

Name: _____

Student #: _____

Date: _____

T.A. #: _____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 17 TEST – FUNCTION OPERATIONS

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***Full marks will NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. If $f(x) = -3x + 1$ and $g(x) = 2x^2$, determine $h(x) = f(x) - g(x)$ and find $h(-2)$. (2 marks)

$$h(x) = -3x + 1 - 2x^2$$

$$h(-2) = 6 + 1 - 8$$

$$= (-1)$$

2. If $f(x) = 2x - 3$ and $g(x) = x + 1$ determine the function $h(x) = (f \cdot g)(x)$ and determine the range of $h(x)$. (2 marks)

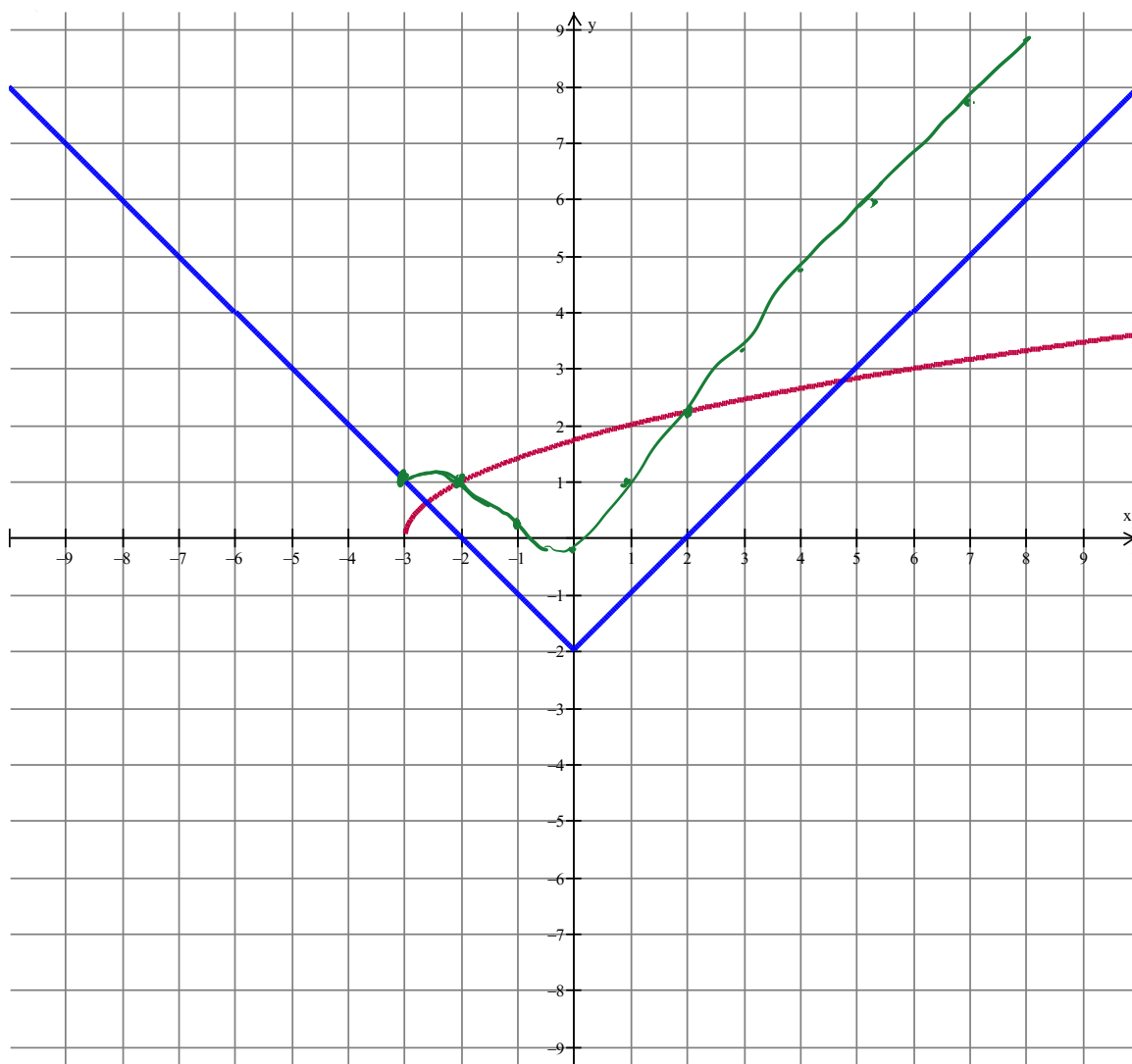
$$h(x) = (2x - 3)(x + 1) = 2x^2 + 2x - 3x - 3$$

$$= 2x^2 - x - 3$$

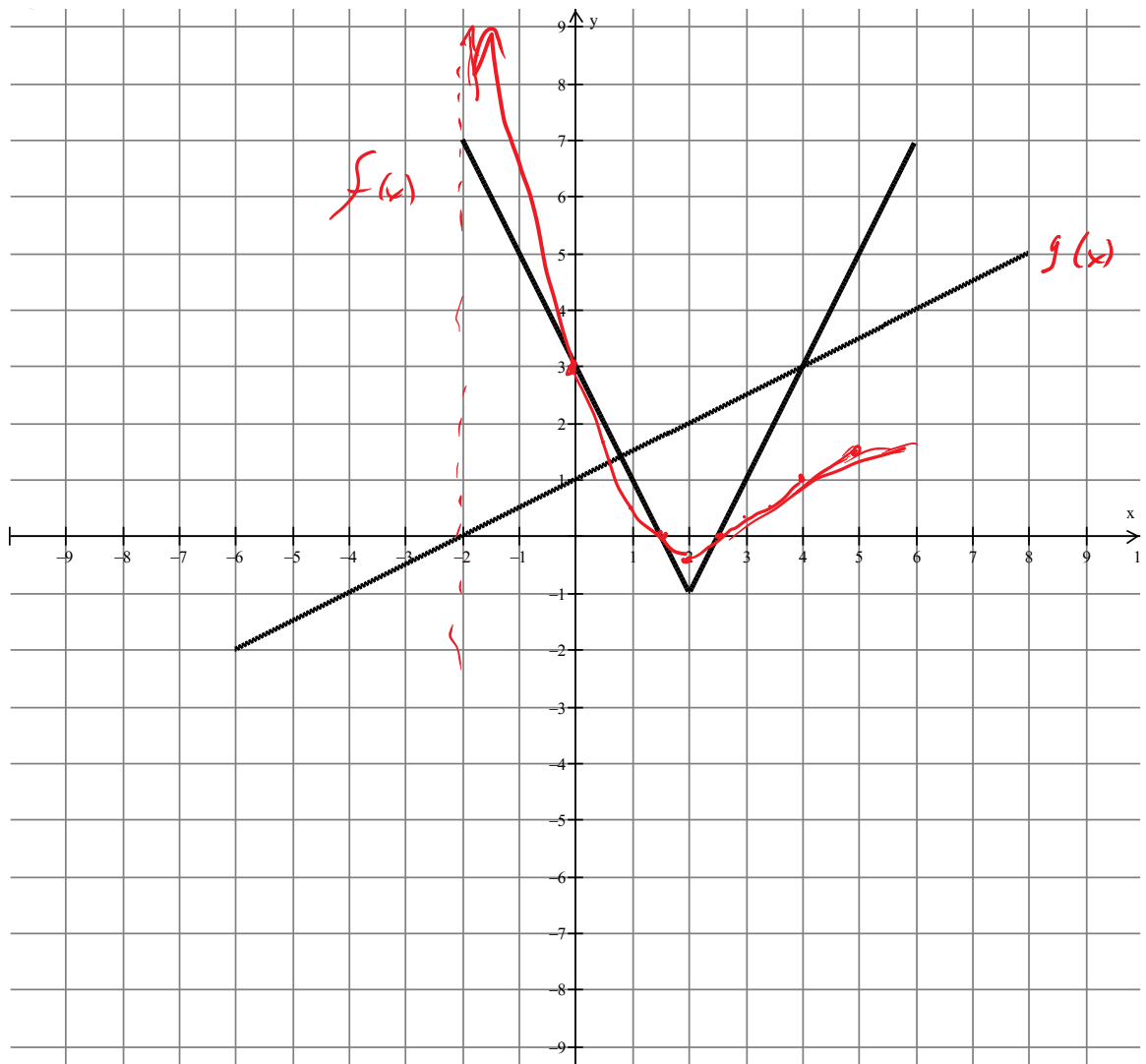
$$\text{Range: } y \geq -3.125$$

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3. Given the graphs of $y = f(x)$ and $y = g(x)$, sketch the graph of $y = f(x) + g(x)$.
(2 marks)



4. Given the functions $y = f(x)$ and $y = g(x)$, determine $\left(\frac{f}{g}\right)(2)$ and determine the domain and range of the function $\left(\frac{f}{g}\right)$. (3 marks)



$$\frac{f}{g}(2) = \left(-\frac{1}{2}\right)$$

$$\text{Domain: } -2 < x \leq 6$$

$$\text{Range: } y \geq -\frac{1}{2}$$

5. If $f(x) = 2x - 5$ and $g(x) = 3 - 7x$, determine: (1 mark each)

a) $f(g(x))$

$$= 2(3-7x) - 5$$

$$= 6 - 14x - 5 = \boxed{1 - 14x}$$

b) $g(f(1))$

$$f(1) = -3 \quad g(-3) = 3 - 7(-3) = \boxed{24}$$

c) $g(g(x))$

$$3 - 7(3-7x) = 3 - 21 + 49x = \boxed{49x - 18}$$

6. The revenue function for a school group selling n bookmarks is given by $R(n) = 2n$, and the total cost function is given by $C(n) = 144 + 0.80n$. Determine the number of bookmarks that need to be sold for the school group to break even. (2 marks)

$$R(n) = C(n)$$

$$2n = 144 + 0.8n$$

$$1.2n = 144$$

$$n = 120$$

120 BOOKMARKS NEED TO BE SOLD.

7. A clothing store is having a massive sale. All items are 30% off.

- a) Write the function, $s(p)$, that relates the regular price, p , to the sale price, s .
(1 mark)

$$s(p) = .70p$$

- b) If tax is 12%, write the function, $t(s)$, that relates the sale price, s , to the total cost including taxes, t .
(1 mark)

$$t(s) = 1.12s$$

- c) Write a composite function, $t(p)$, that expresses the total cost, t , in terms of the regular price, p .
(1 mark)

$$t(p) = 1.12(.70p)$$

- d) What would be the total cost of a sweater with a regular price of \$59.99? (1 mark)

$$\begin{aligned} t(p) &= 1.12(.70(59.99)) \\ &= \$47.02 \end{aligned}$$