Algebra 17: Surd Equations

Prerequisite Knowledge:
• **Algebra 15 (Modulus Equations)**
Tips for students:
• In order to eliminate a surd we square both sides.
• If there are two different surds in the equation, we must square both sides twice.
• When we get our answer we must sub back in to the original equation to verify our answer(s).
• Where possible, isolate the surd on one side of the equation before squaring both sides.

Example 1
Solve for x, :

$$\sqrt{x+3} = 4$$

Example 2
Solve for x:

$$\sqrt{2x-3} + \sqrt{x+2} = 3$$

Question 1
Solve for x:

$$2 + \sqrt{x-2} = x$$

Question 2
Solve for x:

$$\sqrt{x-7} = \sqrt{2}(\sqrt{x}-2)$$

Example 1
Solve for x, :

$$\sqrt{3x-5} + 1 = x \quad \text{where } x \geq \frac{5}{3}$$

Example 2
Solve for x:

$$\sqrt{3x-2} = \sqrt{x-2} + 2 \quad \text{where } x \geq 2$$

Question 1
Solve for x:

$$\sqrt{2-7x} + 2x = 0 \quad \text{where } x \geq \frac{2}{7}$$

Question 2
Solve for x:

$$\sqrt{5x+1} + \sqrt{x+1} = 6 \quad \text{where } x \geq -\frac{1}{5}$$

Example 1
 Draw the graph of:

$$f(x) = |x + 1|$$

Example 2
 Draw the graph of:

$$f(x) = |x - 2|$$

Question 1
 Draw the graphs of: $f(x) = |x - 3|$ $g(x) = 2$

on the same co-ordinate grid.
Hence, find the range of values of x for which :

1. $f(x) > g(x)$

2. $g(x) > f(x)$

Question 2
 Draw the graphs of: $h(x) = |2x + 5|$ $g(x) = 3$

on the same co-ordinate grid.
Hence, find the values of x for which :

$$h(x) = (g(x)$$