Marked example 2

Paper 1 style · No calculator

2 7 marks AHL 3.9 ●●○ Typical

It is given that $\tan\theta = -\frac{2\sqrt{6}}{5}$, where $\frac{\pi}{2} < \theta < \pi$.

(a) Find the exact value of $\sec\theta$. **[3]**

(b) Find the exact value of $\operatorname{cosec}\theta$. **[2]**

(c) Hence find the exact value of $\sin 2\theta$. **[2]**

MARKSCHEME (a)

$\sec^2\theta = 1 + \frac{24}{25} = \frac{49}{25}$ **M1**

$\sec\theta < 0$ because $\cos\theta < 0$ for $\frac{\pi}{2} < \theta < \pi$ **R1**

$\sec\theta = -\frac{7}{5}$ **A1**

Total 3 marks

MARKSCHEME (b)

$\operatorname{cosec}^2\theta = 1 + \cot^2\theta = 1 + \frac{25}{24} = \frac{49}{24}$ **M1**

$\operatorname{cosec}\theta = \frac{7}{2\sqrt{6}} = \frac{7\sqrt{6}}{12}$ **A1**

Total 2 marks

Note Or $\sin\theta = \tan\theta\cos\theta = \frac{2\sqrt{6}}{7}$.

Note Positive: $\sin\theta > 0$ in the second quadrant.

MARKSCHEME (c)

$\sin\theta = \frac{2\sqrt{6}}{7},\ \cos\theta = -\frac{5}{7},\ 2 \times \frac{2\sqrt{6}}{7} \times \left(-\frac{5}{7}\right)$ **M1**

$\sin 2\theta = -\frac{20\sqrt{6}}{49}$ **A1**

Total 2 marks

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