

# Overview of quadratic functions/expressions

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A quadratic function or expression is a polynomial of degree 2 (i.e. the highest power/exponent of the variable (normally  $x$ ) is 2).

The **general/standard form** of a quadratic function  $f$  in  $x$  is:

$$f(x) = ax^2 + bx + c \quad (\text{where } a \neq 0)$$

where  $a$  is the coefficient of  $x^2$ ,  $b$  is the coefficient of  $x$  and  $c$  is a constant term.

**Example**  $f(x) = 2x^2 - 3x + 7$

2 is the coefficient of  $x^2$ , -3 is the coefficient of  $x$  and 7 is the constant term.

Note: Sometimes the variable is not called  $x$ , for example:

$$g(t) = t^2 + 2t + 1$$

$g$  is a polynomial function of variable  $t$ .

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A quadratic function can also be expressed in another two forms, the factored form and the vertex form,

The **factored form** of a quadratic function  $f$  in  $x$  is:

$$f(x) = a(x-x_1)(x-x_2) \quad (\text{where } a \neq 0)$$

where  $x_1$  and  $x_2$  are the roots of the quadratic equation (this will be covered later).

The **vertex form** of a quadratic function  $f$  in  $x$  is:

$$f(x) = a(x-h)^2 + k \quad (\text{where } a \neq 0)$$

where  $h$  and  $k$  are the  $x$  and the  $y$  coordinates of the vertex (this will be covered later).