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Surds | Past Exam Question | Edexcel C1 Core Maths June 2014 Q6

(a) Write $\sqrt{80}$ in the form $c\sqrt{5}$, where c is a positive constant. (1)

A rectangle R has a length of $(1 + \sqrt{5})$ cm and an area of $\sqrt{80}$ cm².

(b) Calculate the width of R in cm. Express your answer in the form $p + q\sqrt{5}$, where p and q are integers to be found. (4)

$$\begin{aligned} \text{(a)} \quad \sqrt{80} &= \sqrt{16 \times 5} \\ &= 4\sqrt{5} \end{aligned}$$

$$\text{(b)} \quad lw = A \Rightarrow w = \frac{A}{l}$$

$$\begin{aligned} \therefore \text{width} &= \frac{\sqrt{80}}{1 + \sqrt{5}} \times \frac{(1 - \sqrt{5})}{(1 - \sqrt{5})} \\ &= \frac{4\sqrt{5}}{(1 + \sqrt{5})} \times \frac{(1 - \sqrt{5})}{(1 - \sqrt{5})} \end{aligned}$$

$$\begin{aligned} \therefore \text{width} &= \frac{4\sqrt{5} - 20}{1 - \sqrt{5} + \sqrt{5} - 5} \\ &= \frac{4\sqrt{5} - 20}{-4} \\ &= \frac{-4(\sqrt{5} - 5)}{-4} \\ &= 5 - \sqrt{5} \\ &\equiv p + q\sqrt{5} \\ \text{where } p &= 5, \quad q = -1 \end{aligned}$$

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