Substituting and Evaluating

Sunday, 13 October 2019 9:59 AM

★ By the end of the lesson I would hope that you have an understanding of the concepts below:

- Know what it means to substitute
- Know what it means to evaluate
- Know that a pronumeral really just stands in place for a number
- Know that a pronumeral is really a variable and can, in different questions, stand for different values
- Know how to use BIDMAS to help us correctly find the answer to a substitution.
- Know that Maffs is a BIG FAT TRICK!

RECAP:

During the last lesson we spent time looking at the language of Algebra and how it can try and confuse us.
We looked at words such as term, coefficient, variable, pronumeral, and constant.
We looked at the difference between an expression and an equation.
We also looked at how we need to understand English before we can make real headway in Mathematics.

FOOTIE OR SOCCER?!

Which do you prefer: Footie or Soccer?

Who cares!

Each of these sports have something where they take one player off and put someone in their place.
Might be because they are tired or injured ... or their hair has fallen out of place!
The idea of taking something off and putting something back in it's place is taken from Mathematics.

It's called **substituting**.

Letters are really just in the dinner queue for numbers.

A list of **terms** is nothing more a load of things in a queue.
There is the front of the queue and there is the back.
We work our way along the queue.

A pronumeral is a variable. It stands for lots of different numbers.

However, in each question, the value of the pronumeral stays the same throughout the whole question.

Let's look at an example:

Example 1: Provided from the Cambridge Essentials Textbook series

Given that t= 5, evaluate:

$t + 7$

$8t$

$t + 7$
$= 5 + 7$
$= 12$

$8t$
$= 8 \times t$
$= 8 \times 5$

$3a$

$a = 5$

$1
$2
$5

$8t$

$= 8 \times 5$ s

$= 40$ s

$\frac{10}{t} + 4 - t$

$= \frac{10}{5} + 4 - 5$

$= 2 + 4 - 5$

$= 1$

Note: All we did is make sure that the letter was replaced/substituted for the number.

The most important part of Maths is knowing how to use BIDMAS!

BIDMAS/BODMAS???

Which is it?!?!? What is this BIDMAS STUFF?!?!?

Let's get something clear ... it's the same ... well ... sort of!

Brackets
Indices
Division
Multiplication
Addition
Subtraction

t^2

Brackets
Over/**O**f
Division
Multiplication
Addition
Subtraction

Examples of how to use BIDMAS ...

$2 + 5 = 7$

B $(2+5) - 6$

$= 7 - 6$

$= 1$

B $2(3-4) + 7$

$= 2 \times -1 + 7$

$= -2 + 7$

$= 5$

$+7 - 2$

$= 5$

= 1

= 5

= 5

$$\frac{4+8}{3} + 6$$

$$= \frac{12}{3} + 6$$

$$= 4 + 6$$

$$= 10$$

FORMULA, SUBSTITUTE, SOLVE ... FSSSSSSSSSS

There is one important thing which I use all the time.
I make sure that I always show the working out for these questions.
When you get to Years 10, 11 and 12, you get LOTS of marks for writing the correct working out in questions. If you get into a good habit now, you will get LOTS of marks.

Let's see how I can put FSSSSSS and BIDMAS to work in some questions.

Example 2: Taken from the Cambridge Essentials Textbook series

Substitute $x = 4$ and $y = 7$ to evaluate these expressions.

$5x + y + 8$

$$5x + y + 8$$
$$= 5 \times x + y + 8$$
$$= 5 \times 4 + 7 + 8$$
$$= 20 + 7 + 8$$
$$= 35$$

$80 - (2xy + y)$

$= 50$

$80 - (2xy + y)$

$= 80 - (2 \times x \times y + y)$

$= 80 - (2 \times 4 \times 7 + 7)$

$= 80 - (56 + 7)$

$= 80 - 63$

$= 17$

Example 3: Taken from the Cambridge Essentials Textbook series

If $p = 4$ and $t = 5$, find the value of:

$3p^2$

$3p^2$

$= 3 \times p \times p$

$= 3 \times 4 \times 4$

$= 48$

p^2

$= p \times p$

2^2

$= 2 \times 2$

$= 4$

$t^2 + p^3$

$t^2 + p^3$

$= t \times t + p \times p \times p$

$= 5 \times 5 + 4 \times 4 \times 4$

$= 25 + 64$

$= 89$

p^3

$= p \times p \times p$

$\sqrt{p^2 + 3^2}$

$= \sqrt{p \times p + 3 \times 3}$

$= \sqrt{4 \times 4 + 3 \times 3}$

$= \sqrt{16 + 9}$

$= \sqrt{25}$

$= 5$

A slightly harder example:

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If $x = 5$, evaluate the following:

$$\frac{6(3x - 8)}{x + 2}$$

$$\frac{6\,(3x - 8)}{x + 2}$$

$$= \frac{6(3 \times x - 8)}{x + 2}$$

$$= \frac{6 \times (3 \times 5 - 8)}{5 + 2}$$

$$= \frac{6 \times (15 - 8)}{5 + 2}$$

$$= \frac{6 \times 7}{5 + 2}$$

$$= \frac{42}{7}$$

$$= 6$$