General practice

QT Surds

1. Write the following surds in the form $a\sqrt{b}$, where a and b are integers.

(a) $\sqrt{12}$ $\sqrt{4}\sqrt{3} = 2\sqrt{3}$.

(b) $\sqrt{48}$ $\sqrt{16}\sqrt{3} = 4\sqrt{3}$

(c) $2\sqrt{50}$ $2.\sqrt{25}.\sqrt{2} = 10\sqrt{2}$

(d) $7\sqrt{20}$ $7.\sqrt{4}\sqrt{5} = 14\sqrt{5}$.

2. Simplify the following surds in the form ab, where a and b are integers.

(a) $\sqrt{8} + \sqrt{72}$ $\sqrt{4}\sqrt{2} + \sqrt{36}\sqrt{2} = 8\sqrt{2}$.
$2\sqrt{2} + 6\sqrt{2}$

(b) $\sqrt{1000} - \sqrt{90}$ $\sqrt{100}\sqrt{10} - \sqrt{9}\sqrt{10} = 7\sqrt{10}$
$10\sqrt{10} - 3\sqrt{10}$

(c) $\sqrt{125} - \sqrt{500}$ $\sqrt{25}\sqrt{5} - \sqrt{100}\sqrt{5} = -5\sqrt{5}$.
$5\sqrt{5} - 10\sqrt{5}$

(d) $2\sqrt{125} + \sqrt{80}$ $2.\sqrt{25}.\sqrt{5} + \sqrt{16}\sqrt{5} = 14\sqrt{5}$.
$10\sqrt{5} + 4\sqrt{5}$

3. Expand and simplify $(3 + \sqrt{5})(3 - \sqrt{5})$

$9 - 3\sqrt{5} + 3\sqrt{5} - \sqrt{25}$

$9 - 5 = 4$.

4. Expand and simplify $(2+\sqrt{2})(1-\sqrt{2})$

$2 - 2\sqrt{2} + 1\sqrt{2} - \sqrt{4}$

$= -\sqrt{2}$.

5. Show that $(4+\sqrt{5})^2 = 21 + 8\sqrt{5}$

Show each stage of your working

$(4+\sqrt{5})(4+\sqrt{5})$

$16 + 8\sqrt{5} + \sqrt{25}$

$16 + 8\sqrt{5} + 5$ → $21 + 8\sqrt{5}$,

6. a and b are positive integers such that $(2-\sqrt{a})^2 = b - 4\sqrt{3}$

Find the value of a and the value of b.

$(2-\sqrt{a})(2-\sqrt{a})$

$4 - 2\sqrt{a} - 2\sqrt{a} + a$

$4 - 4\sqrt{a} + a$ → $7 - 4\sqrt{3}$

$a = 3 \quad b = 7$

7. Show that $\frac{4\sqrt{5}+5}{5+\sqrt{5}}$ can be written as $\frac{1+3\sqrt{5}}{4}$

$\frac{(4\sqrt{5}+5)(5-\sqrt{5})}{(5+\sqrt{5})(5-\sqrt{5})}$

$\frac{20\sqrt{5} - 20 + 25 - 5\sqrt{5}}{25-5}$ → $\frac{5 + 15\sqrt{5}}{20}$

$\frac{5}{20} + \frac{15\sqrt{5}}{20}$

$\frac{1}{4} + \frac{3\sqrt{5}}{4}$

$\frac{1+3\sqrt{5}}{4}$