

- 1 Express each of the following in the form $a\sqrt{2} + b\sqrt{3}$, where a and b are integers.

a $\sqrt{27} + 2\sqrt{50}$

b $\sqrt{6}(\sqrt{3} - \sqrt{8})$

- 2 Given that $x > 0$, find in the form $k\sqrt{3}$ the value of x such that

$$x(x - 2) = 2(6 - x).$$

- 3 Solve the equation

$$25^x = 5^{4x+1}.$$

- 4 a Express $\sqrt[3]{24}$ in the form $k\sqrt[3]{3}$.

- b Find the integer n such that

$$\sqrt[3]{24} + \sqrt[3]{81} = \sqrt[3]{n}.$$

- 5 Show that

$$\frac{10\sqrt{3}}{\sqrt{15}} + \frac{4}{\sqrt{5}-\sqrt{7}}$$

can be written in the form $k\sqrt{7}$, where k is an integer to be found.

- 6 Showing your method clearly,

a express $\sqrt{37.5}$ in the form $a\sqrt{6}$,

b express $\sqrt{9\frac{3}{5}} - \sqrt{6\frac{2}{3}}$ in the form $b\sqrt{15}$.

- 7 Given that $x = 2^{t-1}$ and $y = 2^{3t}$,

- a find expressions in terms of t for

i xy

ii $2y^2$

- b Hence, or otherwise, find the value of t for which

$$2y^2 - xy = 0.$$

- 8 Solve the equation

$$\sqrt{2}(3x - 1) = 2(2x + 3),$$

giving your answer in the form $a + b\sqrt{2}$, where a and b are integers.

- 9 Given that $6^{y+1} = 36^{x-2}$,

- a express y in the form $ax + b$,

- b find the value of $4^{x - \frac{1}{2}y}$.

- 10 Express each of the following in the form $a + b\sqrt{2}$, where a and b are integers.

a $(3 - \sqrt{2})(1 + \sqrt{2})$

b $\frac{\sqrt{2}}{\sqrt{2}-1}$

- 11 Solve the equation

$$16^{x+1} = 8^{2x+1}.$$

- 12 Given that

$$(a - 2\sqrt{3})^2 = b - 20\sqrt{3},$$

find the values of the integers a and b .

- 13 a Find the value of
- t
- such that

$$\left(\frac{1}{4}\right)^{t-3} = 8.$$

- b Solve the equation

$$\left(\frac{1}{3}\right)^y = 27^{y+1}.$$

- 14 Express each of the following in the form
- $a + b\sqrt{5}$
- , where
- a
- and
- b
- are integers.

a $\sqrt{20}(\sqrt{5} - 3)$

b $(1 - \sqrt{5})(3 + 2\sqrt{5})$

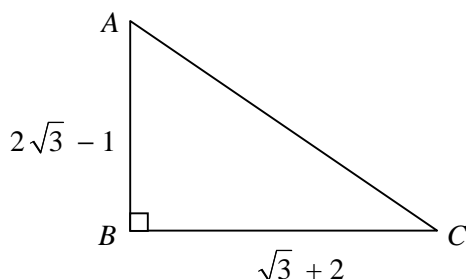
c $\frac{1+\sqrt{5}}{\sqrt{5}-2}$

- 15 Given that
- $a^{\frac{1}{3}} = b^{\frac{3}{4}}$
- , and that
- $a > 0$
- and
- $b > 0$
- ,

- a find an expression for
- $a^{\frac{1}{2}}$
- in terms of
- b
- ,

- b find an expression for
- $b^{\frac{1}{2}}$
- in terms of
- a
- .

- 16



In triangle ABC , $AB = 2\sqrt{3} - 1$, $BC = \sqrt{3} + 2$ and $\angle ABC = 90^\circ$.

- a Find the exact area of triangle
- ABC
- in its simplest form.

- b Show that
- $AC = 2\sqrt{5}$
- .

- c Show that
- $\tan(\angle ACB) = 5\sqrt{3} - 8$
- .

- 17 a Given that
- $y = 2^x$
- , express each of the following in terms of
- y
- .

i 2^{x+2}

ii 4^x

- b Hence, or otherwise, find the value of
- x
- for which

$$4^x - 2^{x+2} = 0.$$

- 18 Given that the point with coordinates
- $(1 + \sqrt{3}, 5\sqrt{3})$
- lies on the curve with the equation

$$y = 2x^2 + px + q,$$

find the values of the rational constants p and q .