

Core 1 - Surds

Challenge 1

Express $(4 - \sqrt{7})(5 + 2\sqrt{7})$ in the form $a + b\sqrt{7}$, where a and b are integers. (3 marks)

(a) Express each of the following in the form $k\sqrt{5}$:

(i) $\sqrt{45}$

(ii) $\frac{20}{\sqrt{5}}$

(3 marks)

(b) Hence write $\sqrt{45} + \frac{20}{\sqrt{5}}$ in the form $n\sqrt{5}$, where n is an integer. (1 mark)



Challenge 2

(a) Express $(\sqrt{7} + 1)^2$ in the form $a + b\sqrt{7}$, where a and b are integers. (2 marks)

(b) Hence express $\frac{(\sqrt{7} + 1)^2}{(\sqrt{7} + 2)}$ in the form $p + q\sqrt{7}$, where p and q are rational numbers. (3 marks)



Challenge 3

Express each of the following in the form $p + q\sqrt{3}$:

(a) $(2 + \sqrt{3})(5 - 2\sqrt{3})$;

(3 marks)

(b) $\frac{26}{4 - \sqrt{3}}$.

(3 marks)



Final Challenge

(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)

