Daily Question Pure Maths Day 6 Mark Scheme

Question Number	Scheme	Marks
(a)	$\text{cosec}^2 x - \text{cosec}x - 12 = 0$ or $k = -12$	B1 [1]
(b)	$\text{cosec}^2 x - \text{cosec}\, x - 12 = 0$ so $(\text{cosec}x - 4)(\text{cosec}x + 3) = 0 \Rightarrow \text{cosec}x = ...$	M1
	$\sin x = \frac{1}{4}$ or $-\frac{1}{3}$	dM1
	$\Rightarrow x = 14.5°$ or $165.5°$ or $340.5°$ or $199.5°$	dM1, A1 A1 [5] **(6 marks)**

(a)

B1: Accept $\text{cosec}^2 x - \text{cosec}x - 12 = 0$ or $k = -12$. No working is required.
If they write $\text{cosec}^2 x - \text{cosec}x - 12 = 0$ followed by $k = 12$ allow isw

(b)

M1 Solves quadratic in cosec x by any method – factorising, formula (accept answers to 1 dp), completion of square. Correct answers (for cosec x of 4 and −3) imply this M mark.
Quadratic equations that have 'imaginary' roots please put into review.

dM1 Uses $\sin x = \frac{1}{\text{cosec}x}$ by taking the reciprocal of at least one of their previous answers
This is dependent upon having scored the first M1

dM1 For using arcsin to produce one answer inside the range 0 to 360 from their values.
Implied by any of $14.5°$ or $165.5°$ or $340.5°$ or $199.5°$ following (cosec x -4) (cosec x+3) =0

A1 Two correct answers inside the range 0 to 360

A1 All four answers in the range, x = awrt $14.5°$ $165.5°$ $340.5°$ $199.5°$
Any extra solutions in the range withhold the last A mark.
Ignore any solutions outside the range $0 \leqslant x \leqslant 360°$

Radian solutions will be unlikely, but could be worth dM1 for one solution and dM1A1 A0 for all four solutions (maximum penalty is 1 mark) but accuracy marks are awarded for solutions to 3dp
FYI: Solutions awrt are 0.253, 2.889, 3.481, 5.943

The first two M marks may be achieved 'the other way around' if a candidate uses $\text{cosec}x = \frac{1}{\sin x}$ in line 1 and produces a quadratic in $\sin x$.

Award M1 for using $\text{cosec}x = \frac{1}{\sin x}$ (twice) and producing a quadratic in $\sin x$ and dM1 for solving as above.