Substitution

Standard

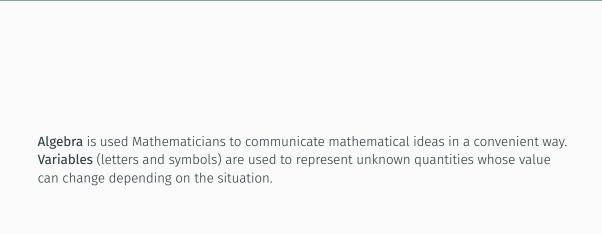## Learning Outcome
Topic:

Substitution

Syllabus:

- review substitution of numerical values into linear and non-linear algebraic expressions and equations

Activities/Tasks:

- Cambridge Ex 3A Q1-17

Why algebra?

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Algebra is used Mathematicians to communicate mathematical ideas in a convenient way. **Variables** (letters and symbols) are used to represent unknown quantities whose value can change depending on the situation.

Expressions

We can think of expressions as number crunching machines. Numbers are put in and then a related number is produced.

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$$= (-5)^2 + 1$$
$$= 25 + 1$$

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For example the expression $a^2 + 1$ starts with an input a, squares it and adds 1.

If the number -5 is fed into the machine, the machine **substitutes** the number 5 in place of a and then **evaluates** the result:

$$a^2 + 1$$
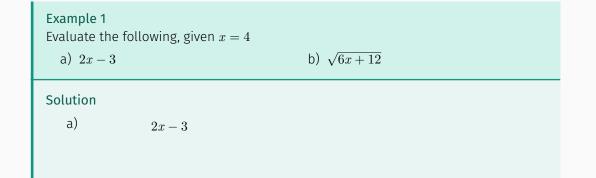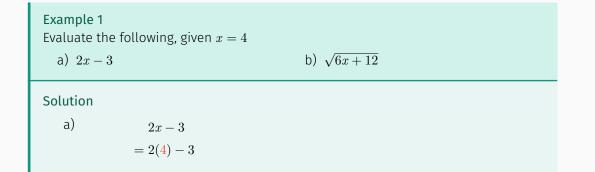$$= (-5)^2 + 1$$
$$= 25 + 1$$
$$= 26$$

Important Note

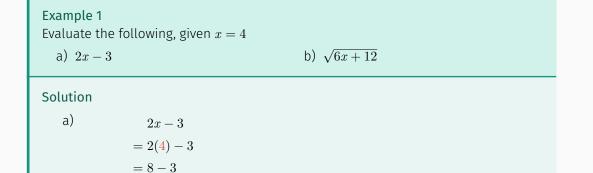To avoid making mistakes it is good practice to **always** substitue into brackets.

Example 1
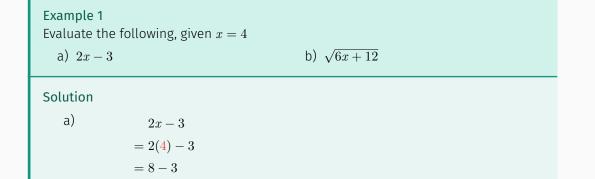
Evaluate the following, given $x = 4$

   a) $2x - 3$ b) $\sqrt{6x + 12}$

Example 1

Evaluate the following, given $x = 4$

a) $2x - 3$

b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$

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Evaluate the following, given $x = 4$

a) $2x - 3$ 　　　　　　　　　　　　　　b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$

Example 1

Evaluate the following, given $x = 4$

  a) $2x - 3$ b) $\sqrt{6x + 12}$

Solution

  a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$

Example 1

Evaluate the following, given $x = 4$

a) $2x - 3$

b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

Example 1

Evaluate the following, given $x = 4$

  a) $2x - 3$ b) $\sqrt{6x + 12}$

Solution

  a)

$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

  b)

$$\sqrt{6x + 12}$$

Example 1

Evaluate the following, given $x = 4$

a) $2x - 3$

b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

b)
$$\sqrt{6x + 12}$$
$$= \sqrt{6(4) + 12}$$

Example 1

Evaluate the following, given $x = 4$

a) $2x - 3$

b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

b)
$$\sqrt{6x + 12}$$
$$= \sqrt{6(4) + 12}$$
$$= \sqrt{24 + 12}$$

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Evaluate the following, given $x = 4$

   a) $2x - 3$ b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

b)
$$\sqrt{6x + 12}$$
$$= \sqrt{6(4) + 12}$$
$$= \sqrt{24 + 12}$$
$$= \sqrt{36}$$

Example 1

Evaluate the following, given $x = 4$

  a) $2x - 3$ b) $\sqrt{6x + 12}$

Solution

a)
$$2x - 3$$
$$= 2(4) - 3$$
$$= 8 - 3$$
$$= 5$$

b)
$$\sqrt{6x + 12}$$
$$= \sqrt{6(4) + 12}$$
$$= \sqrt{24 + 12}$$
$$= \sqrt{36}$$
$$= 6$$

Example 2

Evaluate $\quad a^2 - 5b + c \quad$ given $a = 3$, $b = -3$, $c = 7$

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Solution

$$a^2 - 5b + c$$

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Evaluate $\quad a^2 - 5b + c \quad$ given $a = 3$, $b = -3$, $c = 7$

Solution

$$a^2 - 5b + c$$
$$= (3)^2 - 5(-3) + (7)$$

Example 2

Evaluate $\quad a^2 - 5b + c \quad$ given $a = 3$, $b = -3$, $c = 7$

Solution

$$a^2 - 5b + c$$
$$= (3)^2 - 5(-3) + (7)$$
$$= 9 + 15 + 7$$

Example 2

Evaluate $\quad a^2 - 5b + c \quad$ given $a = 3$, $b = -3$, $c = 7$

Solution

$$a^2 - 5b + c$$
$$= (3)^2 - 5(-3) + (7)$$
$$= 9 + 15 + 7$$
$$= 31$$

Today's work

- Cambridge Ex 3A Q1-17