Obj 4: Function Notation and Evaluate Functions

When an equation such as $y = 5x + 2$ defines y as a function of x, we can use **function notation** to describe it.

We name the function by the letter f (or g or h or k, etc.)

We rewrite the dependent variable y with the notation $f(x)$. This is read as f of x

The equation $y = 5x + 2$ is rewritten in function notation as:

name of function

$$f(x) = 5x + 2$$

f of x

x : input
$f(x)$: output

This equation tells us how to get the output from the input.

Evaluate the function at 5 ⟶ Replace x by 5 :

$$f(5) = 5 \cdot (5) + 2 = 27$$

f of 5   input   output

Evaluate the function at 100 → Replace x by 100

$$f(100) = 5 \cdot (100) + 2 = 502$$

E.g. Evaluate function.

$$f(x) = x^2 - 2x + 7$$

Evaluate ⓐ $f(2)$ ⓑ $f(0)$ ⓒ $f(-1)$

Sol:

ⓐ $f(2) = (2)^2 - 2(2) + 7$

$$= 4 - 4 + 7 = 7$$

So, $f(2) = 7$ (f of 2 is equal to 7)

ⓑ $f(0) = (0)^2 - 2 \cdot (0) + 7$

$$= 0 - 0 + 7 = 7$$

So, $f(0) = 7$ (f of 0 is equal to 7)

ⓒ $f(-1) = (-1)^2 - 2(-1) + 7$

$$= 1 + 2 + 7 = 10$$

So, $f(-1) = 10$

Note: The input does not always have to be a number

E.g. $f(\boxed{x}) = x^2 - 2x + 7$

$\downarrow$
place holder

$$f(\boxed{}) = (\boxed{})^2 - 2(\boxed{}) + 7$$

Evaluate $f(a)$?

$$f(a) = (a)^2 - 2(a) + 7 = a^2 - 2a + 7$$

Evaluate $f(a+1)$?

$$f(a+1) = (a+1)^2 - 2(a+1) + 7$$

$$= (a+1)(a+1) - 2a - 2 + 7$$

$$= a^2 + \cancel{2a} + 1 - \cancel{2a} - 2 + 7$$

combine like terms

$$= a^2 + 6$$

So, $\boxed{f(a+1) = a^2 + 6}$

Evaluate : $f(x+2)$

$$f(x+2) = (x+2)^2 - 2(x+2) + 7$$

$$= (x+2)(x+2) - 2x - 4 + 7$$

$$= x^2 + 4x + 4 - 2x - 4 + 7$$

$$= x^2 + 2x + 7$$

So, $\boxed{f(x+2) = x^2 + 2x + 7}$

Evaluate $f(-x)$?

$$f(-x) = (-x)^2 - 2(-x) + 7$$

$$= (-x)(-x) + 2x + 7$$

$$= x^2 + 2x + 7$$

So, $\boxed{f(-x) = x^2 + 2x + 7}$