

Begin lesson with Khan Article
practice questions:

1. Intro to Combining Functions
2. Intro to Composing Functions
3. Composing Functions

4. *skipped book lesson

Name _____

Modeling With Functions | 7.4

Ready, Set, Go!

Ready

Topic: Recognizing operations on a variable

Each expression contains 2 operations. One of the operations will be "inside" the second operation. Identify the "inside" operation as u by writing $u = \underline{\hspace{2cm}}$. Then substitute u into the expression so that the "outside" operation is being performed on u .

Example: Given: $5x^3$

I can see two operations on x . First the x is being cubed and then x^3 is multiplied by 5. So if $u = x^3$, then $5x^3 = 5u$.



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1. Would the answer in the example have been different if you were given $(5x)^3$? Explain

2. $(x - 6)^2$

$u = x - 6$
 u^2

3. $\tan(x + 4)$

$u =$

4. $\sqrt[3]{(2x - 7)}$

$u = 2x - 7$
 $\sqrt[3]{u}$

5. $-9(x + 5)$

$u =$

6. $\frac{5}{x^2} u$

$u = x^2$
 $\frac{5}{u}$

7. $(\sin x)^4$

$u =$

Set Topic: Creating formulas for composite functions

Recall that $f(g(x)) = (f \circ g)(x)$.

8. Let $f(x) = 2x^2 - 4$ and $g(x) = 5x$. Find:

- a) $(f \circ g)(1)$ b) $(g \circ f)(1)$ c) $(f \circ f)(-2)$ d) $(g \circ g)(-1)$

$$\begin{aligned} &g(f(1)) \\ &5(2(1)^2 - 4) \\ &5(2 - 4) = -10 \end{aligned}$$

9. Let $f(x) = \frac{8}{x-3}$ and $g(x) = \frac{15}{x+1}$.

- Find: a) $(f \circ g)(x)$ b) $(g \circ f)(x)$ c) $(f \circ f)(x)$ d) $(g \circ g)(x)$

$$\frac{8}{\left(\frac{15}{x+1}\right) - 3}$$

$$\frac{15}{\left(\frac{8}{x-3}\right) + 1}$$

10. Use the functions in #9. Find: a) $(f \circ g)(2)$

$$\frac{8}{\left(\frac{15}{2+1}\right) - 3} = \frac{8}{5-3} = \frac{8}{2} = 4$$

b) $(g \circ f)(-5)$

$$\frac{15}{\left(\frac{8}{-5-3}\right) + 1} = \frac{15}{\frac{8}{-8} + 1} = \frac{15}{-1 + 1} = \frac{15}{0} = \text{UNDEF}$$

11. Describe the problem that you encountered when calculating the values in #10.

Well, part a was fine, but part b was undefined if $x = -5$, so there is an asymptote @ $x = -5$

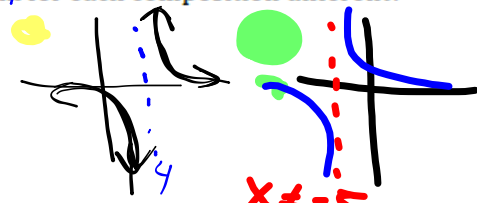
12. Describe the domains for a) $(f \circ g)(x)$ b) $(g \circ f)(x)$ c) $(f \circ f)(x)$ d) $(g \circ g)(x)$

where is the asymptote?

$$\frac{15}{x+1} = 3 \implies 15 = 3(x+1) \implies 15 = 3x + 3 \implies 12 = 3x \implies x = 4$$

asymptote at $x = -5$
 $d: \mathbb{R}, x \neq -5$
 because it makes the denominator = 0.

13. What makes the domain for each composition different?



The domain is usually everything (all real #s) except when the denominator is 0 [undefined]

Different equations have different denominators, so their domains have different restrictions.

GO Topic: Writing equations of polynomials given the degree and the roots

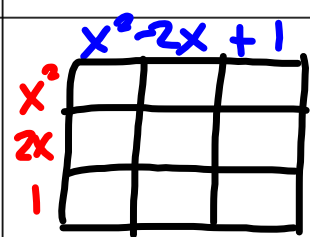
Write the equation of the polynomial with the given features.

	Degree of polynomial	Given roots (you may have to determine others):	Leading coefficient	Equation in standard form: <i>Multiply it out</i>
14.	3	-2, 1, and -1	3	
15.	4	$(2+i), 4, 0$	1	
16.	5	1 multiplicity 2, -1 multiplicity 2, and 3	-1	
17.	4	$(3 \pm i), \sqrt{2}$	-2	

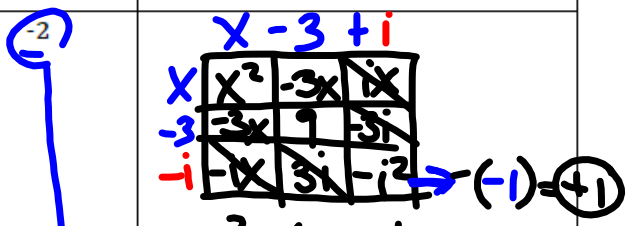
3(x+2)(x-1)(x+1)

$(x-2+i)$
 $(x-2-i)$
 $(x-4)$
 $(x+0) \rightarrow x$

bounce
 $(x-1)^2 (x+1)^2 (x-3)$
 $-1(x^2-2x+1)(x^2+2x+1)(x-3)$



$(x-3+i)$
 $(x-3-i)$
 $(x-\sqrt{2})(x+\sqrt{2})$
 $x^2 + \sqrt{2}x - \sqrt{2}x - 2$
 $= (x^2 - 2)$



$x^2 - 6x + 10$
 x^2
 $x^4 - 6x^3 + 10x^2$
 -2
 $-2x^4 + 12x^3 - 20x^2$

$-2(x^4 - 6x^3 + 10x^2 - 20)$
 $-2x^4 + 12x^3 - 20x^2 + 40$