

**Section 3.3b – Practice Problems****EMERGING LEVEL QUESTIONS**For  $f(x) = 3x - 2$ , find:

1.  $f(3)$

$$f(3) = 3(3) - 2$$

$$f(3) = 9 - 2$$

$$f(3) = 7$$

2.  $f(-4)$

$$f(-4) = 3(-4) - 2$$

$$f(-4) = -12 - 2$$

$$f(-4) = -14$$

3.  $f(k)$

$$f(k) = 3k - 2$$

4.  $f(2x - 1)$

$$f(2x - 1) = 3(2x - 1) - 2$$

$$f(2x - 1) = 6x - 3 - 2$$

$$f(2x - 1) = 6x - 5$$

**PROFICIENT LEVEL QUESTIONS**

5.  $f(x + h)$

$$f(x + h) = 3(x + h) - 2$$

$$f(x + h) = 3x + 3h - 2$$

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

$$f(x) + f(h) = (3x - 2) + (3h - 2)$$

$$f(x) + f(h) = 3x + 3h - 4$$

## EMERGING LEVEL QUESTIONS

For  $f(x) = 4x + 5$ , find:

7.  $f(3)$

$$f(3) = 4(3) + 5$$

$$f(3) = 12 + 5$$

$$f(3) = 17$$

8.  $f(-4)$

$$f(-4) = 4(-4) + 5$$

$$f(-4) = -16 + 5$$

$$f(-4) = -11$$

9.  $f(k)$

$$f(k) = 4k + 5$$

10.  $f(2x - 1)$

$$f(2x-1) = 4(2x-1) + 5$$

$$f(2x-1) = 8x - 4 + 5$$

$$f(2x-1) = 8x + 1$$

## PROFICIENT LEVEL QUESTIONS

11.  $f(x+h)$

$$f(x+h) = 4(x+h) + 5$$

$$f(x+h) = 4x + 4h + 5$$

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

$$f(x) + f(h) = 4x + 5 + 4h + 5$$

$$f(x) + f(h) = 4x + 4h + 10$$

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

13.  $f(x) = -12$

$$-5x + 2 = -12$$

$$-5x = -14$$

$$x = \frac{14}{5}$$

14.  $f(x) = 7$

$$-5x + 2 = 7$$

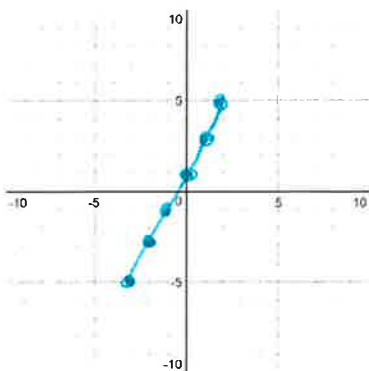
$$-5x = 5$$

$$x = -1$$

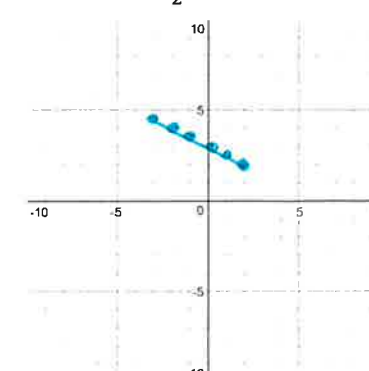
Graph each function if the domain is  $\{-3, -2, -1, 0, 1, 2\}$ , show the calculations of the outputs

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

$$\begin{aligned} f(-3) &= 2(-3) + 1 \\ f(-3) &= -6 + 1 \\ f(-3) &= -5 \rightarrow (-3, -5) \\ f(-2) &= 2(-2) + 1 \\ f(-2) &= -4 + 1 \\ f(-2) &= -3 \rightarrow (-2, -3) \\ f(-1) &= 2(-1) + 1 \\ f(-1) &= -2 + 1 \\ f(-1) &= -1 \rightarrow (-1, -1) \\ f(0) &= 2(0) + 1 \\ f(0) &= 0 + 1 \\ f(0) &= 1 \rightarrow (0, 1) \\ f(1) &= 2(1) + 1 \\ f(1) &= 2 + 1 \\ f(1) &= 3 \rightarrow (1, 3) \\ f(2) &= 2(2) + 1 \\ f(2) &= 4 + 1 \\ f(2) &= 5 \rightarrow (2, 5) \end{aligned}$$



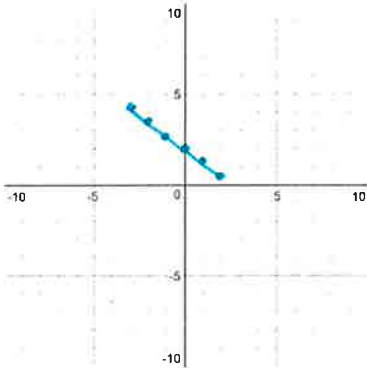
16.  $f(x) = -\frac{1}{2}x + 3$



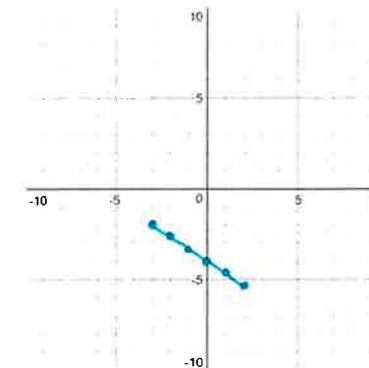
$$\begin{aligned} f(-3) &= -\frac{1}{2}(-3) + 3 \\ f(-3) &= \frac{3}{2} + \frac{6}{2} \\ f(-3) &= \frac{9}{2} \rightarrow (-3, \frac{9}{2}) \\ f(-2) &= -\frac{1}{2}(-2) + 3 \\ f(-2) &= 1 + 3 \\ f(-2) &= 4 \rightarrow (-2, 4) \\ f(-1) &= -\frac{1}{2}(-1) + 3 \\ f(-1) &= \frac{1}{2} + \frac{6}{2} \\ f(-1) &= \frac{7}{2} \rightarrow (-1, \frac{7}{2}) \\ f(0) &= -\frac{1}{2}(0) + 3 \\ f(0) &= 0 + 3 \\ f(0) &= 3 \rightarrow (0, 3) \\ f(1) &= -\frac{1}{2}(1) + 3 \\ f(1) &= -\frac{1}{2} + \frac{6}{2} \\ f(1) &= \frac{5}{2} \rightarrow (1, \frac{5}{2}) \\ f(2) &= -\frac{1}{2}(2) + 3 \\ f(2) &= -1 + 3 \\ f(2) &= 2 \rightarrow (2, 2) \end{aligned}$$

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

$$\begin{aligned} f(-3) &= \frac{3}{4}(-3) - 2 \\ f(-3) &= -\frac{9}{4} - \frac{8}{4} \\ f(-3) &= -\frac{17}{4} \rightarrow (-3, -\frac{17}{4}) \\ f(-2) &= \frac{3}{4}(-2) - 2 \\ f(-2) &= -\frac{6}{4} - \frac{8}{4} \\ f(-2) &= -\frac{14}{4} \rightarrow (-2, -\frac{7}{2}) \\ f(-1) &= \frac{3}{4}(-1) - 2 \\ f(-1) &= -\frac{3}{4} - \frac{8}{4} \\ f(-1) &= -\frac{11}{4} \rightarrow (-1, -\frac{11}{4}) \\ f(0) &= \frac{3}{4}(0) - 2 \\ f(0) &= 0 - 2 \\ f(0) &= -2 \rightarrow (0, -2) \\ f(1) &= \frac{3}{4}(1) - 2 \\ f(1) &= \frac{3}{4} - \frac{8}{4} \\ f(1) &= -\frac{5}{4} \rightarrow (1, -\frac{5}{4}) \\ f(2) &= \frac{3}{4}(2) - 2 \\ f(2) &= \frac{6}{4} - \frac{8}{4} \\ f(2) &= -\frac{2}{4} \rightarrow (2, -\frac{1}{2}) \end{aligned}$$



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



$$\begin{aligned} f(-3) &= -\frac{2}{3}(-3) - 4 \\ f(-3) &= 2 - 4 \\ f(-3) &= -2 \rightarrow (-3, -2) \\ f(-2) &= -\frac{2}{3}(-2) - 4 \\ f(-2) &= \frac{4}{3} - \frac{12}{3} \\ f(-2) &= -\frac{8}{3} \rightarrow (-2, -\frac{8}{3}) \\ f(-1) &= -\frac{2}{3}(-1) - 4 \\ f(-1) &= \frac{2}{3} - \frac{12}{3} \\ f(-1) &= -\frac{10}{3} \rightarrow (-1, -\frac{10}{3}) \\ f(0) &= -\frac{2}{3}(0) - 4 \\ f(0) &= 0 - 4 \\ f(0) &= -4 \rightarrow (0, -4) \\ f(1) &= -\frac{2}{3}(1) - 4 \\ f(1) &= -\frac{2}{3} - \frac{12}{3} \\ f(1) &= -\frac{14}{3} \rightarrow (1, -\frac{14}{3}) \\ f(2) &= -\frac{2}{3}(2) - 4 \\ f(2) &= -\frac{4}{3} - \frac{12}{3} \\ f(2) &= -\frac{16}{3} \rightarrow (2, -\frac{16}{3}) \end{aligned}$$

## EXTENDING LEVEL QUESTIONS

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

19.  $f(x) = 3x$

$$f(x) = 3x, \quad f(x+h) = 3(x+h)$$

$$\text{So, } \frac{f(x+h)-f(x)}{h} = \frac{[3(x+h)]-3x}{h}$$

$$\frac{f(x+h)-f(x)}{h} = \frac{3x+3h-\cancel{3x}}{h}$$

$$\frac{f(x+h)-f(x)}{h} = \frac{3h}{h}$$

$$\boxed{\frac{f(x+h)-f(x)}{h} = 3}$$

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

$$f(x) = 3x - 4, \quad f(x+h) = 3(x+h) - 4$$

$$\text{So, } \frac{f(x+h)-f(x)}{h} = \frac{[3(x+h)-4]-[3x-4]}{h}$$

$$\frac{f(x+h)-f(x)}{h} = \frac{3x+3h-\cancel{4}-\cancel{3x}+\cancel{4}}{h}$$

$$\frac{f(x+h)-f(x)}{h} = \frac{3h}{h}$$

$$\boxed{\frac{f(x+h)-f(x)}{h} = 3}$$