CHAPTER 5

Algebraic Expressions

What will you learn?

- Variables and Algebraic Expression
- Algebraic Expressions Involving Basic Arithmetic Operations

Why study this chapter?

In the field of algebra, you will learn the method to represent an unknown value with a letter. Thus, daily life problems can be represented in simple mathematical models by writing the relationship between the quantities involved in algebraic language. Discuss daily life problems which involve unknown values.

During the school holidays, a tour company offers a promotional package of three days two nights holiday in Pulau Pangkor. How can you determine the total cost for the different number of adults and children?

Walking through Time

Abu Abdullah Muhammad Ibn Musa Al-Khwarizmi

The term 'algebra' was derived from the Arabic word 'al-jabr' based on the book entitled 'al-jabr wa'l Muqabalah' written by an Arabic mathematician, Muhammad Ibn Musa Al-Khwarizmi. He is also known as the 'Father of Algebra' for his contributions in the field of algebra.

For more information:

http://goo.gl/qAuzp9

Word Link

• letter	• *huruf*
• coefficient	• *pekali*
• variable	• *pemboleh ubah*
• term	• *sebutan*
• algebraic term	• *sebutan algebra*
• like terms	• *sebutan serupa*
• unlike terms	• *sebutan tidak serupa*
• algebraic expression	• *ungkapan algebra*

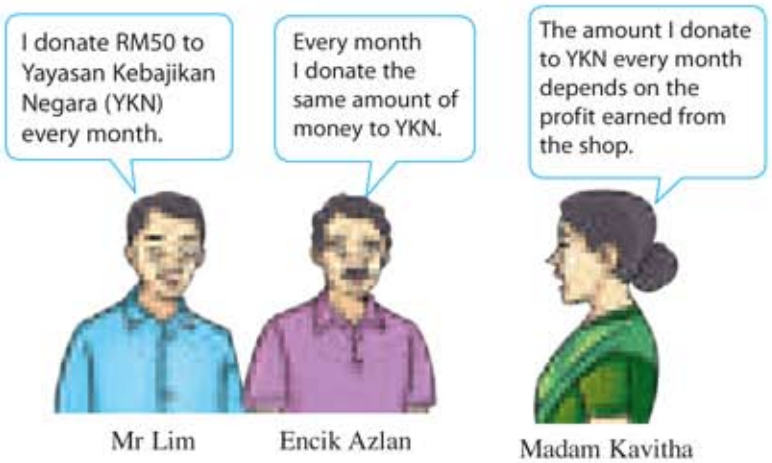
Open the folder downloaded from page vii for the audio of Word Link.

5.1 Variables and Algebraic Expression

How do you use letters to represent variables?

LEARNING STANDARDS

Use letters to represent quantities with unknown values. Hence, state whether the value of the variable varies or fixed, with justification.



Based on the situation above, we know the total amount of money donated by Mr Lim every month. However, we do not know the amount of money donated by Encik Azlan and Madam Kavitha. The total amount of money donated by Encik Azlan and Madam Kavitha is a quantity with an unknown value. The quantity is known as a **variable**.

We can use letters to represent variables. For example:

Every month, Encik Azlan donates RMx and Madam Kavitha donates RMy to Yayasan Kebajikan Negara.

Between the variables x and y, which one has a fixed value and which one has a varied value?

SMART TIPS

- A variable has a fixed value if the represented quantity is always constant at any time.
- A variable has a varied value if the represented quantity changes over time.

Example 1

Represent each of the following variables with an appropriate letter. Hence, determine whether the variable has a fixed value or a varied value. Justify your answers.

(a) The annual interest rate for a fixed deposit offered by a bank.

(b) The travelling time taken by Faizal from his house to the school every day.

Solution

(a) k represents the annual interest rate for a fixed deposit.
k has a fixed value because the interest rate for the fixed deposit does not change throughout the year.

(b) t represents the travelling time taken by Faizal from his house to the school every day.
t has a varied value because the travelling time of Faizal changes every day.

Let's Discuss

The market price for 1 gram of gold is RMy per day. Is y a variable with a fixed value or a varied value? Discuss this situation.

Self Practice 5.1a

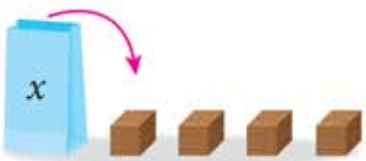
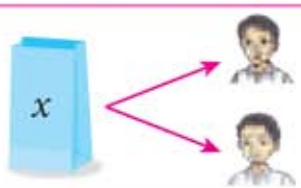
1. Represent each of the following variables with an appropriate letter. Hence, determine whether the variable has a fixed value or a varied value. Justify your answers.
(a) The mass of each student in your class.
(b) The mark obtained by Zaini in a Mathematics test.
(c) The distance between Arman's house and his school.
(d) The temperature at the peak of Gunung Kinabalu in a day.

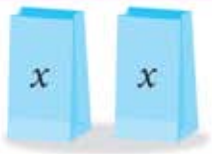
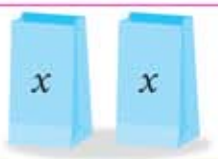
How do you derive an algebraic expression from a situation?

LEARNING STANDARDS

Derive algebraic expressions based on arithmetic expressions that represent a situation.

Study the situations below where the number of blocks in each bag is not known.

Situation		Total number of blocks
A bag contains x blocks.		x
3 blocks are added into the bag.		$x + 3$
4 blocks are taken out from the bag.		$x - 4$
The blocks in the bag are divided equally between 2 students.		$\frac{x}{2}$

Two bags each contains x blocks respectively.		$2 \times x = 2x$
Two bags each contains x blocks respectively while another bag contains y blocks, and 2 extra blocks are added.		$2x + y + 2$
Two bags each contains x blocks respectively where the mass of each block is p gram.		Total mass of the blocks in both bags $= 2 \times x \times p$ $= 2xp$

The total number or the mass of blocks which are written in **numbers** and **variables**, for example, x, $x + 3$, $x - 4$, $\frac{x}{2}$, $2x$, $2x + y + 2$, $2xp$ are called **algebraic expressions**.

Example 2

Yusri buys 5 apples which cost x sen each and 8 oranges which cost y sen each. Write an algebraic expression for the total amount of money that he paid.

Solution

The total price of the apples $= 5 \times x$
$= 5x$

The total price of the oranges $= 8 \times y$
$= 8y$

The total payment $= 5x + 8y$

Self Practice 5.1b

1. Write an algebraic expression for each of the following situations:
(a) Subtract 7 from a number, x.
(b) The sum of y and z is divided by 9.
(c) The total number of people for x tents if each tent can accommodate 4 people.
(d) Madam Neo bought m kg of bream which costs RMp per kilogram and n kg of hardtail scad which costs RMq per kilogram. What is the total payment?
(e) The age of Nazmi is h years old and Jagjit is k years old whereas the age of Izhar is twice that of Jagjit. What is the difference in age between Nazmi and Izhar?

How do you determine the values of algebraic expressions?

LEARNING STANDARDS

Determine the values of algebraic expressions given the values of variables and make connection with appropriate situations.

The value of an algebraic expression can be determined by substituting the variables with given values.

Example 3

Given that $x = 3$ and $y = 2$, find the value of $8x - 5y + 7$.

Solution

$$\begin{aligned} 8x - 5y + 7 &= 8(3) - 5(2) + 7 \\ &= 24 - 10 + 7 \\ &= 21 \end{aligned}$$

Example 4

In a class, $\frac{1}{3}$ of the boys are members of *Kadet Remaja Sekolah* whereas 9 girls are not members of *Kadet Remaja Sekolah*.

(a) Write an expression for the total number of members of *Kadet Remaja Sekolah* in the class.

(b) If there are 12 boys and 16 girls in the class, calculate the total number of members of *Kadet Remaja Sekolah* in the class.

Solution

(a) Let the number of boys $= x$
and the number of girls $= y$
Thus, the total number of members of *Kadet Remaja Sekolah* $= \frac{1}{3}x + y - 9$

(b) When $x = 12$ and $y = 16$,
the total number of members of *Kadet Remaja Sekolah* $= \frac{1}{3}(12) + 16 - 9$
$= 4 + 16 - 9$
$= 11$

Smart

A scientific calculator can be used to determine the value of an expression. For instance, in Example 3:

1. Press
   8 | ALPHA | X | − | 5 | ALPHA | Y | + | 7 | CALC
   Screen displayed
   X?
2. Enter the given value of x.
   Press 3 | =
   Screen displayed
   Y?
3. Enter the given value of y.
   Press 2 | =
   Screen displayed
   8X − 5Y + 7
   21

Self Practice 5.1c

1. Given that $p = 5$, $q = 2$ and $r = -4$, find the value for each of the following expressions:
(a) $2p + q$ (b) $3q - 4r + 8$ (c) $5(p - r)$ (d) $\frac{r}{2} + 7q - 3$

2. Encik Adnan and Mr Tan donate rice to the flood victims. Encik Adnan donates 8 bags of rice and each bag has a mass of x kg. Mr Tan donates 4 bags of rice and each bag has a mass of y kg.
(a) Write an expression for the total mass of rice donated by them.
(b) If $x = 5$ and $y = 10$, calculate the total mass of rice donated by them.

3. Jane and Kamalesh buy m and n *Hari Raya* greeting cards respectively at a price of RMp for each card. These cards will be given to their Muslim friends.
(a) Write an expression for the difference in the amount of money that they had paid.
(b) If $m = 8$, $n = 6$ and $p = 1.5$, calculate the difference in the amount of money they had paid.

What are the terms and the coefficients in an expression?

In an expression, for example, $2x + 3xy$,
$2x$ is the product of the number 2 and the variable x.
$3xy$ is the product of the number 3 and the variables x and y.

$2x$ dan $3xy$ are known as **algebraic terms**.

LEARNING STANDARDS

Identify the terms in an algebraic expression. Hence, state the possible coefficients for the algebraic terms.

Example 5

Identify the algebraic terms for each of the following algebraic expressions.

(a) $x + 5x$ (b) $\frac{x}{8} - 7y$

(c) $pq - 2q + 13$ (d) $m^2 - 2m + n - 6$

Solution

(a) $x + 5x$
Algebraic terms are x and $5x$.

(b) $\frac{x}{8} - 7y$
Algebraic terms are $\frac{x}{8}$ and $7y$.

(c) $pq - 2q + 13$
Algebraic terms are pq, $2q$ and 13.

(d) $m^2 - 2m + n - 6$
Algebraic terms are m^2, $2m$, n and 6.

An algebraic term can be written as the product of the variable and its factor. For example,

$3xy = 3x \times y$ ← 3x is a factor of the variable y. So, 3x is the coefficient of the variable y.
$= 3y \times x$ ← 3y is a factor of the variable x. So, 3y is the coefficient of the variable x.
$= 3 \times xy$

Variable

What is the coefficient of the variable xy?

Communication Corner

Is x an algebraic term? Explain.

Did You Know

The algebraic term that consists of one variable with the power 1 is called a linear algebraic term.

SMART TIPS

In an algebraic expression, a number is also considered as a term.

Think Smart

Is term xy an algebraic expression? Give your reasons.

Example 6

In the term $-3k^2mn$, state the coefficient of

(a) k^2mn (b) $-mn$ (c) $3k^2$

Solution

(a) $-3k^2mn = -3 \times k^2mn$
The coefficient of k^2mn is -3.

(b) $-3k^2mn = 3k^2 \times (-mn)$
The coefficient of $-mn$ is $3k^2$.

(c) $-3k^2mn = -mn \times 3k^2$
The coefficient of $3k^2$ is $-mn$.

Self Practice 5.1d

1. Identify all the terms for each of the following algebraic expressions:

(a) $6k + 2k$ (b) $x^2 - 9xy$

(c) $\frac{ab}{3} + 2a - 5b$ (d) $4pq - \frac{7x}{2} + 8p^2q - 1$

2. In the term $-8xy^2$, state the coefficient of

(a) xy^2 (b) $8x$ (c) y^2 (d) $-x$

What are like terms and unlike terms?

LEARNING STANDARDS
Identify like and unlike terms.

$-2m$ and $\frac{3}{7}m$	$\frac{pq}{3}$ and $6.9pq$	$6ab$ and $7ba$	$5k^2$ and $-k^2$

Diagram (a)

Each pair of terms in Diagram (a) has the same variable with the same power. The pair of terms is known as **like terms**.

$2v$ and $2w$	$5xy$ and $-yz$	$9x^2$ and $8x$	$3m^2n$ and $\frac{1}{4}mn^2$

Diagram (b)

Each pair of terms in Diagram (b) does **not** have the same variable with the same power. The pair of terms is known as **unlike terms**.

Let's Discuss

Discuss whether $\frac{xy}{2}$ and $\frac{5x}{y}$ are like terms or unlike terms.

Example 7

Identify whether each of the following pairs of terms is like terms or unlike terms:

(a) $4xy, \frac{xy}{2}$ (b) $12pq, 12pr$ (c) $3abc, 0.5bca$ (d) $-7h, 6h^2$

Solution

(a) Like terms ← Same variable xy.

(b) Unlike terms ← Variables pq and pr are different.

(c) Like terms ← Variable abc is equal to bca.

(d) Unlike terms ← The powers of the variable h are different.

Self Practice 5.1e

1. Identify whether each of the following pairs of terms is like terms or unlike terms:

(a) $5k, -0.1k$ (b) $4y, y^2$ (c) $4srt, 11rts$ (d) $\frac{3ab}{2}, -8bc$

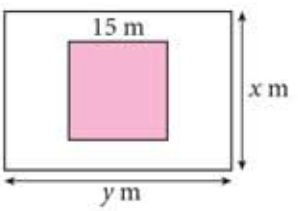
Mastery Q 5.1

Open the folder downloaded from page vii for extra questions of Mastery Q 5.1.

1. Mr Gan invests a certain amount of money in Amanah Saham. A dividend is paid based on a specific rate every year. Represent each variable in this situation with a suitable letter. Hence, explain whether each variable has a fixed value or a varied value.

2. A watermelon with a mass of 5 kg and two durians with the same mass are placed on an electronic balance. If the reading shown on the balance is m kg, write an expression for the mass of a durian.

3. The diagram shows a rectangular park. The shaded square is planted with flowers. The rest of the area is covered with bricks. Write an expression for the area covered with bricks.



4. (a) Given that $x = 5$ and $y = -2$, find the value of $xy + \frac{x}{2} - 6y$.

(b) Given that $a = 7$, $b = 3$ and $c = -4$, find the value of $3(b - a) - 5ac + 14$.

5. Azlan has n coins, consisting of x 10-sen coins, $3x$ 20-sen coins and the rest are 50-sen coins, in a coin box.

(a) State an expression for the number of 50-sen coins in the coin box.

(b) Find the total amount of money in the coin box if $x = 6$ and the number of 50-sen coins is twice the number of 20-sen coins.

6. A ribbon with a length of p cm is cut into three parts. The length of the first part and the second part are x cm and $2x$ cm respectively.

(a) Write an expression for the length of the third part.

(b) If $x = 10$ and the length of the second part is four times the length of the third part, calculate the value of p.

7. Copy and complete the table by stating the possible coefficients for the following algebraic term.

Algebraic term	Coefficient	Variable
$-10abc$		

5.2 Algebraic Expressions Involving Basic Arithmetic Operations

How do you add and subtract two or more algebraic expressions?

LEARNING STANDARDS

Add and subtract two or more algebraic expressions.

When adding and subtracting two or more algebraic expressions, gather the like terms first. Then, add or subtract the like terms.

Example 8

Simplify each of the following.

(a) $(3x + 5y) + (8x - y - 9)$

(b) $(12mn - 4p) + (6 + 7p) - (10mn + p - 2)$

Solution

(a) $(3x + 5y) + (8x - y - 9)$

$= 3x + 5y + 8x - y - 9$

$= 3x + 8x + 5y - y - 9$ ← Gather the like terms.

$= 11x + 4y - 9$ ← Simplify the like terms.

(b) $(12mn - 4p) + (6 + 7p) - (10mn + p - 2)$

$= 12mn - 4p + 6 + 7p - 10mn - p + 2$

$= 12mn - 10mn - 4p + 7p - p + 6 + 2$

$= 2mn + 2p + 8$

When arranging like terms, the operation sign which lies before the term must be transferred together.

SMART TIPS

- When the '+' sign which lies before the brackets is removed, the sign for each term in the brackets remains unchanged.
- When the '–' sign which lies before the brackets is removed, the sign for each term in the brackets changes from: '+ to –'; '– to +'.

$-(a + b) = -a - b$
$-(a - b) = -a + b$
$-(-a + b) = +a - b$
$-(-a - b) = +a + b$

Self Practice 5.2a

1. Simplify each of the following.
   (a) $(3x - 2y) + (5x + 9y)$
   (b) $(6ab + 2bc + 10) - (ab + 3bc - 2)$
   (c) $(4xy + 5k) - (-3k + 7) + (13xy - k)$
   (d) $(7p - 8q + 6pq) + (q - 2p + pq) - (10pq - p - 4q)$
   (e) $\frac{2}{3}fg - (9mn - \frac{1}{2}fg) + (3mn - \frac{1}{6}fg)$

What is the product of the repeated multiplication of algebraic expressions?

LEARNING STANDARDS

Make generalisation about repeated multiplication of algebraic expressions.

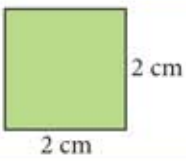
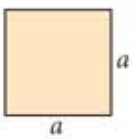
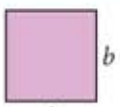
Exploration Activity 1

Group

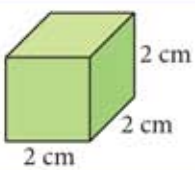
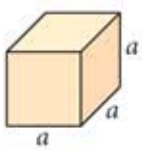
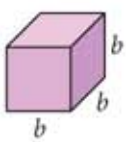
Aim: To make a generalisation about the repeated multiplication of algebraic expressions.

Instruction: Perform the activity in groups of four.

1. Find the area for each of the following squares in the form of repeated multiplication.

		
Area = ☐ cm × ☐ cm = ☐^{2} cm^2	Area = ☐ × ☐ = ☐$^{\square}$	Area = ☐ × ☐ = ☐$^{\square}$

2. Find the volume for each of the following cubes in the form of repeated multiplication.

		
Volume = ☐ cm × ☐ cm × ☐ cm = ☐^{3} cm^3	Volume = ☐ × ☐ × ☐ = ☐$^{\square}$	Volume = ☐ × ☐ × ☐ = ☐$^{\square}$

3. Based on the results above, what generalisations can be made about
   (a) $a \times a \times a \times a$?
   (b) $a \times a \times a \times a \times \ldots \times a$, where the multiplication of a is repeated n times?
   (c) (i) $(a + b) \times (a + b)$?
   (ii) $(a + b) \times (a + b) \times (a + b)$?
   (iii) $(a + b) \times (a + b) \times (a + b) \times (a + b)$?
   (iv) $(a + b) \times (a + b) \times (a + b) \times (a + b) \times \ldots \times (a + b)$, where the multiplication of $(a + b)$ is repeated n times?

From the results of Exploration Activity 1, it is found that

$\underbrace{a \times a}_{\text{Repeated multiplication of } a \text{ by 2 times}} = a^2$ $\underbrace{a \times a \times a}_{\text{Repeated multiplication of } a \text{ by 3 times}} = a^3$ $\underbrace{a \times a \times a \times \ldots \times a}_{\text{Repeated multiplication of } a \text{ by } n \text{ times}} = a^n$ ← Power of n

Hence, generalisations regarding the repeated multiplication of algebraic expressions are recognised as follows.

$(a + b) \times (a + b) = (a + b)^2$

$(a + b) \times (a + b) \times (a + b) = (a + b)^3$

$(a + b) \times (a + b) \times (a + b) \times (a + b) = (a + b)^4$

In general,

$\underbrace{(a + b) \times (a + b) \times (a + b) \times \ldots \times (a + b)}_{\text{Repeated multiplication of the algebraic expression } (a + b) \text{ by } n \text{ times}} = (a + b)^n$ ← Power of n

Example 9

Simplify each of the following:

(a) $m \times m \times m \times m$

(b) $(x + 7) \times (x + 7)$

(c) $(p - 3q) \times (p - 3q) \times (p - 3q)$

Solution

(a) $\underbrace{m \times m \times m \times m}_{\text{Multiplication is repeated 4 times}} = m^4$

(b) $\underbrace{(x + 7) \times (x + 7)}_{\text{Multiplication is repeated 2 times}} = (x + 7)^2$

(c) $\underbrace{(p - 3q) \times (p - 3q) \times (p - 3q)}_{\text{Multiplication is repeated 3 times}} = (p - 3q)^3$

Example 10

Write each of the following in the form of repeated multiplication:

(a) $(x + 4y)^2$

(b) $(9p - q)^3$

Solution

(a) $(x + 4y)^2 = (x + 4y)(x + 4y)$

(b) $(9p - q)^3 = (9p - q)(9p - q)(9p - q)$

Self Practice 5.2b

1. Simplify each of the following:

(a) $pq \times pq \times pq$

(b) $(6a - 1) \times (6a - 1)$

(c) $(8x + 3y) \times (8x + 3y) \times (8x + 3y)$

2. Write each of the following in the form of repeated multiplication:

(a) $(2 + 7x)^2$

(b) $(h - 4k)^3$

(c) $(5p + q)^4$

How do you multiply and divide algebraic expressions?

To find the product of algebraic expressions with one term, gather all the same variables, and then multiply the number with number and the variable with variable.

LEARNING STANDARDS

Multiply and divide algebraic expressions with one term.

Example 11

Simplify $3ab^2 \times 4a^3b$.

Solution

$$3ab^2 \times 4a^3b = 3 \times a \times b \times b \times 4 \times a \times a \times a \times b$$ ← Write as the product of factors.

$$= 3 \times 4 \times a \times a \times a \times a \times b \times b \times b$$ ← Gather the numbers and the same variables.

$$= 12a^4b^3$$

The quotient of algebraic expressions with one term can be obtained by eliminating the common factors.

Example 12

Simplify $20m^4n^2 \div 5m^2n^3$.

Solution

$$20m^4n^2 \div 5m^2n^3 = \frac{20m^4n^2}{5m^2n^3}$$ ← Write in fraction form.

$$= \frac{\overset{4}{\cancel{20}} \times \cancel{m} \times \cancel{m} \times m \times m \times \cancel{n} \times \cancel{n}}{\underset{1}{\cancel{5}} \times \cancel{m} \times \cancel{m} \times \cancel{n} \times \cancel{n} \times n}$$ ← Simplify.

$$= \frac{4m^2}{n}$$

Let's Discuss

By using a cube with sides of x cm, discuss how you would show the quotient for $x^3 \div x$ and $x^3 \div x^2$.

Example 13

Simplify $21xy \times 6x \div 14y^3z$.

Solution

$$21xy \times 6x \div 14y^3z = \frac{\overset{3}{\cancel{21}} \times x \times \cancel{y} \times \overset{3}{\cancel{6}} \times x}{\underset{z_1}{\cancel{14}} \times \cancel{y} \times y \times y \times z}$$

$$= \frac{9x^2}{y^2z}$$

Self Practice 5.2c

1. Find the product for each of the following:

(a) $3x \times 5x^3$ (b) $-4mn \times 7m^2$ (c) $\frac{2}{3}p^4q \times 6pr$

2. Find the quotient for each of the following:

(a) $8x^6y^4 \div 2xy^3$ (b) $4ab^3 \div 6a^2b$ (c) $12p^5r \div (-10pq)$

3. Simplify each of the following:

(a) $2mn \times 5m^2 \div 3n^3$ (b) $6xy \div 20px^2 \times (-5p^6y)$

Mastery Q 5.2

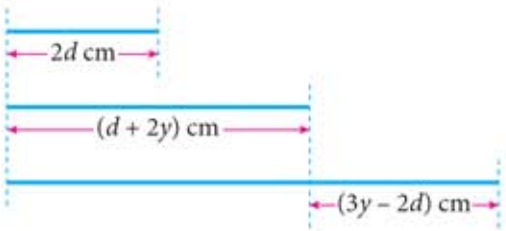
Open the folder downloaded from page vii for extra questions of Mastery Q 5.2.

1. Simplify each of the following:

(a) $(x + pq) - (3y - \frac{pq}{2} - 4) + (\frac{1}{3}x - 5y + 7)$

(b) $\frac{6ab - 9mn}{3} - 2(4mn - 3ab)$

2. In the diagram, a rope is cut into three parts. Write the expression for the length of the rope in terms of d and y.



3. The age of Azhar's mother was four times the age of Azhar last year. If Azhar is n years old now, state the age of Azhar's mother seven years later in terms of n.

4. It is given that $(ax + b)(ax + b)(ax + b) = (9x - 2)^n$, where a, b and n are integers. Determine the values of a, b and n.

5. Aina makes a cubic model from a manila card. If the volume of the cube is $(2 + 3p)^3$ cm^3, find the total surface area of the cube in terms of p.

6. Simplify each of the following:

(a) $\frac{18xy \times 10y^3z}{15xz^2}$ (b) $-\frac{8pq}{12p^2q} \times (-3p^2q^3)$

7. Copy and fill in the boxes with the correct algebraic terms:

(a) $\square \times 3pqr = 15p^2qr^3$ (b) $\square \div 2xy^2z = 7x^2yz$

8. The area of the rectangle is $12a^3b^2$ cm^2. Express the length of the rectangle in terms of ab.

SUMMARY

ALGEBRAIC EXPRESSIONS

- **Variables**
  - **Fixed value**
    The value of the variable is fixed at any time.
  - **Varied value**
    The value of the variable varies over time.
- **Algebraic terms**
  - **Like terms**
    Contain the same variables with the same power.
    Example: $2x$ and $-\frac{3}{5}x$
  - **Unlike terms**
    Contain different variables or the same variables with different powers.
    Example: • $2x$ and $6y$ • $2x$ and $-7x^2$
- **Addition and subtraction**
  Example: • $5a + 6a = 11a$ • $12bc - 3bc = 9bc$
- **Multiplication and division**
  Example: • $5mn \times 2n = 5 \times 2 \times m \times n \times n = 10mn^2$
  • $\frac{36pq}{4p} = \frac{\overset{9}{\cancel{36}} \times p \times q}{\underset{1}{\cancel{4}} \times \cancel{p}} = 9q$

At the end of this chapter, I can...	Very good	Work harder
use letters to represent quantities with unknown values. Hence state whether the value of the variable varies or is fixed with justification.		
derive algebraic expressions for a situation.		
determine the values of algebraic expressions.		
identify the terms in an algebraic expression and hence state the possible coefficients.		
identify like and unlike terms.		
add and subtract two or more algebraic expressions.		
make generalisation about repeated multiplication of algebraic expressions.		
multiply and divide algebraic expressions with one term.		

Let's PRACTISE

Test Yourself

1. It is given that $(3x^2 + 7y - 1) - (x^2 + 2y - 5) + (6x^2 - y) = ax^2 + by + c$, where a, b and c are integers. Determine the values of a, b and c.

2. Pavathy buys x m of batik cloth which costs RM12 per metre and y m of curtain which costs RM7 per metre. If she pays RM120 to the cashier, express the balance in terms of x and y.

3. If $p^3 + 2q = -5$ and $4px = 6$, find the value of $p^3 - (4px - 2q)$.

Self Mastery

4. Kumar buys four pineapples at a price of RMx each. He pays RM20 and receives 80 sen in change. What is the price of a pineapple?

5. In a Mathematics test, Su Lin obtains double the marks of Daud and their total marks are $3k$. If Hafiz obtains 10 marks more than Su Lin, state Hafiz's marks in terms of k.

6. Zuriana's mother gives a certain amount of money to Zuriana to buy satay and *otak-otak*. Zuriana buys m sticks of satay which costs RMx for 5 sticks and receives a balance of 80 sen. Then, she buys $2m$ pieces of *otak-otak* which costs RMy per piece and receives a balance of 60 sen.
   (a) Write an algebraic expression for the total payment of the satay and *otak-otak*.
   (b) If $m = 10$, $x = 4$ and $y = 1.2$, find the total amount of money that Zuriana received from her mother.

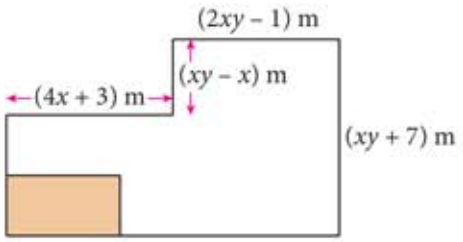
Challenge Yourself

7. A number is added to 7, and its result is x. If the number is divided by 2, its result is y. Explain how you would determine the value of $x + y$ if the value of the number is known.

8. **Application** **Business**
   An electrical shop buys 120 filament lamps at a cost of RMp each and 180 LED lamps at a cost of RMq each. The shop then sells the lamps with 2 filament lamps and 3 LED lamps at a price of RM$(3h + 4k)$ during their sales promotion. If the shop is able to sell all the lamps, express the profits earned in terms of p, q, h and k.

9. Application Construction

The diagram shows a farm owned by Norhaimi. The rectangular shaded area has not been fertilised. The rest of the area is planted with vegetables. Norhaimi intends to fence up the area planted with vegetables. Express the length of fence required in terms of x and y.



10. Application Science

The temperature in the unit of degree Celsius (°C) can be converted into degree Fahrenheit (°F) by using the expression $\frac{9}{5}T + 32$, where T is the temperature in the unit of degree Celsius. When a type of liquid is heated from 18°C to 33°C, what is the change in temperature of the liquid in the unit of degree Fahrenheit?

ASSIGNMENT

Scan the QR Code or visit the website to get information regarding the uses of algebraic expression in our daily lives.

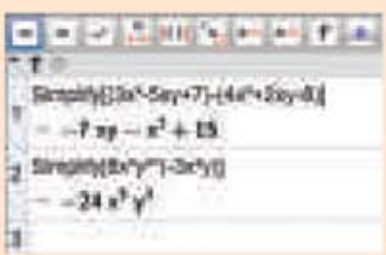
Hence, write a report about the importance and the application of algebraic expression in our daily lives. Present your report in class.

https://goo.gl/ev3Gzs

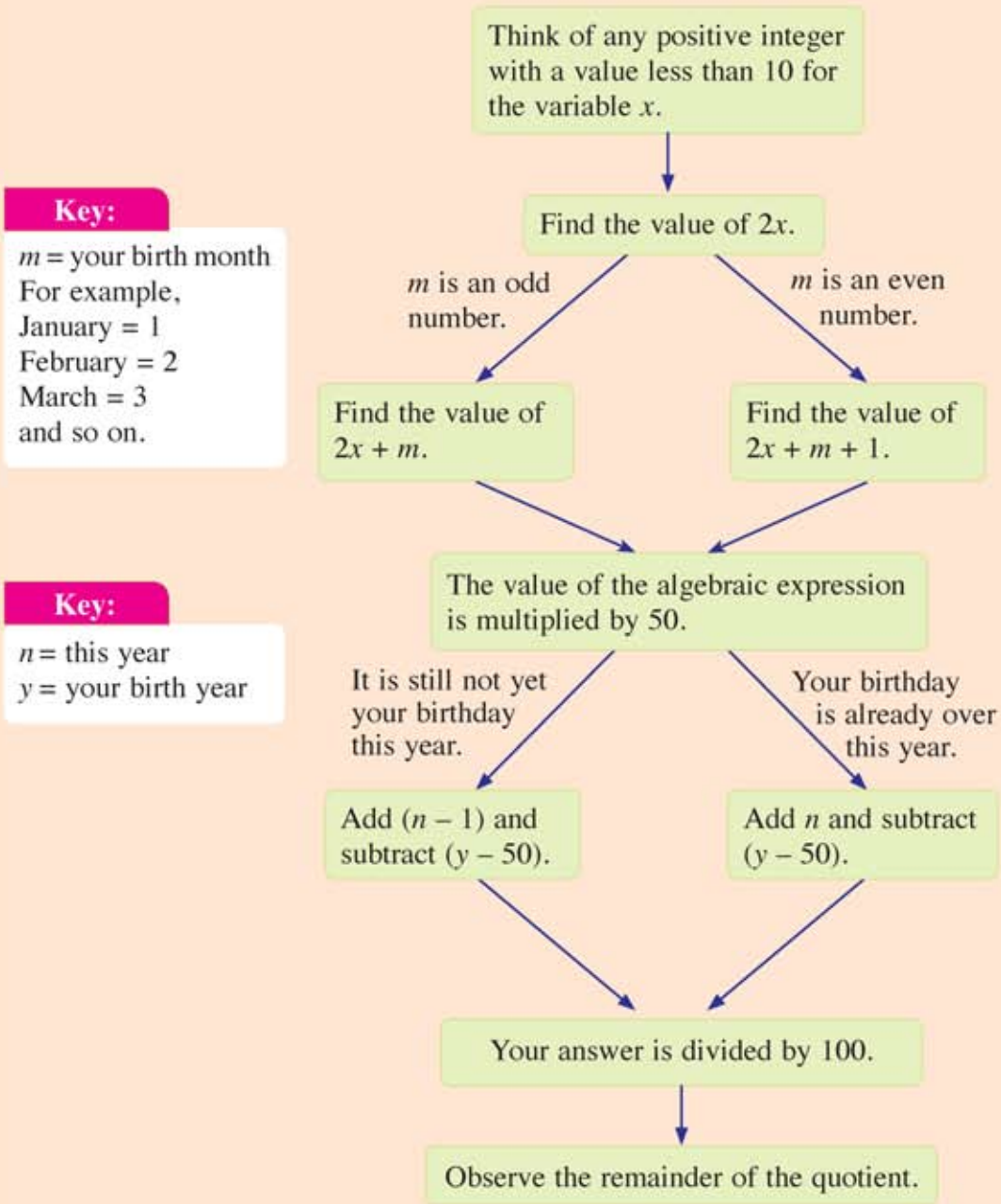
Exploring MATHEMATICS

A The *GeoGebra* software can be used to simplify the algebraic expression involving basic arithmetic operations.

1. Select on the menu *View* → *CAS*.
2. Use the instruction *Simplify* and type the expression involving basic arithmetic operations and then press Enter in the *CAS* space. For example,
   (i) Simplify $[(3x^2 - 5xy + 7) - (4x^2 + 2xy - 8)]$
   (ii) Simplify $[8x^3y^2(-3x^2y)]$
3. Enhance your exploration with other expressions involving basic arithmetic operations.



B By following the given instructions and the keys, carry out the following activity.



Key:

m = your birth month
For example,
January = 1
February = 2
March = 3
and so on.

Key:

n = this year
y = your birth year

What is represented by the remainder of the final answer? State your comment.