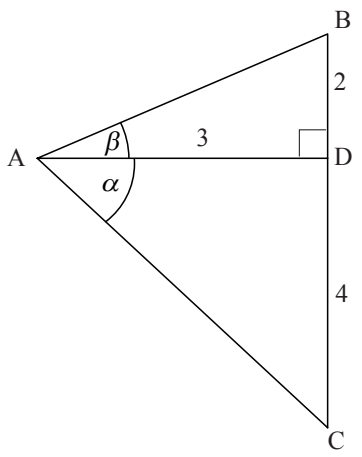
IB Mathematics HL 12
Break Homework

1. In the diagram below, AD is perpendicular to BC. [*6 marks*]
   CD = 4, BD = 2 and AD = 3. $C\hat{A}D = \alpha$ and $B\hat{A}D = \beta$.



   Find the exact value of $\cos(\alpha - \beta)$.

2. (a) Show that $\dfrac{\sin 2\theta}{1 + \cos 2\theta} = \tan\theta$. [*2 marks*]

   (b) Hence find the value of $\cot\dfrac{\pi}{8}$ in the form [*3 marks*]
   $a + b\sqrt{2}$, where $a, b \in \mathbb{Z}$.

3. Given that $\dfrac{\pi}{2} < \alpha < \pi$ and $\cos\alpha = -\dfrac{3}{4}$, find the value [*4 marks*]
   of $\sin 2\alpha$.