5 DO NOT USE A CALCULATOR IN THIS QUESTION.

In this question, all lengths are in centimetres.

(a) You are given that $\cos 120° = -\frac{1}{2}$, $\sin 120° = \frac{\sqrt{3}}{2}$ and $\tan 120° = -\sqrt{3}$.

In the triangle ABC, $AB = 5\sqrt{3} - 6$, $BC = 5\sqrt{3} + 6$ and angle $ABC = 120°$. Find AC, giving your answer in the form $a\sqrt{b}$ where a and b are integers greater than 1. [4]

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(b) You are given that $\cos 30° = \frac{\sqrt{3}}{2}$, $\sin 30° = \frac{1}{2}$ and $\tan 30° = \frac{1}{\sqrt{3}}$.

In the triangle PQR, $PQ = 3 + 2\sqrt{5}$ and angle $PQR = 30°$. Given that the area of this triangle is $\frac{2 + 5\sqrt{5}}{4}$, find QR, giving your answer in the form $c + d\sqrt{5}$, where c and d are integers. [4]

6 **(a)** Show that $\dfrac{\cot\theta + \tan\theta}{\sec\theta} = \operatorname{cosec}\theta$. [4]