**Functions, Domain and Range**

**Exercise 1**

1. [AQA Worksheet] . Work out when

2. [AQA Worksheet] .  
If , determine the value of .

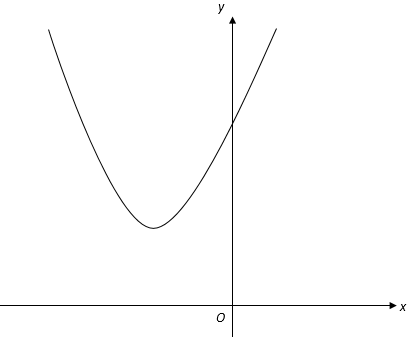
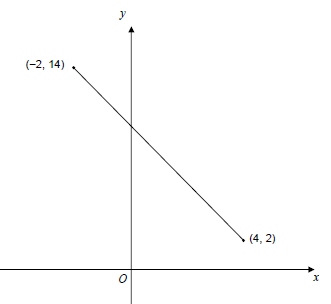
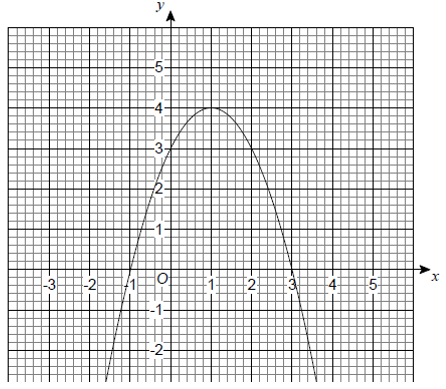
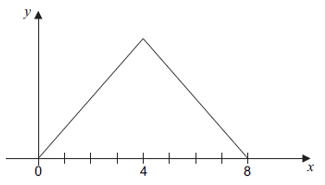
3. [AQA Worksheet]   
Show that

4. [June 2012 Paper 2] for all values of . Solve

5. [AQA Set 2] The function is defined as  
(a) Work out the value of   
(b) Work out the value of   
(c) Solve

6. If determine:  
(a)   
(b)   
(c)   
(d)   
(e) Solve

**Exercise 2**

1. [AQA Worksheet] Work out the range for each of these functions.  
   (a) for all   
   (b)   
   (c)
2. [AQA Worksheet] (a)   
   Give a reason why is not a suitable domain for .  
   (b) Give a possible domain for
3. The range of is   
   Work out and .
4. [Set 1 Paper 2] (a) The function is defined as:  
   The range of is   
   Work out the value of .  
   (b) The function is defined as  
    for all .  
   (i) Express in the form   
   (ii) Hence write down the range of .
5. [June 2012 Paper 1] for all values of .  
   (a) What is the value of ?  
   (b) What is the range of ?
6. [Jan 2013 Paper 2]  
   (a) What is the range of ?  
   (b) You are given that .  
   Work out the value of .
7. By completing the square or otherwise, determine the range of the following functions:  
   (a) for all   
   (b) for all
8. [AQA Worksheet] Here is a sketch of for all , where is a constant.  
     
     
   The range of is . Work out the value of .
9. [Set 3] The straight line shows a sketch of for the full domain of the function.  
     
   (a) State the domain of the function.  
   (b) Work out the equation of the line.
10. [Set 3] is a quadratic function with domain all real values of . Part of the graph of is shown.  
      
    (a) Write down the range of .  
    (b) Use the graph to find solutions of the equation .  
    (c) Use the graph to solve .
11. [Set 2] The function is defined as:  
    Work out the range of .
12. The function has the domain   
     and is defined as:  
    Work out the range of .
13. [June 2012 Paper 2] A sketch of for domain is shown.  
      
    The graph is symmetrical about . The range of is .  
    Work out the function .

**Exercise 3 – Forming Equations**

Finding a suitable function (for which you may always use a straight line) that matches the following criteria.

1. Domain is . Range . is an increasing function.
2. Domain is . Range .  
    is a decreasing function.
3. Domain is . Range . is an increasing function.
4. Domain is . Range . is a decreasing function.
5. Domain is . Range . is a decreasing function.