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A LEVEL MATHS

(5) Surds

WORKING AT D/E

(1) Without a calculator, show that $\left(\sqrt{2}+\sqrt{8}\right)^2$ is an integer. The common error is students writing 10.

(2) Without a calculator, show that $\frac{2}{3\sqrt{6}}$ can be written as $\frac{\sqrt{2a}}{3a}$ where a is an integer to be found.

(3) Without a calculator, show that $\frac{22}{5-\sqrt{3}}$ can be simplified to $5+\sqrt{3}$. Be rational here!

WORKING AT B/C

(1) Without a calculator, show that:

$$\left(\frac{1}{\sqrt{2}}+\sqrt{50}-\frac{\sqrt{2}}{2}-\sqrt{32}\right)^2 = 2$$

(2) Show that $\frac{\sqrt{6}+2}{\sqrt{6}-2}$ can be written as $\frac{\left(\sqrt{6}+2\right)^n}{n}$ where n is an integer

(3) Expand and simplify $\left(\sqrt{A}+\sqrt{B}\right)^2$

WORKING AT A*/A

(1) Show that:

$$\left(\sqrt{A}+\sqrt{B}\right)^3 \equiv A^{\frac{3}{2}}+3AB^{\frac{1}{2}}+3BA^{\frac{1}{2}}+B^{\frac{3}{2}}$$

(2) Without a calculator, show that $\frac{20}{(2+\sqrt{2})(6-\sqrt{2})}$ can be written as $A(B-C\sqrt{C})$ where A is a rational fraction in its simplest form and B and C are integers.

(3) A rectangle has an area of $21+9\sqrt{3}$ and one side length of $\sqrt{3}+3$. Without a calculator, show that the perimeter of the rectangle can be written in the form $A\sqrt{B}+C$.