REVISE
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Simultaneous equations

Mark schemes for the Simultaneous equations question pack

WJEC Level 2 Additional Mathematics (9550) · Algebra

Official WJEC mark schemes for the 6 questions in the matching revise.wales question pack (44 marks total), from the 2011–2024 papers.

8	$2x + 3 = 5x^2 + 6x - 7$ $5x^2 + 4x - 10 = 0$	M1 A1	Must be equated to zero. '=0' may be implied in further work to solve, if no further work and not '=0' then A0 FT provided their quadratic does not factorise and equivalent level of difficulty
	$x = \frac{-4 \pm\sqrt{(4^2 - 4\times5\times-10)}}{2\times5}$	m1	Use of correct quadratic formula, allow 1 slip in substitution (not a slip with the formula) If completing the square used award m1for sight of $5(x + 4/10)^2 \pm \ldots$
	$x = \frac{-4 \pm\sqrt{216}}{10}$	A1	
	$x = 1.069\ldots$ or $x = 1.07$ **and** $x = -1.869\ldots$ or $x = -1.87$	A1	Allow truncation from correct working
	$x = 1.07$ with $y = 5.14$ **and** $x = -1.87$ with $y = -0.74$	A1	FT provided M1, m1 previously awarded using their values of x in $2x + 3$ or equivalent to find y-values to 2 d.p. Accept answers given as coordinates *Alternative using $x = (y - 3)/2$* M1 $y = 5(\frac{y-3}{2})^2 + 6(\frac{y-3}{2}) - 7$ or equivalent A1 $5y^2 - 22y - 19 = 0$ or equivalent (equate to zero) m1 $y = \{22\pm\sqrt{((-22)^2 - 4\times5\times-19)}\}/2\times5$ or equivalent Allow 1 slip in substitution A1 $y = (22\pm\sqrt{864})/10$ or equivalent A1 $y = 5.139\ldots$ or $y = 5.14$ **and** $y = -0.739\ldots$ or $y = -0.74$ A1 $x = 1.07, y = 5.14$ with $x = -1.87, y = -0.74$ FT to final A1, provided M1, m1 previously awarded using their values of y in $(y - 3)/2$ or equivalent to find x-values to 2 d.p.
		6	

	$(x-1)(x+4)(x+2)$		
11	(a) ½ y(x + x + 4) = 28 or equivalent	B1	Accept xy + 4y/2 = 28, do not accept xy + 2y = 28
	y(x + y) = 43 or equivalent	B1	
	Expanding and simplifying both	B1	Convincing xy = 28 – 2y AND xy = 43 – y^2
	(b) *(xy =) 28 – 2y = 43 – y^2 or equivalent*		
	AND $y^2 - 2y - 15 = 0$ or $-y^2 + 2y + 15 = 0$	M1	For correct quadratic equated to zero
	$(y - 5)(y + 3) = 0$	A1	OR from formula method or completing square $y = (2 \pm \sqrt{64})/2$
	y = 5 (and y = -3)	A1	CAO. Negative value not required, ignore
	(x =) 3.6 (cm) and (x+4 =) 7.6 (cm)	A1	CAO. Must be from positive y only
		7	*Trial and improvement methods are not accepted*

3	$4y = 4x + 12$ or $y = x + 3$	B1	The variables maybe reversed (or different), check that they are used consistently, otherwise max B1 here
	$x^2 + 30 = y^2$	B1	
	$x^2 + 30 = (x + 3)^2$ or $(y - 3)^2 + 30 = y^2$	M1	Correct equate implies previous B2 FT for their equate equivalent level of difficulty provided B1 awarded.
	$x^2 + 30 = x^2 + 6x + 9$ or $y^2 - 6y + 9 + 30 = y^2$	A1	For correct expansion
	$6x = 21$ or $6y = 39$	A1	
	$x = 3.5$ (cm) or $y = 6.5$ (cm)	A1	CAO
	$y = 6.5$ (cm) or $x = 3.5$ (cm)	A1	CAO
			Trial and improvement methods are not accepted.
		7	*No marks for an unsupported correct answer*

		7	FT their value but not 25 or 15
10	$y = 13 - 2x$ $x^2 + x(13 - 2x) - 30 = 0$ $x^2 - 13x + 30 = 0$ or $-x^2 + 13x - 30 = 0$ or equivalent in y $(x - 10)(x - 3)$ {=0} $x = 10$ and $x = 3$ $y = -7$ and $y = 7$	B1 M1 A1 M1 A1 A1 6	*OR equivalent using $x = \ldots$.* FT their y, attempt to substitute Must equate to 0 (maybe implied by answer) FT equivalent level of difficulty *OR correct use of formula with $b^2 - 4ac$ evaluated correctly* FT from M1, A0 *Answer $x=3$ and $y=7$ **OR** $x=10$ and $y=-7$ from a trial and improvement method, award SC1. Also possible B1, M1, A1 with SC1* *Alternative method:* *B1 $2x^2 + xy = 13x$* *M1 Intention to subtract, using $x^2 + xy - 30 = 0$ then as original method*

	Additional Mathematics Summer 2012		Final Mark Scheme

	Additional Mathematics Summer 2012		Final Mark Scheme
11	Any two of the equations: ½ xy = 1350, $x^2 + y^2 = 75^2$, x + y + 75 = 180	B2	Or equivalents. B1 for any one of the three equations. FT provided B1 awarded for possible M, A and m, not final A1, A1
	Attempt to solve the simultaneous equations	M1	Accept a trial & improvement method for at least one correct trial
	$x^2 - 105x + 2700 = 0$ OR $y^2 - 105y + 2700 = 0$	A1	Must equate to zero. FT a trial & improvement method for at least one correct trial either side or including of '0'
	Reasonable attempt to factorise, or use of quadratic formula, or completing the square	m1	FT a trial & improvement method, depends on M1 and A1, for working towards a correct answer, narrowing search further
	Sides: 45(cm) 60(cm)	A1 A1	CAO CAO *If no marks, award SC1 if the sum of their AB and their BC is 105* Correct answers 45(cm) and 60(cm) are awarded 7 marks, but if unsupported, or use of only one of the statements, then QWC0
	QWC2 requires some text connected to equations as well as good mathematical notation with units in the final answer. QWC2: Candidates will be expected to • present work clearly, with clear process or steps shown AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar • QWC1: Candidates will be expected to • present work clearly, with clear process or steps shown explaining process or steps OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar	QWC 2 9	QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

	Summer 2011		
7	$2(x+1)+2(y+3)=62$ ISW $(x+9)(2x+y)=703$ ISW Attempt to solve the simultaneous equations, at least being quadratic $x^2+36x-460=0$ $(x-10)(x+46)=0$ $x=10$ $(x=-46)$ A is 11 (cm) by 20 (cm) AND B is 19 (cm) by 37 (cm) Look for: • Clear which equation to which rectangle or diagram • Correct use of brackets in set up and the correct use '=' throughout • Final answer with some text and units, if no final answer then needs to have text/label connection with equations QWC2: Candidates will be expected to • present work clearly, with symbols/words explaining process or steps OR in conclusion AND • make few if any mistakes in mathematical form, spelling, punctuation and grammar in their answer QWC1: Candidates will be expected to • present work clearly, with symbols/words explaining process or steps OR in conclusion OR • make few if any mistakes in mathematical form, spelling, punctuation and grammar in	B1 B1 M1 A1 m1 A1 A1 Q W C 2 9	Or $2x+2y+8=62$ OR $x+y+4=31$ OR $y=27-x$ Or $2x^2+18x+xy+9y=703$ Provided at least B1 $2x^2+18x+x(27-x)+9(27-x)=703$ $2x^2+18x+27x-x^2+243-9x=703$ CAO Or for correct use of quadratic formula (correct substitution & correct simplification of b^2-4ac) or completing the square. FT equivalent level of difficulty CAO *Or alternate working* $(36-y)(54-y)=703$ $1944-54y-36y+y^2=703$ $y^2-90y+1241=0$ $(y-17)(y-73)=0$ $y=73, x=-46;\ y=17, x=10$ QWC2 Presents relevant material in a coherent and logical manner, using acceptable mathematical form, and with few if any errors in spelling, punctuation and grammar. QWC1 Presents relevant material in a coherent and logical manner but with some errors in use of mathematical form, spelling, punctuation or grammar OR evident weaknesses in organisation of material but using acceptable mathematical form, with few if any errors in spelling, punctuation and grammar. QWC0 Evident weaknesses in organisation of material, and errors in use of mathematical form, spelling, punctuation or grammar.

End of solutions