

### Section 3.3b – Function Notation

This booklet belongs to: \_\_\_\_\_ Block: \_\_\_\_\_

- The notation  $f(x)$  is another way of writing **y as a function of x**.
- $y = 2x - 4$  may be written as  $f(x) = 2x - 4$ , where  $f(x)$  is read “*f of x*”
- Given  $y = 2x - 4$ , we could ask, “find  $y$  when  $x = 5$ ”
- Using function notation, the same problem can be asked by writing

$$f(x) = 2x - 4, \text{ find } f(5).$$

- **The notation  $f(5)$  implies the value of  $y$  when  $x$  is 5.**
- $f(5) = 2(5) - 4 = 6$ , this **implies** that when  $x$  is 5,  $y$  is 6.
- This gives us the point **(5, 6)**.

**Example 1:** Given  $f(x) = 3x + 5$ , determine the coordinates of one point on the line for  $f(2)$ .

**Solution 1:**  $f(2) = 3(2) + 5 \rightarrow 6 + 5 \rightarrow 11$  Therefore the point is **(2, 11)**.

**Example 2:** Given  $f(x) = 3x + 5$ , determine the coordinates of the point where  $f(x) = -7$ .

**Solution 2:**  $f(x) = -7$  is the same as saying  $y = -7$

$$-7 = 3x + 5$$

$$-7 - 5 = 3x$$

$$-12 = 3x \quad \rightarrow \quad -\frac{12}{3} = x \quad \rightarrow \quad x = -4$$

Therefore, the point is **(-4, -7)**.

**Example 3:** Complete the table for  $f(x) = 3x + 5$

$x$	$3x + 5$	$f(x)$	$(x, y)$
3			

**Solution 3:**

$x$	$3x + 5$	$f(x)$	$(x, y)$
3	$= 3(3) + 5$ $= 9 + 5$ $= 14$	$f(3)$	$(3, 14)$

**Example 4:** If  $f(x) = 2x + 1$ ,

- a) What is  $f(3x)$ ?
- b) What is  $f(x + 3)$ ?

**Solution 4:**

$$\begin{aligned}
 \text{a) } f(3x) &= 2(3x) + 1 \\
 &= 6x + 1 \\
 \text{b) } f(x + 3) &= 2(x + 3) + 1 \\
 &= 2x + 6 + 1 \\
 &= 2x + 7
 \end{aligned}$$

**Example 5:** If  $f(x) = 2x + 1$ , determine  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$

**Solution 5:**  $f(x) = 2x + 1$ ,  $f(x + h) = 2(x + h) + 1$

$$\begin{aligned}
 \text{So, } \frac{f(x+h) - f(x)}{h} &= \frac{[2(x+h) + 1] - [2x + 1]}{h} \\
 \rightarrow &= \frac{2x + 2h + 1 - 2x - 1}{h} \rightarrow = \frac{2h}{h} \\
 \rightarrow &= 2
 \end{aligned}$$

**Section 3.3b – Practice Problems****EMERGING LEVEL QUESTIONS**

For  $f(x) = 3x - 2$ , find:

1.  $f(3)$

2.  $f(-4)$

3.  $f(k)$

4.  $f(2x - 1)$

**PROFICIENT LEVEL QUESTIONS**

5.  $f(x + h)$

6.  $f(x) + f(h)$

**EMERGING LEVEL QUESTIONS**For  $f(x) = 4x + 5$ , *find*:

7.  $f(3)$

8.  $f(-4)$

9.  $f(k)$

10.  $f(2x - 1)$

**PROFICIENT LEVEL QUESTIONS**

11.  $f(x + h)$

12.  $f(x) + f(h)$

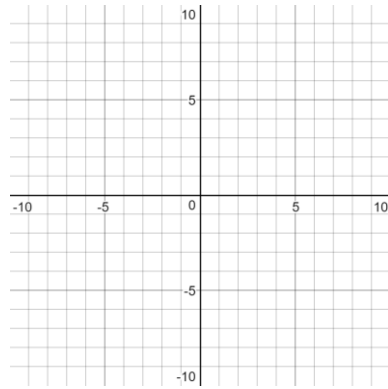
For  $f(x) = -5x + 2$ , *find*:

13.  $f(x) = -12$

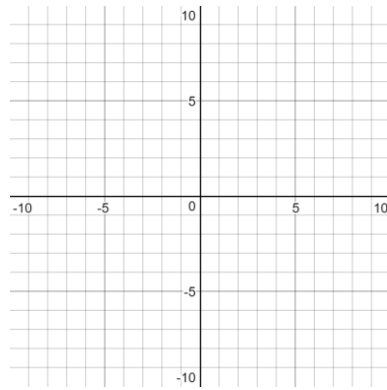
14.  $f(x) = 7$

Graph each function if the domain is  $\{-3, -2, -1, 0, 1, 2\}$ , show the calculations of the outputs

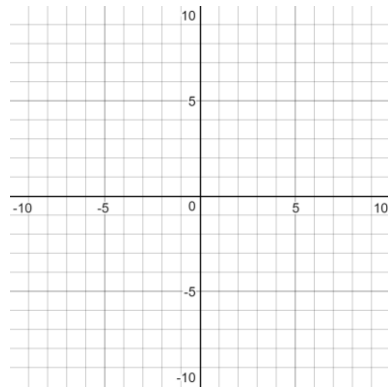
15.  $f(x) = 2x + 1$



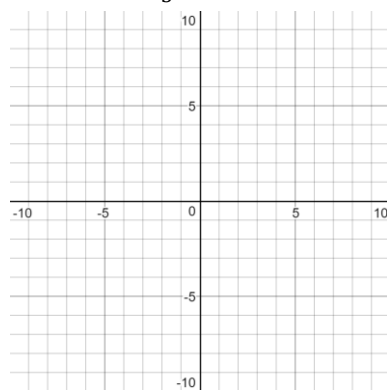
16.  $f(x) = -\frac{1}{2}x + 3$



17.  $f(x) = \frac{3}{4}x - 2$



18.  $f(x) = -\frac{2}{3}x - 4$



**EXTENDING LEVEL QUESTIONS**

Determine  $\frac{f(x+h) - f(x)}{h}$ ,  $h \neq 0$ .

19.  $f(x) = 3x$

20.  $f(x) = 3x - 4$

**Section 3.3b – Answer Key**

1. 7
2.  $-14$
3.  $3k - 2$
4.  $6x - 5$
5.  $3x + 3h - 2$
6.  $3x + 3h - 4$
7. 17
8.  $-11$
9.  $4k + 5$
10.  $8x + 1$
11.  $4x + 4h + 5$
12.  $4x + 4h + 10$
13.  $x = \frac{14}{5}$
14.  $x = -1$
15. See Website
16. See Website
17. See Website
18. See Website
19. 3
20. 3

**Extra Work Space**