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# Composition Function and Inverse Function

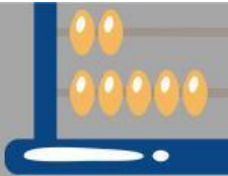
Mathematics



Name :

For XI Grade

 **LIVEWORKSHEETS**



# COMPOSITION FUNCTION

## Definition of Function

A function is a relation that connects one member of a set to exactly one member of another set. Functions are more specific relations. Functions are usually expressed in the form  $f(x)=y$ , where  $f$  is the function,  $x$  is the input variable and  $y$  is the output variable.

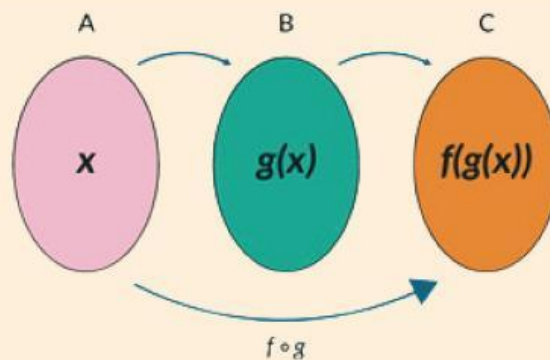
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**What information do you get from the video?**

# COMPOSITION FUNCTION

## Composition Function

If  $g: A \rightarrow B$  and  $f: B \rightarrow C$  are two functions then their composition  $f(g(x))$  expressed with the notation  $(f \circ g)(x)$  is a function from domain  $A$  to codomain  $C$ . The composition of two functions can be understood via the following arrow diagram:

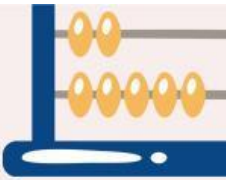


To better understand composition functions watch the following video





# EXERCISE



If  $f(x) = x^2 + 1$  and  $g(x) = 2x - 1$ , then  $(f \circ g)(x)$  is ...

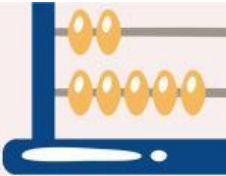
$$\begin{aligned}(f \circ g)(x) &= f(g(x)) \\ &= (g(x))^2 + 1 \\ &= ( \quad )^2 + 1 \\ &= \quad + 1 \\ &= \quad\end{aligned}$$

Known  $f = \{(1,1), (2,3), (3,5), (5,7), (7,9)\}$   
and  $g = \{(1,3), (3,5), (5,7)\}$ . The ordered pair of  
compositions  $(f \circ g)$  are ...

- A.  $\{(1,3), (3,5)\}$
- B.  $\{(1,5), (3,7), (5,7)\}$
- C.  $\{(1,5), (3,7)\}$
- D.  $\{(1,5), (3,7), (5,9)\}$
- E.  $\{(1,3), (3,7)\}$



# EXERCISE



If known  $f(x) = 2x + 3$  and  $(f \circ g)(x) = 6x^2 - 4x + 13$ , then  $g(x)$  is ...

$$(f \circ g)(x) = 6x^2 - 4x + 13$$

$$\dots = 6x^2 - 4x + 13$$

$$2g(x) + 3 =$$

$$=$$
$$=$$

Match them with the correct answer

Known  $f(x) = 3x - 4$  and  $g(x) = x + 7$ , determine

$$(f \circ g)(x)$$

$$3x + 3$$

$$(g \circ f)(x)$$

$$x + 14$$

$$(f \circ f)(x)$$

$$9x - 16$$

$$(g \circ g)(x)$$

$$3x + 17$$

# INVERSE FUNCTION

## Definition of Inverse

The inverse is simply the opposite of something. For example, in everyday life, if you walk forward, then the inverse is to walk backward. Or if you turn on a light, the inverse is to turn off the light. So, an inverse is an action or condition that is opposite to the original.

## Example



open the inverse door close the door



up the stairs its inverse down the stairs

## Inverse Function

An inverse function is the opposite of a function. Think of a function like a machine that turns something into something else. So, the inverse function restores what was previously changed by the original function, like reversing the process.

is usually given a negative power of 1 to indicate the inverse.

## Exercise 1

complete the blanks below

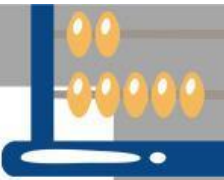
$f(x) = \text{up}$   $\gg$   $f^{-1}(x) = \dots$

$y = \dots$   $\gg$   $y^{-1} = \text{true}$

$g(x) = \text{small}$   $\gg$   $g^{-1}(x) = \dots$



to better understand inverses in functions  
watch the following video



## Exercise 2

complete the blanks below

### Problem 1:

Given the function  $f(x) = 2x + 3$ ,

find the inverse function of  $f(x)$ , denoted as  $f^{-1}(x)$ .

Here's the solution

$$y = 2x + 3$$

$$y - \dots = 2x$$

$$x = \frac{y-3}{\dots}$$

$$f^{-1}(x) = \frac{\dots-3}{2}$$

### Problem 2:

The function is given as  $f(x) = 3x - 4$ .

Find  $f^{-1}(x)$  and calculate  $f^{-1}(11)$ .

Here's the solution

$$y = 3x - 4$$

$$y + \dots = 3x$$

$$x = \frac{y+4}{\dots}$$

$$f^{-1}(x) = \frac{\dots+4}{3}$$

To calculate  $f^{-1}(11)$ :

$$f^{-1}(11) = \frac{\dots+4}{3} = \frac{\dots}{3} = \dots$$