

$$\overline{41+2} = \overline{43}$$

Name: _____

Date: _____

MHF4U

Test – Unit 9: Combination of Functions

1. Given $f(x) = x^2 + 5x$ and $g(x) = 2x + 1$ find:

a) $f + g(x)$ (1 mark)

b) $g - f(x)$ (2 marks)

c) $f \times g(x)$ (2 marks)

d) $f + g^{-1}(x)$ (2 marks)

2. Given $f(x) = \frac{x}{x+1}$ and $g(x) = x^2 - 1$ find:

a) $f \circ g(x)$ (2 marks)

b) $f \circ g(-2)$ (1 mark)

3. Functions $f(x)$ and $g(x)$ are defined by:

$$f(x) = \{(-2,0), (3,1), (5,2), (7,3), (11,5)\}$$

$$g(x) = \{(2,7), (5,-1), (7,4), (9,2), (11,3)\}$$

Determine:

a) $g - f(x)$

b) $f(g(11))$

(3 marks)

5. If $f(x) = x + 1$ and $g(x) = x^2 - 4$, find the function AND the domain of $f \div g(x)$

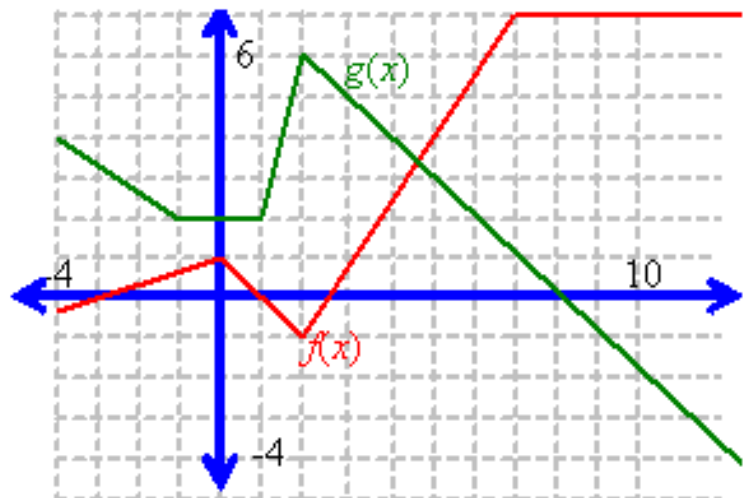
(2 marks)

6. 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. (2 marks)

7. If $f(x) = x + 4$ and $g(x) = x - 4$, what is the minimum value of the function $(f \times g)(x)$? (2 marks)

8. Given the following graph, determine the values for :

- a) $(f + g)(1)$
 - b) $(f - g)(-3)$
 - c) $f \circ g(2)$
- (3 marks)

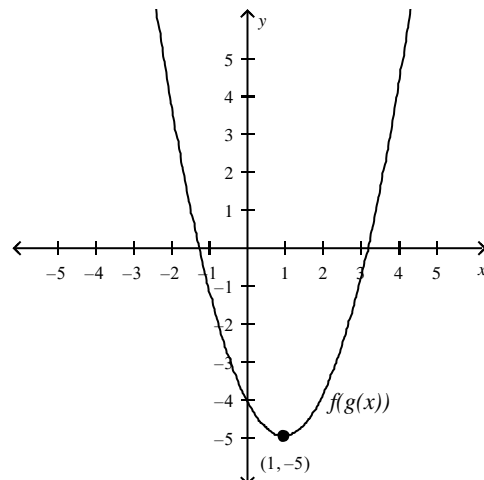


9. Kathy has a small business selling apple cider at the farmers' market. She pays \$35 per day to rent her space at the market and each cup of cider costs her \$1. She sells the cider for \$2.50 per cup and brings enough cider and cups to sell a maximum of 200 cups a day.

- Write an equation to model total cost (C), revenue (R) and profit (P) as a function of number of cups. (3 marks)
- What is the break even point and explain what the coordinates mean. (2 marks)
- What is the maximum daily profit that Kathy can earn? (1 mark)

10. 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 $\frac{1}{2}$. (3 marks)

11. The graph of $f(g(x))$ is shown below. What could be the functions of $f(x)$ and $g(x)$? (2 marks)



12. Let $f(x) = 9 - x$, $g(x) = x^2 + x$, and $h(x) = x - 2$. Compute $g(h(f(5)))$. (3 marks)

13. Let $f(x) = mx^2 + 7x + 8$ and $g(x) = 3x^2 - nx + 3$. The functions are combined to form the new function $f(x) + g(x)$. Points $(1,18)$ and $(-1,14)$ satisfy the new function. Determine $f(x)$ and $g(x)$. (5 marks)