

1. Express $\frac{6}{\sqrt{2}}$ in the form $a\sqrt{b}$, where a and b are positive integers.

$$\frac{6\sqrt{2}}{\sqrt{2}\cdot\sqrt{2}} = \frac{6\sqrt{2}}{2} = 3\sqrt{2}$$

$$3\sqrt{2}$$

.....
(Total 2 marks)

2. Rationalise

$$\frac{1}{\sqrt{7}}$$

$$\frac{1\sqrt{7}}{7}$$

$$\frac{\sqrt{7}}{7}$$

.....
(Total 2 marks)

3. Expand and simplify

$$(\sqrt{3} + \sqrt{15})^2$$

Give your answer in the form $n + m\sqrt{5}$, where n and m are integers.

$$(\sqrt{3} + \sqrt{15})(\sqrt{3} + \sqrt{15})$$

$$\sqrt{9} + \sqrt{45} + \sqrt{45} + 15$$

$$3 + 2\sqrt{45} + 15$$

$$18 + 2\sqrt{9}\sqrt{5}$$

$$18 + 6\sqrt{5}$$

$$\dots\dots\dots 18 + 6\sqrt{5} \dots\dots\dots$$

(Total 4 marks)

4. Expand and simplify $(\sqrt{3} - \sqrt{2})(\sqrt{3} + \sqrt{2})$

$$3 + \sqrt{6} - \sqrt{6} - 2$$

$$\dots\dots\dots 1 \dots\dots\dots$$

(Total 2 marks)

5. Rationalise the denominator of $\frac{1}{\sqrt{3}}$

$$\frac{1\sqrt{3}}{3}$$

$$\frac{\sqrt{3}}{3}$$

.....
(Total 2 marks)

6. Expand $(2 + \sqrt{3})(1 + \sqrt{3})$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

$$\begin{aligned} 2 + 2\sqrt{3} + \sqrt{3} + 3 \\ 5 + 3\sqrt{3} \end{aligned}$$

$$5 + 3\sqrt{3}$$

.....
(Total 3 marks)

7. Write $\frac{\sqrt{18}+10}{\sqrt{2}}$ in the form $p + q\sqrt{2}$, where p and q are integers.

$$\sqrt{18} = \sqrt{9\sqrt{2}} = 3\sqrt{2}$$

$$\frac{3\sqrt{2} + 10}{\sqrt{2}}$$

$$\frac{(3\sqrt{2} + 10)\sqrt{2}}{\sqrt{2}\sqrt{2}}$$

$$\frac{6 + 10\sqrt{2}}{2}$$

$$3 + 5\sqrt{2}$$

$$p = \dots 3 \dots$$

$$q = \dots 5 \dots$$

(Total 4 marks)

8. Expand and simplify

$$(2 + \sqrt{3})(7 - \sqrt{3})$$

Give your answer in the form $a + b\sqrt{3}$, where a and b are integers.

$$14 - 2\sqrt{3} + 7\sqrt{3} - 3$$

~~$$11 + 5\sqrt{3}$$~~

$$11 + 5\sqrt{3}$$

$$11 + 5\sqrt{3}$$

~~$$11 + 5\sqrt{3}$$~~

(Total 3 marks)

9. Work out

$$\frac{(5 + \sqrt{3})(5 - \sqrt{3})}{\sqrt{22}}$$

Give your answer in its simplest form.

$$\frac{25 - 5\sqrt{3} + 5\sqrt{3} - 3}{\sqrt{22}}$$

$$\frac{22 \sqrt{22}}{\sqrt{22} \sqrt{22}} = \frac{22\sqrt{22}}{22}$$

$$\sqrt{22}$$

.....
(Total 3 marks)

10. (a) Rationalise the denominator of $\frac{5}{\sqrt{2}}$

$$\frac{5\sqrt{2}}{2}$$

.....
(2)

(b) Expand and simplify $(2 + \sqrt{3})^2 - (2 - \sqrt{3})^2$

$$\begin{aligned} & (2 + \sqrt{3})(2 + \sqrt{3}) - (2 - \sqrt{3})(2 - \sqrt{3}) \\ & 4 + 2\sqrt{3} + 2\sqrt{3} + 3 - (4 - 2\sqrt{3} - 2\sqrt{3} + 3) \\ & 7 + 4\sqrt{3} - (7 - 4\sqrt{3}) \\ & 8\sqrt{3} \end{aligned}$$

$$8\sqrt{3}$$

.....
(2)

(Total 4 marks)