

The Argand Diagram and Loci Exam Questions MS (From OCR 4725)

Q1, (Jun 2006, Q6)

(i) Circle, Centre O radius 2 One straight line Through O with +ve slope In 1 st quadrant only	B1 B1 B1 B1 B1	5	Sketch showing correct features
(ii) $1 + i\sqrt{3}$	M1 A1	2 2	Attempt to find intersections by trig, solving equations or from graph Correct answer stated as complex number
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Q2, (Jan 2007, Q4)

(i)	B1 B1 B1	3	Circle Centre (1, -1) Passing through (0, 0)
(ii)	B1 B1 B1	3	Sketch a concentric circle Inside (i) and touching axes Shade between the circles

Q3, (Jun 2007, Q8)

(i) Circle, centre (3, 0), y -axis a tangent at origin Straight line, through (1, 0) with +ve slope In 1 st quadrant only	B1B1 B1 B1 B1 B1		Sketch showing correct features N.B. treat 2 diagrams as MR
(ii) Inside circle, below line, above x -axis	B2ft	6 2 8	Sketch showing correct region SR: B1ft for any 2 correct features

Q4, (Jan 2009, Q10)

(i) $x^2 - y^2 = 2, 2xy = \sqrt{5}$

$$4x^4 - 8x^2 - 5 = 0$$

$$x = \pm \frac{\sqrt{10}}{2}, y = \pm \frac{\sqrt{2}}{2}$$

$$\pm \left(\frac{\sqrt{10}}{2} + i \frac{\sqrt{2}}{2} \right)$$

(ii) $z^2 = 2 \pm i\sqrt{5}$

$$z = \pm \left(\frac{\sqrt{10}}{2} \pm i \frac{\sqrt{2}}{2} \right)$$

(iii)

(iv)

M1 A1		Attempt to equate real and imaginary parts Obtain both results a.e.f.
M1 M1 A1		Eliminate to obtain quadratic in x^2 or y^2 Solve to obtain x (or y) values Correct values for both x & y obtained a.e.f.
A1	6	Correct answers as complex numbers
M1 A1 M1 A1ft	4	Solve quadratic in z^2 Obtain correct answers Use results of (i) Obtain correct answers, ft must include root from conjugate
B1ft	1	Sketch showing roots correctly
B1 B1ft B1ft	3	Sketch of straight line, \perp to α Bisector
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Q5, (Jan 2011, Q6)

(i) (a)

(b)

B1*	Vertical line
depB1 2	Clearly through (4, 0)
B1	Sloping line with +ve slope
B1	Through (0, -2)
B1ft 3	Half line starting on y-axis 45° shown convincingly

Q6, (Jan 2012, Q6)

B1	Circle
B1	Centre $(\sqrt{3}, 1)$
B1	Passing through O and crosses y-axis again
B1	Line, with correct slope shown
B1	$\frac{1}{2}$ line starting at O
B1	Completely correct diagram for both loci
[6]	

Q7, (Jun 2013, Q6)

$$\arg(z - 3i) = \frac{1}{4}\pi$$

$$|z - 3i| = 3$$

M1	Use $\arg(z - a) = \theta$ in equation for l condone missing brackets
A1	Obtain correct answer
M1	Use $ z - a = k$ in equation for C , k must be real
A1	Obtain correct answer
[4]	

Q8, (Jun 2015, Q5)

(i)		B1 B1 B1 B1 [4]	Circle centre $(-2, 0)$ or circle centre $(2, 0)$ Touching y -axis at origin Half line with negative slope upwards Completely correct diagram
(ii)	$-2 - \sqrt{3} + i$	B1ft B1ft [2]	Correct real part and correct imaginary part of a complex number, ft for their half line from centre of their circle, allow decimals (-3.73 or better) or trig expressions
(iii)		B1ft B1 [2]	Shade inside their circle Completely correct diagram and shading S.C. allow last B1 for radius or complete line

Q8, (Jun 2016, Q6)

(i)	$3 + 3i$ $\sqrt{5}$ $ z - 3 - 3i = \sqrt{5}$	B1 B1 M1 A1ft [4]
(ii)	Circle, centre in 1st quadrant, not touching or intersecting axes Straight line with $-ve$ slope through $(3, 3)$	B1 B1 [2]
(iii)	$2 + 5i$ $4 + i$	M1 A1 A1 [3]