

1 (i) Expand and simplify $(3 + 4\sqrt{5})(3 - 2\sqrt{5})$. [3]

(ii) Express $\sqrt{72} + \frac{32}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible. [2]

2 (i) Expand and simplify $(7 - 2\sqrt{3})^2$. [3]

(ii) Express $\frac{20\sqrt{6}}{\sqrt{50}}$ in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible. [2]

3 Rearrange the following formula to make r the subject, where $r > 0$.

$$V = \frac{1}{3}\pi r^2(a + b) \quad [3]$$

4 (i) Express $125\sqrt{5}$ in the form 5^k . [2]

(ii) Simplify $10 + 7\sqrt{5} + \frac{38}{1 - 2\sqrt{5}}$, giving your answer in the form $a + b\sqrt{5}$. [3]

5 (i) Express $\sqrt{48} + \sqrt{75}$ in the form $a\sqrt{b}$, where a and b are integers. [2]

(ii) Simplify $\frac{7 + 2\sqrt{5}}{7 + \sqrt{5}}$, expressing your answer in the form $\frac{a + b\sqrt{5}}{c}$, where a , b and c are integers. [3]

6 Make b the subject of the following formula.

$$a = \frac{2}{3}b^2c \quad [3]$$

7 (i) Expand and simplify $(7 + 3\sqrt{2})(5 - 2\sqrt{2})$. [3]

(ii) Simplify $\sqrt{54} + \frac{12}{\sqrt{6}}$. [2]

8 The volume V of a cone with base radius r and slant height l is given by the formula

$$V = \frac{1}{3}\pi r^2 \sqrt{l^2 - r^2}.$$

Rearrange this formula to make l the subject. [4]

9 (i) Express $\sqrt{48} + \sqrt{27}$ in the form $a\sqrt{3}$. [2]

(ii) Simplify $\frac{5\sqrt{2}}{3 - \sqrt{2}}$. Give your answer in the form $\frac{b + c\sqrt{2}}{d}$. [3]

10 (i) Simplify $\frac{\sqrt{48}}{2\sqrt{27}}$. [2]

(ii) Expand and simplify $(5 - 3\sqrt{2})^2$. [3]

11 (i) Express $\sqrt{75} + \sqrt{48}$ in the form $a\sqrt{3}$. [2]

(ii) Express $\frac{14}{3 - \sqrt{2}}$ in the form $b + c\sqrt{d}$. [3]

- 12 (i) Express $\frac{1}{5 + \sqrt{3}}$ in the form $\frac{a + b\sqrt{3}}{c}$, where a , b and c are integers. [2]
- (ii) Expand and simplify $(3 - 2\sqrt{7})^2$. [3]
- 13 Make v the subject of the formula $E = \frac{1}{2}mv^2$. [3]
- 14 Make t the subject of the formula $s = \frac{1}{2}at^2$. [3]
- 15 (i) Simplify $\sqrt{98} - \sqrt{50}$. [2]
- (ii) Express $\frac{6\sqrt{5}}{2 + \sqrt{5}}$ in the form $a + b\sqrt{5}$, where a and b are integers. [3]
- 16 The volume of a cone is given by the formula $V = \frac{1}{3}\pi r^2 h$. Make r the subject of this formula. [3]
- 17 (i) Simplify $5\sqrt{8} + 4\sqrt{50}$. Express your answer in the form $a\sqrt{b}$, where a and b are integers and b is as small as possible. [2]
- (ii) Express $\frac{\sqrt{3}}{6 - \sqrt{3}}$ in the form $p + q\sqrt{3}$, where p and q are rational. [3]