Surds Homework

Expand and Simplify where Possible

1) $(5+\sqrt{7})(4+\sqrt{7})$

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

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

4) $(5+2\sqrt{3})(4+3\sqrt{3})$

5) $(6-2\sqrt{5})(3-\sqrt{5})$

6) $(4-3\sqrt{7})(2+5\sqrt{7})$

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

Rationalise the Denominator

8) $\frac{20}{\sqrt{5}}$

9) $\frac{11}{4+\sqrt{5}}$

10) $\frac{3+\sqrt{2}}{5-\sqrt{2}}$

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1) $(5+\sqrt{7})(4+\sqrt{7})$

$= 20 + 4\sqrt{7} + 5\sqrt{7} + 7$

$= 27 + 9\sqrt{7}$

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

$= 15 - 5\sqrt{2} + 3\sqrt{2} - 2$

$= 13 - 2\sqrt{2}$

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

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

$= 8 + 5\sqrt{2}$

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4) $(5+2\sqrt{3})(4+3\sqrt{3})$

$= 20 + 8\sqrt{3} + 15\sqrt{3} + 18$

$= 38 + 23\sqrt{3}$

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5) $(6-2\sqrt{5})(3-\sqrt{5})$

$= 18 - 6\sqrt{5} - 6\sqrt{5} + 10$

$= 28 - 12\sqrt{5}$

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6) $(4-3\sqrt{7})(2+5\sqrt{7})$

$= 8 - 6\sqrt{7} + 20\sqrt{7} - 105$

$= -97 + 14\sqrt{7}$

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

$= 6 + 4\sqrt{2} + 9\sqrt{3} + 6\sqrt{6}$

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8) $\frac{20}{\sqrt{5}} = \frac{20}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{20\sqrt{5}}{5} = 4\sqrt{5}$

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9) $\frac{11}{4+\sqrt{5}} = \frac{11}{4+\sqrt{5}} \times \frac{4-\sqrt{5}}{4-\sqrt{5}}$

$= \frac{44 - 11\sqrt{5}}{4^2 - \sqrt{5}^2}$

$= \frac{44 - 11\sqrt{5}}{11}$

$= 4 - \sqrt{5}$

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10) $\frac{3+\sqrt{2}}{5-\sqrt{2}} = \frac{3+\sqrt{2}}{5-\sqrt{2}} \times \frac{5+\sqrt{2}}{5-\sqrt{2}}$

$= \frac{15 + 5\sqrt{2} + 3\sqrt{2} + 2}{5^2 - \sqrt{2}^2}$

$= \frac{17 + 8\sqrt{2}}{23}$
