Trigonometry
Activity 3a - Inverse Functions

1. What operation will undo the following?

   (a) adding 3

   (b) subtracting 8

   (c) multiplying by -2

   (d) dividing by 6

   (e) multiplying by 0

   (f) taking a reciprocal

   (g) squaring

   (h) cubing

   (i) raising 10 to a power (e.g. when the input is 2, the output is 10^2)

   When is it not possible to undo an operation?

2. For each of the above, write a functional equation for the operation and for the inverse.

   Example: Adding 3, the equation is $y = x + 3$. For the inverse, subtracting 3, the equation is $y = x - 3$

3. For each of the above, write the function $f(x)$ and inverse function $f^{-1}(x)$ in function notation.

   Example: Adding 3, the function is $f(x) = x + 3$. For the inverse, subtracting 3, the function is $f^{-1}(x) = x - 3$

4. For each inverse equation in question 2), solve the equation for x.

   What is the relationship between the equation of a function and its inverse?

5. For each function $f(x)$ in question 3), find $f(-2)$.

   For each inverse function $f^{-1}(x)$ in question 3), find $f^{-1}(-2)$

6. Solve each equation for x

   (a) $1 = x + 3$

   (b) $-10 = x - 8$

   (c) $4 = -2x$

   (d) $-\frac{1}{3} = \frac{x}{6}$

   (e) $0 = 0x$

   (f) $-\frac{1}{2} = \frac{1}{x}$

   (g) $4 = x^2$

   (h) $-8 = x^3$

   (i) $0.01 = 10^x$

   How do the steps used to solve these equations relate to the inverse functions in question 2? Which of the equations produced multiple answers?

7. For each of the equations in question 2), graph the function and its inverse.

   What is the relationship between the graph of a function and its inverse?

8. Examining the graphs in question 7), what property of the function is necessary so that the inverse function produces just one answer? What happens when this property is lacking?