

## KEY CONCEPTS

- An algebraic expression in the form  $a^m$  is called a power. It consists of the base,  $a$ , and the exponent,  $m$ . It is a product of identical factors, where the base is the identical factor and the exponent is the number of times the factor appears. For example,

$$\begin{array}{ccc} 2^3 & = & 2 \times 2 \times 2 \\ \nwarrow & & \swarrow \\ \text{exponential form} & & \text{expanded form} \end{array}$$

- The exponent of a power may be an integer or a rational number.
- The exponent laws can be used to simplify expressions involving powers with the same base.
  - When multiplying powers of the same base, add the exponents and the base remains the same:  

$$a^m \times a^n = a^{m+n}$$
  - When dividing powers of the same base, subtract the exponents and the base remains the same:  

$$a^m \div a^n = a^{m-n}$$
  - When determining a power of a power, multiply the exponents and the base remains the same:  

$$(a^m)^n = a^{m \times n}$$
  - For a power of a product or quotient, the exponent can be applied to each factor inside the bracket:  

$$(ab)^m = a^m b^m \text{ and } \left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$$
- The algebraic expression  $a^1 = a$ .
- The algebraic expression  $a^0 = 1$  for  $a \neq 0$ .
- A negative exponent results in the reciprocal of the base raised to the corresponding positive exponent:  $a^{-n} = \frac{1}{a^n}$  for  $a \neq 0$ .
- The algebraic expression  $a^{\frac{m}{n}} = (\sqrt[n]{a})^m = \sqrt[n]{a^m}$ .