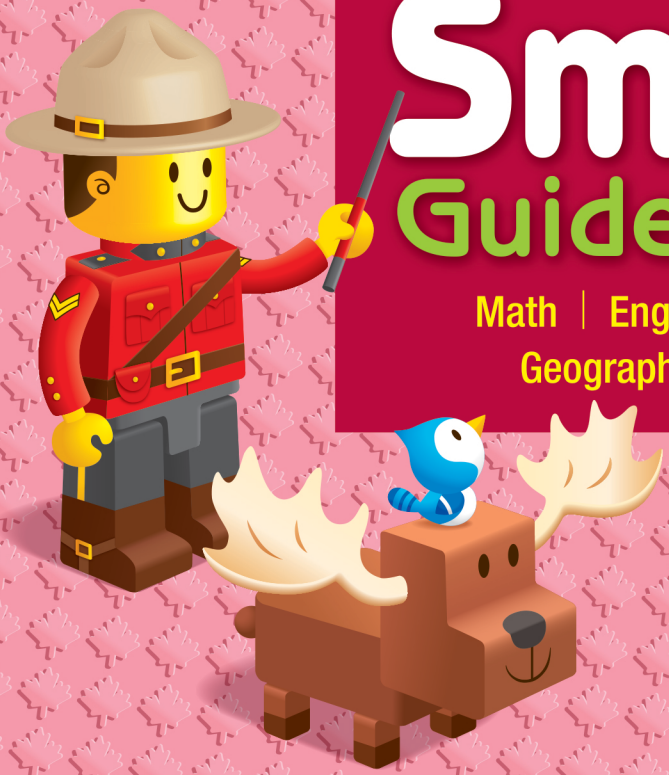
Complete
Canadian
Curriculum

A handy book to guide you through
key terms and concepts!



Smart Guide Book

Math | English | History
Geography | Science

Grade
8

Popular Book Company (Canada) Ltd.

Complete Canadian Curriculum

Smart Guide Book

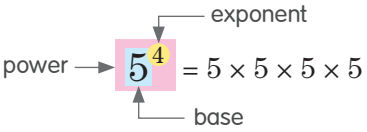
Grade 8

Contents

Number Sense and Numeration

- **Power** – a number written in exponential form

e.g.



5^4 We say "5 to the power of 4".

Follow the order of operations to evaluate; commonly called: **BEDMAS**

e.g. $15 \times (10 - 8)^3 - 7$

$= 15 \times (\mathbf{2})^{\mathbf{3}} - 7$ ← Do the brackets first.

$= 15 \times \mathbf{8} - 7$ ← Evaluate the exponent.

$= \mathbf{120} - 7$

$= \underline{\mathbf{113}}$

BEDMAS

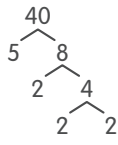
B – Brackets
E – Exponents
D – Division
M – Multiplication
A – Addition
S – Subtraction

- **Prime Factor** – a factor that is a prime number

e.g. $40 = 2 \times 2 \times 2 \times 5$

$= \underline{2^3 \times 5}$ ← a product of prime factors

Factor Tree



- **Finding Common Factors of Numbers Using Prime Factors**

1st Find the prime factors of each number.

2nd Multiply any 2 or more common factors to form another common factor.

e.g. Find the common factors of 54 and 63.

$54 = 2 \times 3 \times 3 \times 3$

$63 = 3 \times 3 \times 7$

The common factors of 54 and 63 are 3 and 9 (3×3).

- **Numbers in Expanded Form Using Powers of Ten**

e.g. $5892 = 5000 + 800 + 90 + 2$

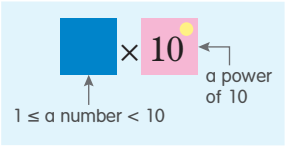
$= 5 \times 1000 + 8 \times 100 + 9 \times 10 + 2 \times 1$

$= \underline{5 \times 10^3 + 8 \times 10^2 + 9 \times 10^1 + 2 \times 10^0}$

Hints!

$1 = 10^0$
$10 = 10^1$
$100 = 10^2$
$1000 = 10^3$

- **Numbers in Scientific Notation**



e.g. Write 478 000 in scientific notation.

4 7 8 0 0 0, ← Move the decimal point 5 places to the left to get 4.78 (1 ≤ 4.78 < 10).

478 000 = 4.78×10^5

- **Ratio and Proportion**

Proportion – an equation that has two equal ratios

Finding the Missing Term in a Proportion

By Equivalent Fractions

e.g. $k:6 = 15:18$

$$\frac{k}{6} \overset{\times 3}{=} \frac{15}{18}$$

Think: $k \times 3 = 15$

$k = 5$

By Multiplication

e.g. $k:6 = 15:18$

$$\frac{k}{6} \times 6 = \frac{15}{18} \times 6$$

Isolate k by multiplying both sides with 6.

$k = 5$

- **Percent**

$$\text{Percent Change} = \frac{\text{amount changed}}{\text{original}} \times 100\%$$

Sale Price

= Regular Price – Discounted Amount

regular price × discount in percent

e.g. Sale price of the dress

= \$125 – \$125 × 20% = \$125 – \$25 = \$100

Simple Interest – interest that is calculated only on the principal

$I = P \times r \times t$

I – Interest (\$)
P – Principal (\$)
r – Interest Rate (%)
t – Time (years)

e.g. P = \$2000 r = 3% t = 5 years

I = \$2000 × 3% × 5

= \$300

- **Fractions**

Addition/Subtraction of Fractions with Different Denominators

1st Find the L.C.M. and equivalent fractions.

2nd Add/Subtract the numerators and keep the denominator the same.

3rd Write the answer in simplest form.

e.g. $1\frac{1}{6} + 2\frac{3}{10}$

$= 1\frac{5}{30} + 2\frac{9}{30}$ ← equivalent fractions

$= 3\frac{14}{30}$ ← Add the whole numbers and the fraction parts separately.

$= 3\frac{7}{15}$ ← in simplest form

Multiplication of Fractions

1st Change all mixed numbers to improper fractions.

2nd Divide the numerators and the denominators by their common factors.

3rd Multiply the numerators and the denominators.

e.g. $1\frac{3}{5} \times 1\frac{1}{14}$

$= \frac{8}{5} \times \frac{15}{14}$ ← 1st

$= \frac{{}^{4}\cancel{8}}{{}_{1}\cancel{5}} \times \frac{\cancel{15}^{3}}{\cancel{14}_{7}}$ ← 2nd

$= \frac{12}{7}$ ← 3rd

$= 1\frac{5}{7}$

Division of Fractions

1st Change all mixed numbers to improper fractions.

2nd Find the reciprocal of the divisor. (reciprocal – swap the numerator and denominator)

3rd Multiply the dividend by the reciprocal of the divisor.

e.g. $\frac{4}{5} \div 1\frac{1}{15}$

$= \frac{4}{5} \div \frac{16}{15}$ ← 1st

$= \frac{{}^{1}\cancel{4}}{{}_{1}\cancel{5}} \times \frac{\cancel{15}^{3}}{\cancel{16}_{4}}$ ← 2nd; 3rd

$= \frac{3}{4}$

- **Decimals**

Terminating Decimal

a decimal having a finite number of digits

e.g. 0.15, 2.158

Repeating Decimal

a decimal having an infinite number of digits

e.g. $0.8888\ldots = 0.\overline{8}$

$4.454545\ldots = 4.\overline{45}$

- **Integers**

Addition/Subtraction of Integers

Adding a negative integer means subtracting its opposite.

e.g. $(+2) + (-3) = +2 - 3$
$= \underline{-1}$

Subtracting a negative integer means adding its opposite.

e.g. $(+2) - (-3) = +2 + 3$
$= \underline{+5}$

Multiplication of Integers

$(+) \times (+) = +$

e.g. $(+2) \times (+3) = +6$

$(-) \times (+) = -$

e.g. $(-2) \times (+3) = -6$

$(+) \times (-) = -$

e.g. $(+2) \times (-3) = -6$

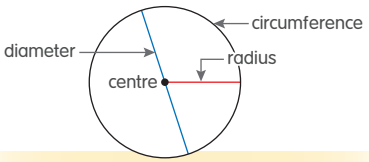
$(-) \times (-) = +$

e.g. $(-2) \times (-3) = +6$

When solving an expression that has multiple operations, follow the order of "BEDMAS".

Measurement

- **The Key Elements of a Circle**



π: the ratio of a circle's circumference to its diameter ($\approx 3.141592\ldots$)

Circumference of a Circle

$C = \pi \times d$
$= 2 \times \pi \times r$

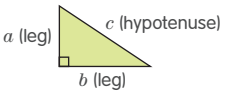
Area of a Circle

$A = \pi \times r^2$
$= \pi(\frac{d}{2})^2$

Geometry

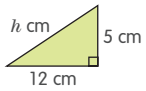
- **Pythagorean Theorem**

In any right triangle, the square of the hypotenuse equals to the sum of the square of each of its legs.



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

e.g.



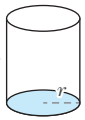
$h^2 = 5^2 + 12^2$
$h^2 = 25 + 144$
$h^2 = 169$
$h = \underline{13}$

• Surface Area and Volume of a Cylinder

Volume of a Cylinder

$= \text{base area} \times \text{height}$

$= \pi r^2 \times h$



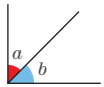
Surface Area of a Cylinder

$= 2\pi r^2 + 2\pi r \times h$

• Angle Properties of Intersecting Lines

Complementary Angles

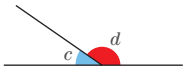
$\angle a$ and $\angle b$



$\angle a + \angle b = 90^\circ$

Supplementary Angles

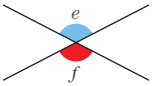
$\angle c$ and $\angle d$



$\angle c + \angle d = 180^\circ$

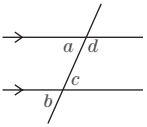
Opposite Angles

$\angle e$ and $\angle f$



$\angle e = \angle f$

• Angle Properties in Parallel Lines

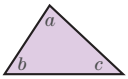


Alternate Angles: $\angle a$ and $\angle c$ ($\angle a = \angle c$)

Corresponding Angles: $\angle a$ and $\angle b$ ($\angle a = \angle b$)

Interior Angles: $\angle d$ and $\angle c$ ($\angle d + \angle c = 180^\circ$)

• Angle Properties in a Triangle



$\angle a + \angle b + \angle c = 180^\circ$

• Coordinates and Transformations

Reflection

a point reflected in the x-axis

$(x,y) \longrightarrow \underset{\text{image}}{(x,-y)}$

a point reflected in the y-axis

$(x,y) \longrightarrow \underset{\text{image}}{(-x,y)}$

Rotation about the Origin

	original	image
90° clockwise:	(x,y)	$\longrightarrow (y,-x)$
180° clockwise:	(x,y)	$\longrightarrow (-x,-y)$
270° clockwise:	(x,y)	$\longrightarrow (-y,x)$

Patterning and Algebra

- **Evaluating Expressions Using Substitution**

  e.g. Evaluate $3x - y$ where $x = -2$ and $y = 5$.

  $3x - y = 3(-2) - (5)$ ← Substitute -2 for x and 5 for y.

  $= -6 - 5$ ← Follow the order of operations to find the answer.

  $= \underline{-11}$

Data Management

- **Using Appropriate Types of Graphs to Show Data**

  Circle Graph – to display part-to-whole relationship

  Double Bar Graph – to display 2 sets of discrete data

  Double Line Graph – to display 2 sets of continuous data

  Scatter Plot – to represent 2 sets of related data

  Histogram – to display a set of data that can be grouped and arranged in numerical order

Probability

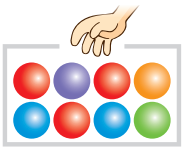
- **Probability** $= \dfrac{\text{No. of favourable outcomes}}{\text{No. of possible outcomes}}$

- **Odds in Favour and Against**

  Odds in Favour – the ratio of the number of favourable outcomes to the number of unfavourable outcomes

  Odds Against – the ratio of the number of unfavourable outcomes to the number of favourable outcomes

e.g.



The odds in favour of picking a red ball : 3 to 5

no. of favourable outcomes: 3

no. of unfavourable outcomes: 5

The odds against picking a blue ball : 6 to 2

no. of unfavourable outcomes: 6

no. of favourable outcomes: 2

Grammar

Verbs

Finite Verb

- agrees with its subject
- changes with the person or number of the subject

Non-finite Verb

- does not have to agree with the subject
- three types: gerund, participle, infinitive

e.g. Joshua loves camping.
finite non-finite

Non-progressive Verb

- describes a sense perception, a mental, emotional, or existing state, or possession
- not normally used in progressive tenses

e.g. I believe you are telling the truth.

Phrasal Verb

- used with a preposition or an adverb
- has a meaning completely different from the verb itself

Prepositional Verb

- needs to be used with a particular preposition
- does not have a complete change of the verb's meaning

e.g. I dream of becoming a ballerina and I will never give up.
prepositional verb phrasal verb

Adjectives

Prepositional Adjective

- must be used with a preposition

e.g. My parents are proud of me.

Order of Adjectives Before a Noun

- must be put in the right order according to the type of each adjective
- order: opinion, size, age, shape, colour, origin, material, purpose

the smartest, largest, brown Canadian Eskimo dog in the world

Adverbs

Interrogative Adverb

- usually placed at the beginning of a question
- when, why, where, how

Relative Adverb

- joins clauses
- replaces the more formal structure of "preposition + which" in a relative clause

e.g. They still remember the day when they left for vacation.
clause — relative adverb — clause

Viewpoint Adverb

- expresses a viewpoint or an opinion about an action
- placed at the beginning of a sentence

Commenting Adverb

- may be the same word as a viewpoint adverb but placed after the verb "be" or before the main verb

e.g. Obviously, no one knows the answer.
viewpoint adverb

This is obviously a very challenging question.
commenting adverb

Phrases

Noun Phrase

- a group of words that functions as a single noun
- can be the subject, the object of a verb, the object of a preposition, a subject complement, an object complement, or an appositive in a sentence

Other Phrases as Nouns

- a gerund phrase or an infinitive phrase can also function as a noun

e.g. Terry, my little brother, loves sleeping on the floor.
noun phrase as an appositive — gerund phrase as the object of a verb

Conjunctions

Coordinating Conjunction

- links independent clauses to form a compound sentence

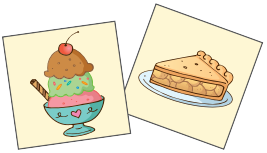
Subordinating Conjunction

- links a dependent clause to an independent clause to form a complex sentence

Correlative Conjunctions

- used in pairs

  e.g. Sara can have <u>either</u> ice cream <u>or</u> apple pie.



Types of Sentences

By Structure

Simple Sentence

- consists of a single independent clause

Compound Sentence

- consists of two or more independent clauses with no dependent clauses
- clauses joined together by coordinating conjunctions

Complex Sentence

- consists of one independent clause with at least one dependent clause
- clauses joined together by subordinating conjunctions

Compound-complex Sentence

- consists of two or more independent clauses, one of which has at least one dependent clause

  e.g. If the weather is good, Keith will do the gardening and Clare will go jogging.

By Purpose

Declarative Sentence – makes a statement

Interrogative Sentence – requests information

Exclamatory Sentence – shows surprise and strong emotions

Imperative Sentence – gives a command or makes a request

Clauses

Dependent Clause – a clause that cannot stand on its own

Noun Clause
- acts as the subject or object of a verb or the object of a preposition

Adjective Clause
- modifies a noun or a pronoun

Adverb Clause
- functions like an adverb
- gives information about "when", "where", "why", and "how"

Conditional Clause – a clause with "if" that is used to talk about a possible situation and its results

- for something that may happen in the future
  conditional clause: present or present perfect tense
  main clause: simple future tense
- for something that is unlikely to happen
  conditional clause: past tense; "were" instead of "was"
  main clause: would + base form of verb
- for something that could have happened in the past but did not actually happen
  conditional clause: past perfect tense
  main clause: would have + past participle of verb

Paragraphs

Introductory Paragraph
- lets the reader know what the piece of writing is about
- contains a thesis statement that introduces the main idea

Body Paragraph
- gives supporting details to the main idea
- consists of a topic sentence, supporting facts, details, examples, and a concluding sentence

Concluding Paragraph
- restates or summarizes the main idea
- gives personal opinion or calls for action

Creating Canada, 1850 – 1890

The creation of Canada involved many changes.

1867 Three colonies in British North America, that is, the Province of Canada (Upper Canada and Lower Canada), Nova Scotia, and New Brunswick, united to form the Dominion of Canada.

1870 The Northwest Territories and Manitoba joined the Dominion of Canada.

1871 British Columbia joined the Dominion of Canada.

1873 Prince Edward Island joined the Dominion of Canada.

1875 Canada established its own Supreme Court.

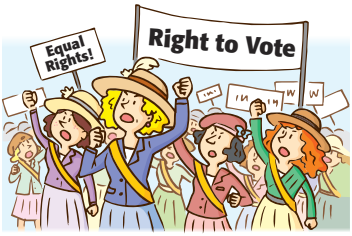
1881 The Canadian Pacific Railway was formed.

There were many conflicts in Canada's early history, such as the conflict over settling land in North Western Canada, the conflict over Confederation, and the debate over the division of power in the government. However, there were also instances of cooperation, for example, the Great Coalition.

Canada, 1890 – 1914

Between 1890 and 1914, Canada underwent many changes. Industrialization in the 18th and 19th century affected poor community members of urban cities, such as the unemployed and the elderly.

With Canada's growing size and population came political, legal, social, and economic changes. For example, the Klondike Gold Rush caused mass immigration to Yukon, which led to the formation of the Yukon Territory. The federal Department of Labour was also created to help resolve disputes between unions and employers concerning workers' rights. The women's suffrage movement was also active during these years in fighting for women's rights, mainly their right to vote.



Global Settlement

Urbanization has been a global settlement trend for decades. More and more people leave villages and farms to live in cities. Canada, with its immigration policy and the resulting fast growing population, is one of the most urbanized countries in the world. However, rapid urban expansion leads to various forms of pollution and environmental degradation, posing great challenges to the sustainable development of cities. It is increasingly important to take steps toward building sustainable communities.

Features of a Sustainable Community

- comprehensive public transportation systems
- renewable sources of energy
- energy-efficient buildings
- waste and water recycling

Quality of Life

The quality of life varies in different regions of the world. Quality of life indicators can be used to measure and compare the quality of life of different places. Very often, the factors that contribute to the quality of life are interrelated. Problems in one area can lead to other problems. There are also correlations between indicators, which means they experience changes simultaneously. There are many non-governmental organizations around the world working to improve quality of life.

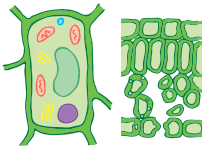
Quality of Life Indicators

- birth rate
- death rate
- crime rate
- fertility rate
- poverty rate
- literacy rate
- national debt
- life expectancy
- per capita income
- doubling time
- gross domestic product
- unemployment rate
- infant mortality rate
- access to education
- access to clean water
- access to medical care
- gross domestic product per capita

Cells

The cell theory is one of the major foundations of biology, and is comprised of three main postulates and two exceptions.

Animal Cell



Plant Cells

Postulates of Cell Theory

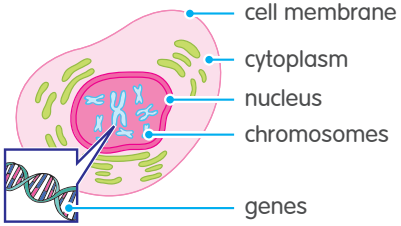
1. All living things are made up of cells.
2. All cells are a structure to carry out functions to sustain life. Energy flow occurs within cells.
3. All cells come from pre-existing cells.

Exceptions

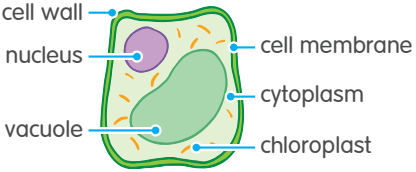
1. The first cell did not come from an already existing cell.
2. Viruses do not contain a cell structure, so they are not living.

Both animal and plant cells contain some of the same types of structures, but not all.

A Typical Animal Cell



A Typical Plant Cell



Organelles are specialized structures in the cytoplasm. They can only be seen under an electron microscope. The organelles of the cell have specific forms and functions. Some examples of organelles are ribosomes, mitochondria, endoplasmic reticulum, golgi apparatus, and lysosomes.

Diffusion	Osmosis
the movement of molecules from an area of high concentration to an area of low concentration	the movement of water molecules from an area of high water concentration to an area of low water concentration

Systems

Systems are groups of parts that work together to do something. They can be found in nature or constructed by humans. Systems can be made up of smaller systems, called subsystems, that work together to make up the whole.

All systems have a purpose and have an input and an output.

A bike is a **mechanical system**. The subsystems at work in a bike are, for example, the gears and drivers, wheels and axles, and the frame and materials.

System: bike
Purpose: moving from one place to another
Input: mechanical energy
Output: movement

Terms Related to Systems:

- **Energy**: the capacity to do work
- **Force**: a push, pull, or another factor that makes an object change speed, shape, or direction
- **Work**: the amount of effort expended in moving an object
- **Efficiency**: how much of the energy used is useful

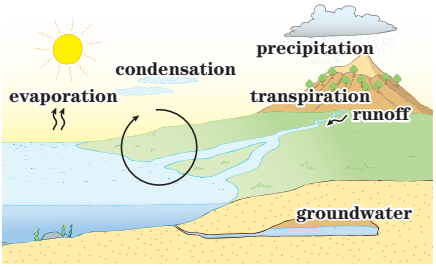
$$\text{Efficiency of a Machine} = \frac{\text{Work Output}}{\text{Work Input}} \times 100\%$$

The higher the percent, the higher the efficiency.

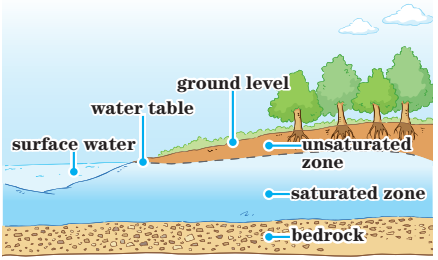
Water

All living things need water to survive. Unfortunately, very little fresh water is available. Apart from various bodies of water, water can be stored underground. Underground water is below the water table when all the spaces among the particles of soil and rocks are filled with water – in other words, where the earth is saturated.

Water Cycle



Underground Water



Glaciers and Polar Ice Caps

Approximately 75% of the Earth's fresh water is in the form of glaciers, with almost all of that in the Antarctic ice sheet.

Precipitation and temperature affect the size of polar ice caps and glaciers. Melting ice caps and glaciers affect both local and global water systems.

Water Conservation

There are three main uses of water: domestic, agricultural, and industrial. The agricultural industry uses the most fresh water because many crops require enormous amounts of water. Conservation efforts are important, and growers are switching to less wasteful irrigation methods.

For domestic purposes, there are many things you can do to conserve water. For example, you can turn the faucet off while brushing your teeth and turn it on when you need to rinse your mouth.

I have learned concepts in these subject areas:

Math

- ✔ Number Sense and Numeration
- ✔ Measurement
- ✔ Geometry and Spatial Sense
- ✔ Patterning and Algebra
- ✔ Data Management and Probability

English

- ✔ Grammar
- ✔ Oral Communication
- ✔ Reading
- ✔ Writing

History and Geography

- ✔ Creating Canada, 1850 – 1890
- ✔ Canada, 1890 – 1914
- ✔ Global Settlement
- ✔ Global Inequalities

Science

- ✔ Life Systems
- ✔ Structures and Mechanisms
- ✔ Matter and Energy
- ✔ Earth and Space Systems