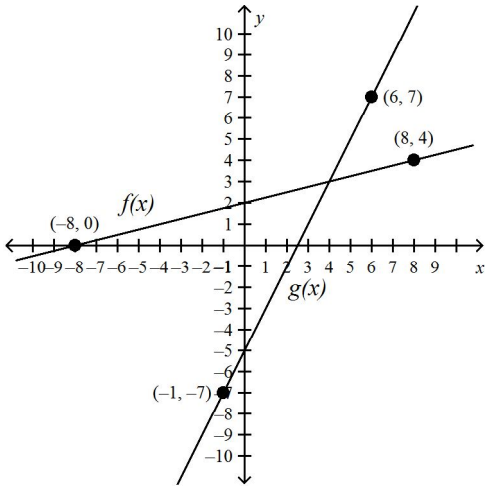
MHF4U: Chapter 8 Practice Quiz

The Questions below are intended as practice for the quiz. The actual quiz will contain questions similar to those below in terms of difficulty level.

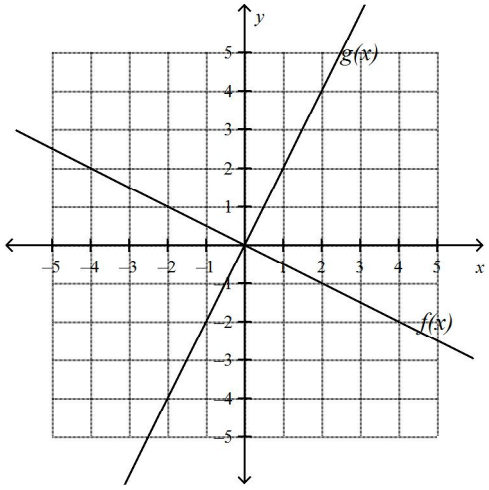
1. If $f(x) = \cos^2 x$ and $g(x) = \sin^2 x$, what is $(f+g)(\frac{\pi}{16})$?
2. If $f(x) = \log x$ and $g(x) = 2^x$, what is $(g - f)(10)$?
3. If $f(x) = \frac{x}{6}$ and $g(x) = \frac{x}{9}$, for what value of x does $(f + g)(x) = 1$? Give your answer as an improper fraction reduced to lowest terms.
4. In the graph shown, what is $(g - f)(4)$?



5. If $f(x) = \log (10 - x)$ and $g(x) = \log (x - 10)$, what is the domain of the function $(f - g)(x)$?
6. Suppose $f(x) = \sin x$ and $g(x) = \cos x$. What is the amplitude of the graph of the function $(f \times g)(x)$? Give your answer as a fraction. (Hint: trig identity for a sine double angle...)
7. If $f = \{(-10, 1), (-1, -1), (10, 0), (11, 7)\}$ and $g = \{(-1, -1), (0, 10), (1, -10), (7, 11)\}$, what is the domain of $\left(f \times g\right)(x)$? What is the domain of $\left(f \circ g\right)(x)$? What is the domain of $\left(g \circ f\right)(x)$?
8. Suppose $f(x) = \frac{2}{x}$ and $g(x) = 5x - 15$. The graph of the function $(f \circ g)(x)$ has a vertical asymptote at what value of x?
9. If $f(x) = \log x - 4$ and $g(x) = \frac{1}{x+4}$, for what value(s) of x is $g(f(x))$ undefined?
10. Suppose that the function f has a domain of $\{x \in \mathbf{R} \mid x \geq -14\}$ and that the function g has a domain of $\{x \in \mathbf{R} \mid x \leq -11\}$, and suppose $g(-12) = 0$. What is the domain of the function $(g + f)(x)$? What is the domain of $\left(\frac{f}{g}\right)(x)$?

11. If $f(x) = \frac{x^3}{2}$, what is $(f \circ f)(-4)$?

12. The graphs of $f(x)$ and $g(x)$ are shown. What is $g(f(4))$?



13. Given $f(x) = \sqrt{x-1}$ and $g(x) = \log(x-1)$, determine $D_{f \circ g}$ and $D_{g \circ f}$.

14. Suppose $f(x) = \cos x - \sin x$ and $g(x) = \cos x + \sin x$. Explain why the graph of $(f \times g)(x)$ is equivalent to the graph of $h(x) = \cos x$ after it has been horizontally compressed by a factor of $\frac{1}{2}$.

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Answer Section

SHORT ANSWER

1. ANS:
1

PTS: 1 REF: Thinking OBJ: 9.2 - Combining Two Functions: Sums and Differences

2. ANS:
1023

PTS: 1 REF: Knowledge and Understanding
OBJ: 9.2 - Combining Two Functions: Sums and Differences

3. ANS:
$\frac{18}{5}$

PTS: 1 REF: Thinking OBJ: 9.2 - Combining Two Functions: Sums and Differences

4. ANS:
0

PTS: 1 REF: Application OBJ: 9.2 - Combining Two Functions: Sums and Differences

5. ANS:
The domain is empty

PTS: 1 REF: Thinking OBJ: 9.2 - Combining Two Functions: Sums and Differences

6. ANS:
$\frac{1}{2}$

PTS: 1 REF: Application OBJ: 9.3 - Combining Two Functions: Products

7. ANS:
$D_{f \times g} = \{-1\}$

$D_{f \circ g} = \{-1, 0, 1, 7\}$

$D_{g \circ f} = \{-10, -1, 10, 11\}$

PTS: 1 REF: Knowledge and Understanding
OBJ: 9.3 - Combining Two Functions: Products

8. ANS:
3

PTS: 1 REF: Thinking OBJ: 9.5 - Composition of Functions

9. ANS:
$x = 1$ or $x \le 0$

PTS: 1 REF: Thinking OBJ: 9.5 - Composition of Functions

10. ANS:
$D_{g+f} = \left[-14, -11\right]$
$D_{f/g} = [-14, -12) \cup (-12, -11]$

PTS: 1 REF: Knowledge and Understanding
OBJ: 9.2 - Combining Two Functions: Sums and Differences

11. ANS:
–16 384

PTS: 1 REF: Knowledge and Understanding OBJ: 9.5 - Composition of Functions

12. ANS:
–4

PTS: 1 REF: Application OBJ: 9.5 - Composition of Functions

13. ANS:
$D_{f \circ g} = (11, \infty)$

$D_{g \circ f} = (2, \infty)$

PTS: 1

PROBLEM

14. ANS:
Since $f(x) = \cos x - \sin x$ and $g(x) = \cos x + \sin x$, $(f \times g)(x) = (\cos x - \sin x)(\cos x + \sin x) = \cos^2 x - \sin^2 x$. Since $\cos^2 x - \sin^2 x = \cos 2x$, and since the graph of $h(x) = \cos 2x$ is equivalent to the graph of $h(x) = \cos x$ after it has been horizontally compressed by a factor of $\frac{1}{2}$, the graph of $(f \times g)(x)$ is also equivalent to the graph of $h(x) = \cos x$ after it has been horizontally compressed by a factor of $\frac{1}{2}$.

PTS: 1 REF: Communication
OBJ: 9.3 - Combining Two Functions: Products