6.3 More Practice with the Quotient of Two Functions

To find the quotient of two functions, we need to divide the y-coordinates with the same x-coordinates.

For the functions f and g, $\frac{f}{g}$ is defined by $\frac{f}{g} = \left\{\left(x, \frac{f(x)}{g(x)}\right) \middle| \frac{f(x)}{g(x)} \; is \; defined\right\}$

Note: The quotient of two functions may not be a function due to possible Holes and V.A.(s)

- **The Domain of $\frac{f}{g}$ = Domain of f ∩ Domain of g, for which $g(x) \neq 0$**
  = $\{x \epsilon R | x \epsilon D_f \cap D_g, g(x) \neq 0\}$

Ex 1) Given $f = \{(-5,1), (-3,1), (0,1), (1,1), (2,1), (4,1)\}$ and
$g = \{(-5,6), (-4,5), (-3,4), (0,1), (1,0), (3,-2), (4,-3)\}$

a) Find the domain of $f + g$

b) Find the domain of $f - g$

c) Find the domain of fg

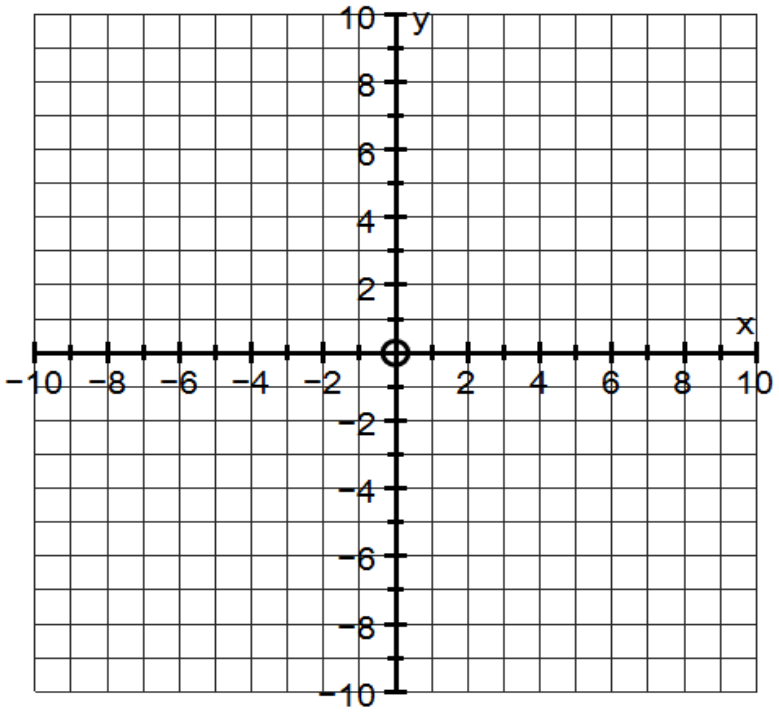
d) Find the domain of $\frac{f}{g}$

e) List $\frac{f}{g}$

Ex 2) Let $f(x) = x + 2$ and $g(x) = x^2 - 3x - 10$.

a) Determine the equation of $h(x) = \frac{f(x)}{g(x)}$

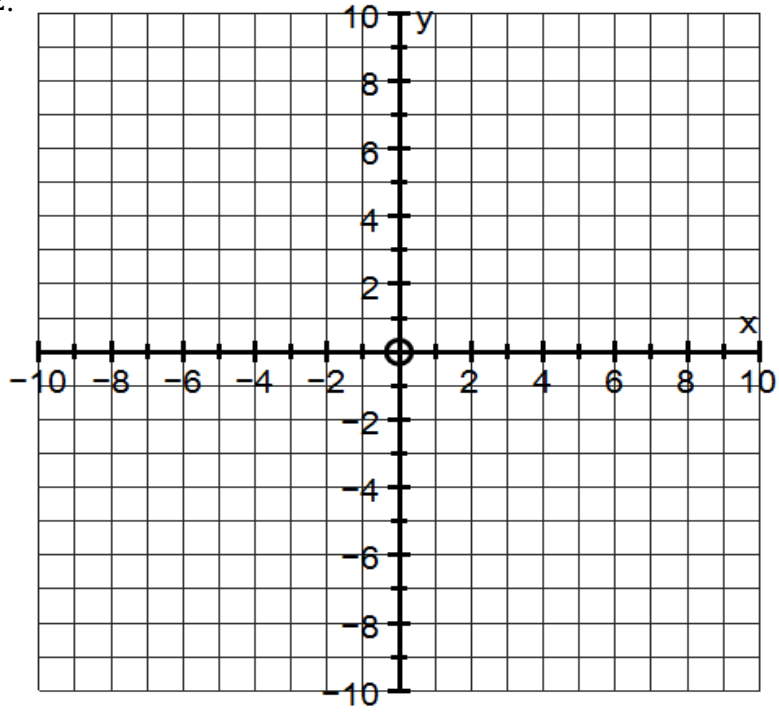
b) Sketch a graph of the combined function



c) State the domain and range of $h(x)$

Ex 3) Let $f(x) = x^3 - 7x - 6$ and $g(x) = x^2 + 3x + 2$.

a) Determine the quotient function $\left(\frac{f}{g}\right)(x)$



b) Determine the domain of the quotient function

c) Make a sketch of the quotient function

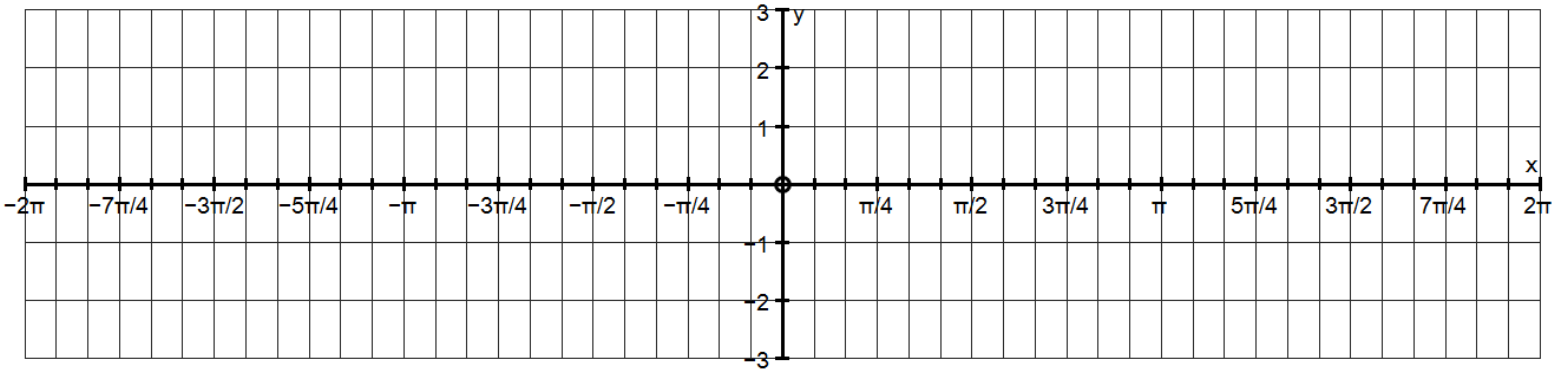
Practice: Quotient of Functions of Different Families

Given $f(x) = \sin(x)$ and $g(x) = \cos(x)$.

a) Complete the table below

b) Graph the functions on the same set of axes. Be as accurate as possible!

c) Sketch $h(x) = \frac{f(x)}{g(x)}$ on the grid below. Be as accurate as possible!

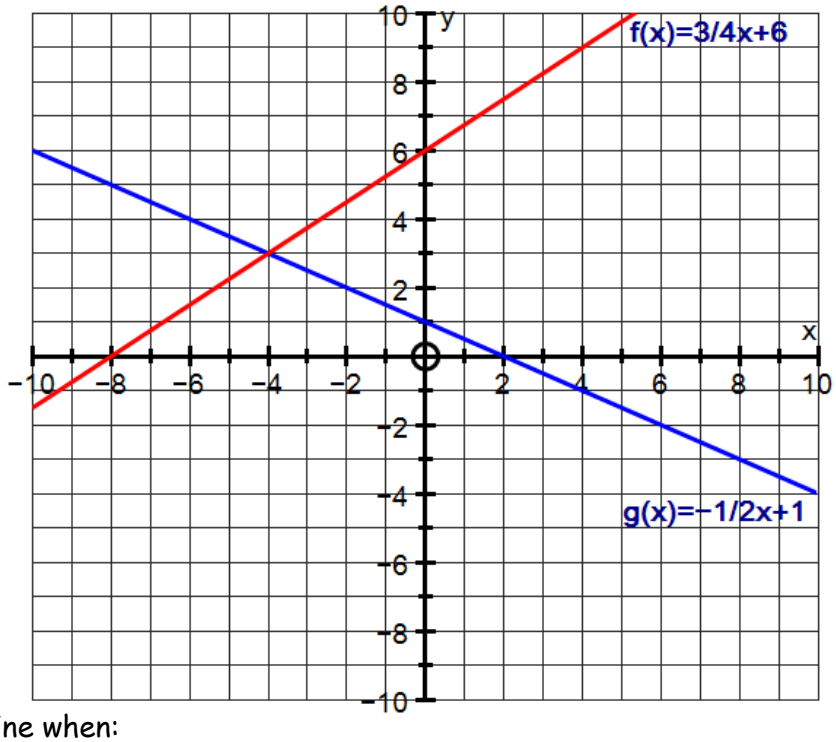


x	$f(x) = \sin(x)$	$g(x) = \cos(x)$	$h(x) = \frac{f(x)}{g(x)}$

Warm Up

1. Given the graphs of f and g, graph fg and $\frac{f}{g}$ using different colours on the grid to the right.
   Label any V.A. if needed.

x	$fg(x)$	$\frac{f}{g}(x)$
-10		
-8		
-6		
-4		
-2		
0		
2		
4		
6		
8		
10		



2. Using the signs (+ or -) of f and g, determine when:
   a. $(fg)(x) > 0$

   b. $(fg)(x) < 0$

   c. $(\frac{f}{g})(x) > 0$

   d. $(\frac{f}{g})(x) < 0$