

Square Roots Of Complex Numbers Exam Questions MS (From OCR 4725)

Q1, (Jun 2005, Q4)

$$x^2 - y^2 = 21 \text{ and } xy = -10$$

$$\pm(5 - 2i)$$

M1	6	Attempt to equate real and imaginary parts of $(x + iy)^2$ and $21 - 20i$ Obtain each result Eliminate to obtain a quadratic in x^2 or y^2 Solve to obtain $x = (\pm) 5$ or $y = (\pm) 2$
A1A1		
M1		
M1		
A1		Obtain correct answers as complex numbers

Q2, (Jan 2007, Q2)

$$x^2 - y^2 = 15 \text{ and } xy = 4$$

$$\pm(4 + i)$$

M1	6	Attempt to equate real and imaginary parts of $(x + iy)^2$ and $15 + 8i$ Obtain each result Eliminate to obtain a quadratic in x^2 or y^2 Solve to obtain $x = (\pm) 4$, or $y = (\pm) 1$ Obtain only correct two answers as complex numbers
A1 A1		
M1		
DM1		
A1		

Q3, (Jun 2007, Q10)

(i)	M1		Attempt to equate real and imaginary parts of $(x + iy)^2$ and $16+30i$
$x^2 - y^2 = 16$ and $xy = 15$			
	A1A1		Obtain each result
	M1		Eliminate to obtain a quadratic in x^2 or y^2
$\pm(5 + 3i)$	M1		Solve to obtain $x = (\pm) 5$ or $y = (\pm) 3$
(ii)	A1	6	Obtain correct answers as complex numbers
$z = 1 \pm \sqrt{16 + 30i}$	M1*		Use quadratic formula or complete the square
$6 + 3i, -4 - 3i$	A1 *M1dep A1 A1ft	5	Simplify to this stage Use answers from (i) Obtain correct answers
		11	

Q4, (Jan 2009, Q10i,ii)

(i) $x^2 - y^2 = 2, 2xy = \sqrt{5}$	M1 A1		Attempt to equate real and imaginary parts Obtain both results a.e.f.
$4x^4 - 8x^2 - 5 = 0$	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.
$x = \pm \frac{\sqrt{10}}{2}, y = \pm \frac{\sqrt{2}}{2}$ $\pm(\frac{\sqrt{10}}{2} + i\frac{\sqrt{2}}{2})$	A1	6	Correct answers as complex numbers
(ii) $z^2 = 2 \pm i\sqrt{5}$	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
$z = \pm(\frac{\sqrt{10}}{2} \pm i\frac{\sqrt{2}}{2})$			

Q5, (Jan 2012, Q3)

$x^2 - y^2 = 3$ and $xy = 3\sqrt{2}$	M1 A1		Attempt to equate real and imaginary parts Obtain both results
$x^4 - 3x^2 - 18 = 0$ or $y^4 + 3y^2 - 18 = 0$	M1 M1		Eliminate to obtain quadratic in x^2 or y^2 Solve to obtain x or y value
$x = \pm\sqrt{6}$ or $y = \pm\sqrt{3}$ $\pm(\sqrt{6} + i\sqrt{3})$	A1 A1		Both values correct Correct answers as complex numbers
		[6]	

Q6, (Jun 2013, Q3)

$$x^2 - y^2 = 11 \text{ and } xy = 6\sqrt{5}$$

$$\pm(2\sqrt{5} + 3i)$$

M1	Attempt to equate real and imaginary parts of $(x + iy)^2$ and $11 + 12\sqrt{5}$
A1	Obtain both results cao
M1*	Obtain a quadratic in x^2 or y^2
DM1	Solve a 3 term quadratic to obtain a value for x or y
A1	Obtain 1 correct answer as complex number
A1	Obtain only the other correct answer
[6]	
