**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.