FLUENCY $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{f(b) - f(a)}{b - a}$

1. Consider the function given by $f(x) = 9 - x^2$. Find its average rate of change between the following points. Carefully show the work that leads to your final answer.

(a) $x = 0$ to $x = 3$ (b) $x = -1$ to $x = 5$ (c) $x = -2$ to $x = 2$

(a) a = 0, b = 3

$f(b)\ 9 - 3^2 = 0$

$f(a)\ 9$

$\frac{0 - 9}{3 - 0} = \frac{-9}{3}$ -3

(b) a = −1, b = 5

-16, 8

$\frac{-16 - 8}{5 - -1}$ $\frac{-24}{6}$ -4

(c) a = −2, b = 2

5, 5

$\frac{5 - 5}{2 + 2} = \frac{0}{4} = 0$

2. The function $f(x)$ is given in the table below. Find its average rate of change between the following points. Show the calculations that lead to your answer.

(a) $x = -3$ to $x = 1$ (b) $x = 0$ to $x = 4$.

(a) a = −3, b = 1

$\frac{3 - 7}{1 + 3} = \frac{-4}{4}$ -1

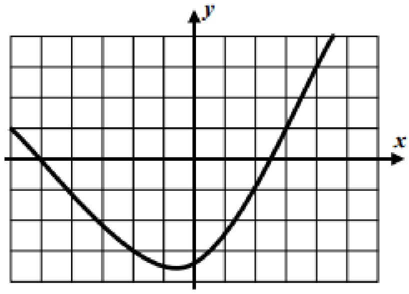
(b) a = 0, b = 4

$\frac{-8 + 2}{4 - 0} = \frac{-6}{4}$ $-\frac{3}{2}, -1.5$

x	$f(x)$
-3	7
0	-2
1	3
4	-8

3. The function $f(x)$ is given in the graph below. Find its average rate of change between the following points. Show the calculations that lead to your answer.

(a) $x = -6$ to $x = 4$ (b) $x = -2$ to $x = 2$.



(a) a: 1, b: 3

$$\frac{3-1}{4-^-6} = \frac{2}{10}$$

$$\boxed{\frac{1}{5}, \text{ or } 0.2}$$

(b) a: -3, b: -1

$$\frac{^-1+^+3}{2+^+2} = \frac{2}{4}$$

$$\frac{1}{2}$$

$$\frac{-3+1}{-2+2} = \frac{-2}{-4}$$

$$\frac{2}{4} = \frac{1}{2}$$

APPLICATIONS

4. The following table shows the number of points the Arlington girls team scored in their last basketball game where t is the time passed in minutes and $f(t)$ the total number of points scored after t minutes.

t	$f(t)$
0	0
8	30
16	48
24	55
32	64

1st Q
2nd Q
3rd Q
4th Q

(a) What was the average rate they were shooting in the first half of the game? Be sure to include proper units in your answer.

$f(b)$ 48 16 (b)
$f(a)$ 0 0

$\frac{48-0}{16-0} = \frac{48}{16} = 3 \frac{pts}{min}$

(b) What was their average rate over the whole game?

$\frac{64-0}{32-0} = \frac{64}{32} = 2 \frac{pts}{min}$

(c) Given your answers above which half of the game do you feel they had a better rate of scoring? Explain.

1st $3 \frac{pts}{min}$ 2nd $1 \frac{pt}{min}$

$$\frac{f(b)-f(a)}{b-a}$$

Reasoning

5. Consider the function given by $f(x)=6x+5$.

(a) Find its average rate of change from $x=1$ (a) to $x=5$ (b).

$$\frac{35-11}{5-1}=\frac{24}{4}=6$$

(b) Find its average rate of change from $x=-2$ (a) to $x=6$ (b).

$$\frac{41+7}{6+2}=\frac{48}{8}=6$$

(c) The average rate of change for this function is always 6 (as you should have found in the first two parts of the problem). What type of function has a constant average rate of change? What do we call this average rate of change in this case? Search the Internet if needed.

LINEAR

m=slope

Bell Ringer:

If $f(x) = \frac{x-4}{x+4}$, then $f(4a)$ equals

1) $\frac{a-1}{a+1}$
2) $\frac{a+1}{a-1}$
3) $\frac{4a-1}{4a+1}$
4) $\frac{4a+1}{4a-1}$

$$\frac{4a-4}{4a+4} \quad \frac{4(a-1)}{4(a+1)}$$

$$\frac{1}{1} \cdot \frac{a-1}{a+1} = \frac{a-1}{a+1}$$

If $f(x) = 4x^2 - x + 1$, then $f(a+1)$ equals

1) ~~$4a^2 - a + 6$~~
2) $4a^2 - a + 4$
3) ~~$4a^2 + 7a + 6$~~
4) $4a^2 + 7a + 4$

$$4(a+1)^2 - (a+1) + 1$$

$$4(a+1)(a+1)$$

$$4(a^2 + 2a + 1) - a - 1 + 1$$

$$4a^2 + 8a + 4 - a - \cancel{1} \cancel{+1}$$

CC.F.IF.2: Functional Notation
www.jmap.org

Unit 3 Quick Review:

Which table represents a function?

1)

x	2	4	2	4
f(x)	3	5	7	9

2)

x	0	−1	0	1
f(x)	0	1	−1	0

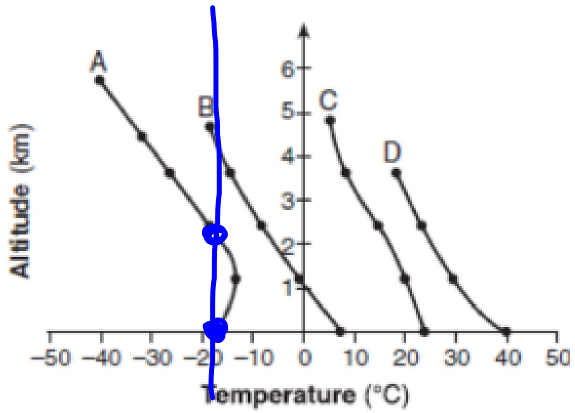
3)

x	3	5	7	9
f(x)	2	4	2	4

4)

x	0	1	−1	0
f(x)	0	−1	0	1

The accompanying graph shows the curves of best fit for data points comparing temperature to altitude in four different regions, represented by the relations *A*, *B*, *C*, and *D*.



Which relation is *not* a function?

1) *A*
2) *B*
3) *C*
4) *D*

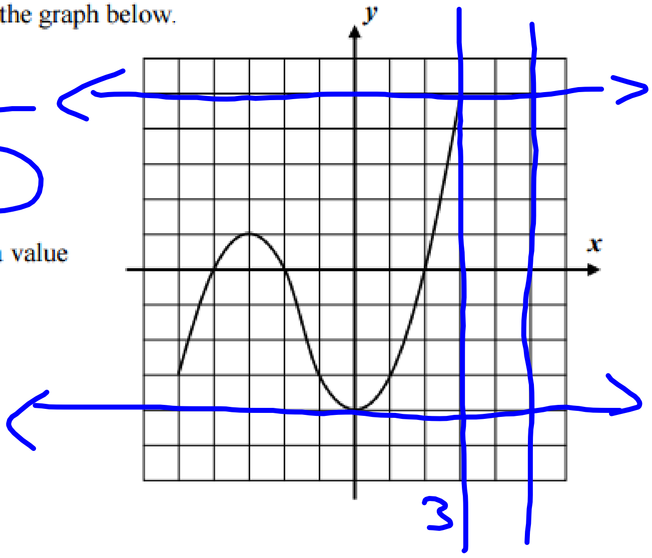
THE DOMAIN AND RANGE OF A FUNCTION
COMMON CORE ALGEBRA I

Ultimately, all functions do is convert inputs into outputs. So, each function has two **sets** associated with it. Those things that serve as **inputs** and those things that serve as **outputs**. These sets are given names.

THE DOMAIN AND RANGE OF A FUNCTION

1. The **domain of a function** is the set of **all inputs** for which the function rule can give an output.
2. The **range of a function** is the **set of all outputs** for which there is an input that results in them.

***Exercise* #1:** Consider the function $y = f(x)$ shown on the graph below.



(a) Evaluate each of the following:

$f(-3) =$ 1 $\quad f(1) =$ -3 $\quad f(3) =$ 5

(b) Can the function rule, given by the graph, give you a value when $x = 5$? If so, what is it? If not, why not?

No.

(c) Is $x = 5$ in the **domain** of the function?

No

(d) Give two other values of x that are **not** in the **domain** of the function.

6, -6

(e) Circle the following y-values that are in the **range** of the function? Show evidence on your graph.

$y = 0$ $\quad \cancel{y = 6}$ $\quad y = -1$

$y = 3$ $\quad \cancel{y = -5}$ $\quad y = 4$

(f) Write the domain and range of this function using a single inequality.

DOMAIN

$\{-5 < x < 3\}$

RANGE

$\{-4 \le y < 5\}$

***Exercise* #2:** Given the function $f(x) = \frac{x}{2} - 3$ and the domain shown below, fill in the range. Write the set in **roster notation**.

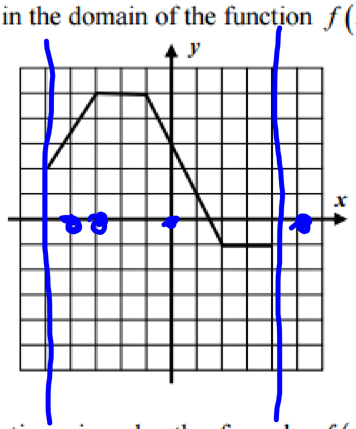
Domain	**Range**
−4	−5
6	0
10	2

Range: $\{-5, 0, 2\}$

***Exercise* #3:** Which of the following values is *not* in the domain of the function $f(x)$ shown below? Illustrate your thinking by marking points on the graph.

(1) -3 (3) 5

(2) -4 (4) 0



***Exercise* #4:** Consider the piecewise linear function given by the formula $f(x)=\begin{cases} \dfrac{-(x+2)}{2} & -4 \le x \le 2 \\ 4x-10 & 2 \le x \le 4 \end{cases}$.

Determine the function's range.

y=?

y=?