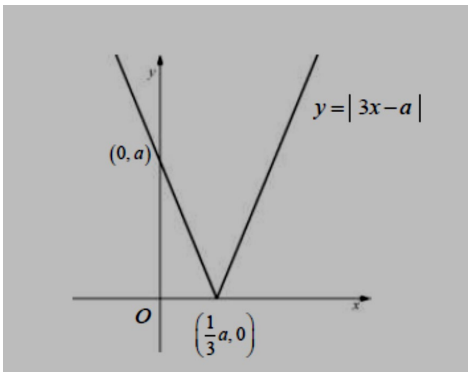
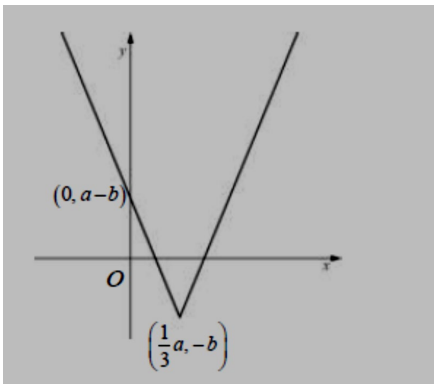
Question Number	Scheme	Marks
7 (a)(i)	 Shape	B1
	Vertex $\left(\frac{1}{3}a,0\right)$	B1
	y intercept $(0,a)$	B1
(a)(ii)	 Shape	B1ft
	Vertex $\left(\frac{1}{3}a,-b\right)$	B1ft
	y intercept $(0,a-b)$	B1ft
		(6)
(b)	Attempts to solve $-3x+a-b=5x \Rightarrow x=...$	M1
	$\Rightarrow x=\frac{a-b}{8}$ ONLY	A1
		(2)
		(8 marks)

Note: accept both diagrams on the same sketch as long as the information for each is clear.

If two graphs are given unlabelled, treat their first as part (a)(i) and their second as part (a)(ii).

(a)(i)

B1: A V shaped curve sitting on the positive x-axis and appearing in at least quadrant 1. Don't be too concerned about the graph being non symmetrical unless it appears wildly incorrect

B1: The vertex is on the positive x- axis and is marked $\left(\frac{1}{3}a,0\right)$ but condone $(x=)\frac{1}{3}a$ which may be seen as the intercept on the graph. May be scored from an incorrect shape for the graph, but must have a single vertex on the x-axis.

B1: The graph passes through the positive y-axis at $(0,a)$ but condone $(y=)a$ which may be seen as the intercept on the graph.

SC If a "Y" shape is given, if part is dashed ignore the dashed line, if all are solid withhold the first B but allow B0B1B1 if vertex and positive intercept are correct.

(a)(ii)

B1ft: A V shaped curve with vertex in quadrant 4 or follow through a V shape that is a translation down from their answer in (a)(i)

B1ft: The vertex is in quadrant 4 and is marked $\left("\frac{1}{3}a", -b\right)$, which may be indicated by appropriate labelling on the graph. Follow through on their x intercept of the vertex in (i) (which must have been on positive the x-axis)

B1ft: The graph passes through the positive y-axis at $\left(0, "a"-b\right)$, following through on their y intercept from (i), but condone $\left(y=\right)a-b$ which may be seen as the intercept on the graph.

SC If a "Y" shape is given, if part is dashed ignore the dashed line, if all are solid withhold the first B but all B0B1B1 if vertex and positive intercept are correct.

(b)

M1: Attempts to solve $-3x+a-b=5x \Rightarrow x=...$ There may be other equations attempted

A1: $x=\frac{a-b}{8}$ or exact equivalent only. If multiple values are found the incorrect ones must be rejected or this correct answer clearly indicated as their final answer (e.g. by underlining). Ignore any reasoning given, mark the value.

Question Number	Scheme	Marks
8 (i)	States or uses $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$	B1
	Uses both $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$ and $\sin 2\theta = 2\sin\theta\cos\theta$	M1
	$3\text{cosec}\,\theta = 8\cos\theta \Rightarrow \sin 2\theta = \dfrac{3}{4}$	A1
	$\Rightarrow \theta = \dfrac{1}{2}\arcsin\left(\dfrac{3}{4}\right) = \text{awrt } 0.424, \text{awrt } 1.15$	M1 A1
		(5)
(ii)	$\dfrac{\tan 2x - \tan 70°}{1+\tan 2x\tan 70°} = -\dfrac{3}{8} \Rightarrow \tan(2x-70°) = -\dfrac{3}{8}$	M1 A1
	Correct order of operations $x = \dfrac{\arctan\left(-\dfrac{3}{8}\right)+70°}{2}$	dM1
	awrt $24.7°$, awrt $114.7°$	A1
		(4)
		(9 marks)

(i)

B1: States or uses $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$

M1: Uses both $\text{cosec}\,\theta = \dfrac{1}{\sin\theta}$ and $\sin 2\theta = 2\sin\theta\cos\theta$ to set up an equation in $\sin 2\theta$

A1: $\sin 2\theta = \dfrac{3}{4}$

M1: Correct method of solving an equation of the form $\sin 2\theta = k$, $|k|<1$ to find at least one value for θ. May be solving in degrees for this mark $(24.30°, 65.70°)$

A1: $\theta = \text{awrt } 0.424, \text{awrt } 1.15$ and no other values in the range (isw for incorrect rounding).

(ii) Main scheme

M1: Uses the compound angle identities to reach $\tan(2x \pm 70°) = \pm\dfrac{3}{8}$

A1: $\tan(2x-70°) = -\dfrac{3}{8}$

dM1: Correct order of operations to find a value for *x*. Condone if radians mode used, e.g.

$2x - 70 = -0.3587... \Rightarrow x = \dfrac{70 - 0.3587...}{2} = 34.82...$ May be scored from

$2x + 70 = ... \rightarrow x = \dfrac{-70 - ....}{2}$ Condone errors in finding the second solution such at $180 - PV$.

A1: Both awrt $24.7°$, awrt $114.7°$ and no other values in the range (isw for incorrect rounding)

(ii) Alt method 1

M1: Cross multiplies and makes $\tan 2x$ the subject. Condone $\tan 70°$ being replaced by 2.75

A1: $\tan 2x = \dfrac{8\tan 70° - 3}{8 + 3\tan 70°} = \text{awrt } 1.17$

dM1: Correct order of operations to find one value for *x*. See note on main scheme.
Implied by a correct value for their $\tan 2x = \text{awrt } 1.17$ provided the previous M has been scored

A1: Both awrt $24.7°$, awrt $114.7°$ and no other values in the range (isw for incorrect rounding)