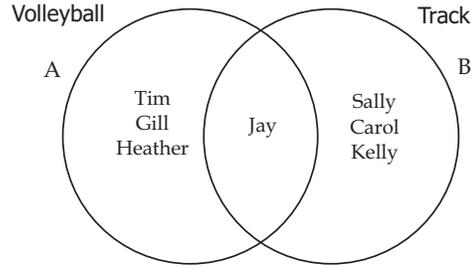
A symbol used to represent a number or element of a set in a relation connecting two or more sets (e.g.,  $y = x + 3$  [the variables are  $x$  and  $y$ ]).

## Venn diagram

A drawing showing relationships among sets.

*Example*

The Venn diagram below shows the students who play volleyball, the students who run track, and the student who plays volleyball and runs track.



## vertex

Can be used in the following ways:

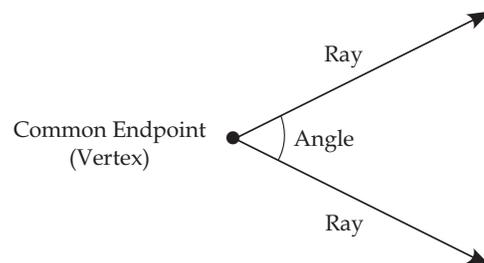
The common endpoint of two sides of a polygon.

The common endpoint of two rays that form an angle.

The common point where three or more edges of a 3-D solid meet.

**Note:** A cone has an **apex**, but it is often referred to as a vertex.

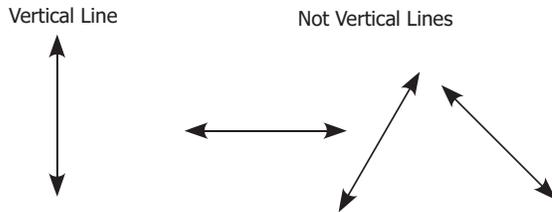
*Example*



### vertical line

A line at right angles to the horizon; a line extending up and down without extending left and right; a line perpendicular to the horizon.

*Example*



### vertices

The plural form of vertex.

### view

A 2-D representation of a 3-D object.

### volume

In general, volume refers to an amount of space occupied by an object (e.g., solids, liquids, gas).

In science, volume is expressed in cubic units (e.g., cubic centimetres ( $\text{cm}^3$ ) and cubic metres ( $\text{m}^3$ )).

In mathematics, volume means the same thing as **capacity**. Both volume and capacity are represented by the number of cubes (and parts of cubes) of a given size it takes to fill an object.

### weight

A measure comprising a combination of the mass of an object and the pull of gravity on that mass. In the SI units of measurement, the units of weight include newtons (N) and dynes (dyn).

**Mass** is a measure of how much matter there is in an object.

In daily life, the terms **mass** and **weight** are virtually interchangeable, but in reality they are not the same thing. An object on the moon weighs less than it does on the earth, and in space is weightless. The mass of the object does not change, regardless of where it is.

### whole numbers

The set of counting numbers plus 0  $\{0, 1, 2, 3, \dots\}$ .

### width

One dimension of a 2-D or 3-D figure.

### x-axis

The horizontal number line (axis) on the Cartesian plane.

***y*-axis**

The vertical number line (axis) on the Cartesian plane.

**zero**

The number that indicates no quantity, size, or magnitude; zero is neither negative nor positive; zero is the additive identity.

**zero property of addition**

The property that states that the sum of a number and 0 is that same number (i.e.,  $a + 0 = a$  for all  $a$ ). This property is sometimes called the **identity property of addition**.

**zero property of multiplication**

The property that states that the product of any number and 0 is always 0 (i.e.,  $a \times 0 = 0$  for all  $a$ ).







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