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

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

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

6. Rationalise $\frac{2}{\sqrt{6}-2}$. [3 marks]

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

Cancel the factor 2.

Answer: $\sqrt{6}+2$