Inverse Functions

When you find an inverse function you are just reversing what has happened. An inverse function is denoted $f^{-1}(x)$.

For example, the function $f(x) = 2x$ has the inverse $f^{-1}(x) = x \div 2$

1. Complete this table

f(x)	$f^{-1}(x)$	True or False
$x + 5$	$x - 5$	
x^2	$x \div 2$	
$2x + 7$	$\frac{x-7}{2}$	
$(x + 4)^2$	$(\sqrt{x}) + 4$	

2. For any False answers to Q1 write the correct $f^{-1}(x)$

3. What happens if you work out: (a) $ff^{-1}(x)$? (b) $f^{-1}f(x)$?

An inverse function basically changes going from x to y, with going from y to x. This means there is an easier way to find inverse functions – just reverse what is going on. You can do this by using y instead of f(x):

Example: f(x) = 5x – 12

Step 1. *Replace f(x) with y* $y = 5x - 12$

Step 2. *Rearrange to make x the subject* $y + 12 = 5x$

$$\frac{y+12}{5} = x$$

Step 3. *Switch the x and y* $y = \frac{x+12}{5}$

Step 4. *Replace y with $f^{-1}(x)$* $f^{-1}(x) = \frac{x+12}{5}$

4. Find the inverse for each of these functions:

(a) $f(x) = x + 5$ (b) $f(x) = 3x + 8$ (c) $f(x) = 5x - 3$ (d) $f(x) = 4(x+9)$

(e) $f(x) = x^2 + 6$ (f) $f(x) = (x - 7)^2$ (g) $f(x) = 10 - x$ (h) $f(x) = \sqrt{(5x + 11)}$