

# C1

## 1 Algebra and functions

### 1.1 Indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

## 2 Quadratic functions

### 2.1 Discriminant

- $b^2 > 4ac$ , Two real solutions
- $b^2 = 4ac$ , One repeated real solution
- $b^2 < 4ac$ , No real solution

## 3 Sketching curves

### 3.1 Graph transformations

- $f(x)+a$ ,  $y$  coordinates increased by  $a$
- $af(x)$ ,  $y$  coordinates multiplied by  $a$
- $-f(x)$ , reflection in the  $x$  axis
- $f(x+a)$ ,  $x$  coordinates reduced by  $a$
- $f(ax)$ ,  $x$  coordinates divided by  $a$
- $f(-x)$ , reflection in the  $y$  axis

## 4 Coordinate geometry

If two lines are perpendicular, the product of their gradients is -1.

## 5 Sequences and series

### 5.1 Deriving the formula for the sum of an arithmetic series

$$S_n = a + (a + d) + (a + 2d) + \dots + (a + (n - 1)d)$$

Reverse the sum

$$S_n = (a + (n - 1)d) + (a + (n - 2)d) + a + (n - 3)d + \dots + (a + d) + a$$

Add the two sums

$$2S_n = [2a + (n - 1)d] + [2a + (n - 1)d] + [2a + (n - 1)d] + \dots + [2a + (n - 1)d]$$

$$2S_n = n[2a + (n - 1)d]$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$