FOUNDATION & HIGHER

HIGHER EXTENDS

Name ..... Class .....

N8: Surds and exact calculation

Reason with exact values, surds and rationalising

20 marks · 25 minutes · Non-calculator

1) Show that $\sqrt{12} = 2\sqrt{3}$

[Question 1: 2 marks]

2) Show that $\sqrt{18} + \sqrt{8} = 5\sqrt{2}$

[Question 2: 2 marks]

3) Tom says $\sqrt{3} + \sqrt{3} = \sqrt{6}$. Explain his mistake.

.....

.....

[Question 3: 2 marks]

4) Show that $(\sqrt{5} + 1)(\sqrt{5} - 1) = 4$

[Question 4: 2 marks]

5) Show that $\frac{10}{\sqrt{5}} = 2\sqrt{5}$

[Question 5: 2 marks]

6) Show that $(3 + \sqrt{2})^2 = 11 + 6\sqrt{2}$

[Question 6: 2 marks]

7) Show that $\frac{1}{2} + \frac{1}{3} \div \frac{2}{3} = 1$

[Question 7: 2 marks]

8) A square has an area of $50\,\text{cm}^2$. Show that its side length is $5\sqrt{2}\,\text{cm}$.

[Question 8: 2 marks]

9) Show that $\sqrt{2} \times \sqrt{8}$ is a rational number.

.....

.....

[Question 9: 2 marks]

10) Show that $\frac{4}{3-\sqrt{5}} = 3 + \sqrt{5}$

[Question 10: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown	$\sqrt{4 \times 3}$ (M1); $2\sqrt{3}$ (C1).
2	Shown	$3\sqrt{2} + 2\sqrt{2}$ (M1); $5\sqrt{2}$ (C1).
3	$2\sqrt{3}$	$\sqrt{6} \approx 2.45$ but $2\sqrt{3} \approx 3.46$, or like terms (C1); $2\sqrt{3}$ (B1).
4	Shown	$5 - \sqrt{5} + \sqrt{5} - 1$ (M1); 4 (C1).
5	Shown	$\frac{10\sqrt{5}}{5}$ (M1); $2\sqrt{5}$ (C1).
6	Shown	$9 + 3\sqrt{2} + 3\sqrt{2} + 2$ (M1); result (C1).
7	Shown	$\frac{1}{3} \div \frac{2}{3} = \frac{1}{2}$ (M1); total 1 (C1).
8	Shown	$\sqrt{50} = \sqrt{25 \times 2}$ (M1); $5\sqrt{2}$ (C1).
9	4	$\sqrt{16} = 4$ (M1); 4 is an integer so rational (C1).
10	Shown	Multiply by $\frac{3 + \sqrt{5}}{3 + \sqrt{5}}$, denominator 4 (M1); result (C1).