

# Work Sheet: Quadratic Functions

## Problem 1

Draw the graphs of the following functions by setting up a table.

a)  $f(x) = x^2$

b)  $f(x) = 2x^2$

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

d)  $f(x) = -x^2$

e)  $f(x) = -2x^2$

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

## Problem 2

In problem 1 we looked at functions of this type:  $f(x) = ax^2$ .

How do different values of  $a$  change the graph of the function  $f$ ?

a) What happens if  $a > 0$  or  $a < 0$ ?

b) What happens if  $a > 1$ ?

c) What happens if  $0 < a < 1$ ?

d) What happens if  $a < -1$ ?

e) What happens if  $-1 < a < 0$ ?

## Problem 3

Draw the graphs of the following functions by setting up a table.

a)  $f(x) = x^2 + 3$

b)  $f(x) = x^2 - 3$

c)  $f(x) = -x^2 - 1$

d)  $f(x) = -x^2 + 1$

## Problem 4

In problem 3 we looked at functions of this type:  $f(x) = \pm x^2 + v$

How do different values of  $v$  change the graph of the function  $f$ ?

**Problem 5**

Draw the graphs of the following functions by setting up a table.

a)  $f(x) = (x - 4)^2$

b)  $f(x) = (x + 4)^2$

c)  $f(x) = -(x - 5)^2$

d)  $f(x) = -(x + 5)^2$

**Problem 6**

In problem 5 we looked at functions of this type:  $f(x) = \pm(x - u)^2$ .

How do different values of  $u$  change the graph of the function  $f$ ?

**Problem 7**

Let's combine everything we've learned so far and look at the most general form of a quadratic function:

$$f(x) = a(x - u)^2 + v$$

Draw the graphs of the following functions. State the vertex of every function.

a)  $f(x) = (x - 4)^2 + 3$

b)  $f(x) = (x + 4)^2 - 3$

c)  $f(x) = -(x - 5)^2 - 1$

d)  $f(x) = -(x + 5)^2 + 1$

e)  $f(x) = 2(x - 1)^2 + 3$

f)  $f(x) = \frac{1}{2}(x - 1)^2 + 3$

g)  $f(x) = -3(x - 5)^2 + 16$

h)  $f(x) = -2(x + 5)^2 + 10$