Rational/irrational numbers and surd operations

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. Classify $\sqrt{81}$ and $\sqrt{18}$. [2 marks]

$\sqrt{81} = 9$; $\sqrt{18} = 3\sqrt{2}$.

Answer: 9 is rational; the square root of 18 is irrational.

2. Simplify $\sqrt{50}$. [2 marks]

$50 = 25 \times 2$ so extract $\sqrt{25} = 5$.

Answer: $5\sqrt{2}$

3. Simplify $3\sqrt{12} - \sqrt{27}$. [2 marks]

$3(2\sqrt{3}) - 3\sqrt{3} = 3\sqrt{3}$.

Answer: $3\sqrt{3}$

4. Expand $(\sqrt{7} + 2)(\sqrt{7} - 2)$. [2 marks]

Use difference of squares: $7 - 4 = 3$.

Answer: 3

5. Rationalise $5/\sqrt{3}$. [2 marks]

Multiply top and bottom by $\sqrt{3}$.

Answer: $5\sqrt{3}/3$

6. Rationalise $2/(\sqrt{6} - 2)$. [3 marks]

Multiply by the conjugate: $2(\sqrt{6} + 2)/(6 - 4)$.

Cancel the factor 2.

Answer: $\sqrt{6} + 2$