

GENERAL MATHEMATICS 11

Name of Learner: _____

Grade Level: _____

Section: _____

Score: _____

LEARNING ACTIVITY SHEET INVERSE OF ONE-TO-ONE FUNCTIONS

Background Information for Learners

We have learned that a function can be regarded as taking an input, x , and processing it in some way to produce a single output $f(x)$. This time, we will find another function that will start with $f(x)$ and process it to produce x again.

Definition

Let f be a one-to-one function with domain A and range B . Then the inverse of f , denoted f^{-1} , is a function with domain B and range A defined by $f^{-1}(y) = x$ if and only if $f(x) = y$ for any y in B .

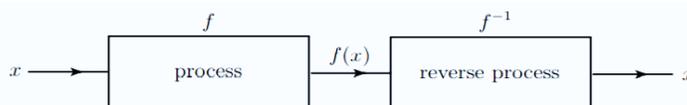


figure 1. f^{-1} reverses the process in f

Note: A function has an inverse if and only if it is one-to-one function.

Finding the inverse of a one-to-one function

1. Write the function in the form $y = f(x)$;
2. Interchange x and y variables;
3. Solve for y in terms of x . The resulting equation is $f^{-1}(x)$.

Example 1. Find the inverse of $f(x) = 8x + 5$

Solution.

$$y = f(x)$$

Interchange x and y variables

Solve for y in terms of x

$$\begin{aligned} f(x) = 8x + 5 &\Rightarrow y = 8x + 5 \\ y = 8x + 5 &\Rightarrow x = 8y + 5 \\ &x = 8y + 5 \\ &x - 5 = 8y \end{aligned}$$

Note: Practice Personal Hygiene protocols at all times

$$\frac{x-5}{8} = y \quad \Rightarrow \quad y = \frac{x-5}{8}.$$

Therefore, the inverse of $f(x) = 8x + 5$ is $f^{-1}(x) = \frac{x-5}{8}$.

Check whether $f(x) = 8x + 5$ and $f^{-1}(x) = \frac{x-5}{8}$ are inverses.

suppose $x=3$ in $f(x)$.

$$f(x) = 8x + 5 \quad \Rightarrow \quad f(3) = 8(3) + 5 = 29$$

$$f^{-1}(x) = \frac{x-5}{8} \quad \Rightarrow \quad f^{-1}(29) = \frac{29-5}{8} = 3$$

$$\text{Domain of } f = \text{Range of } f^{-1} \quad \text{Range of } f = \text{Domain of } f^{-1}$$

Hence, the two functions are inverses of each other.

Learning Competency

The learner is able to determine the inverse of a one-to-one function. **MI1GM-Id-2**

Exercise 1.

State if the given functions are inverses. (2 points each)

$$1. \quad f(x) = \frac{x-5}{10}$$

$$g(x) = 10x + 5$$

$$2. \quad f(x) = \frac{8+9x}{2}$$

$$g(x) = \frac{5x-9}{2}$$

$$3. \quad f(x) = \sqrt[5]{\frac{x-1}{2}}$$

$$g(x) = 2x^5 + 1$$

$$4. \quad f(x) = \frac{2}{x+3}$$

$$g(x) = \frac{3x+2}{x+2}$$

$$5. \quad f(x) = \frac{4-x}{x}$$

$$g(x) = \frac{4}{x}$$

$$6. \quad f(x) = \frac{-2-2x}{x}$$

$$g(x) = \frac{-2}{x+2}$$

$$7. \quad f(x) = 4 - \frac{3}{2}x$$

$$g(x) = \frac{1}{2}x + \frac{3}{2}$$

$$8. \quad f(x) = 4x + 16$$

$$g(x) = \frac{-16+x}{4}$$

$$9. \quad f(x) = 3x + 1$$

$$g(x) = 3 + x$$

$$10. \quad f(x) = -\frac{2}{x} - 1$$

$$g(x) = \frac{-2}{x+1}$$

Exercise 2.

Find the inverse of each function. (4 points each)

1. $f(x) = x - 6$

2. $g(x) = -5x + 1$

3. $h(x) = \frac{4}{x+2}$

4. $f(x) = (x + 3)^3$

5. $g(x) = 2x^3 + 3$

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

7. $g(x) = \frac{-2x+1}{3}$

8. $h(x) = \frac{7-3x}{x-2}$

9. $f(x) = \sqrt[5]{\frac{-x+2}{2}}$

10. $g(x) = \frac{4}{5}x - 4$

Exercise 3.

Identify whether the inverse of each function is a function or not. Explain briefly your answer. (4 points each)

1. $f(x) = \frac{1}{2}x + 1$
2. $f(x) = x^2 + 6x + 9$
3. $f(x) = |2x|$

Reflection

What significant learnings have you acquired in this lesson?

Reference for Learners

Verzosa, D.B, et.al (2016). General Mathematics. Quezon City, Manila
<https://cdn.kutasoftware.com/Worksheets/Alg2/Function%20Inverses.pdf>