

SIMULTANEOUS EQUATIONS

Pearson Edexcel - Tuesday 11 June 2019 - Paper 3 (Calculator) Higher Tier

1.

20	$x = 3\frac{2}{5}, y = -\frac{4}{5}$ $x = 5, y = -2$	M1	for substitution of a rearrangement eg $x = \frac{7-4y}{3}$ or $y = \frac{7-3x}{4}$ into $x^2 - 4y^2 = 9$ or expansion of $\left(\frac{7-4y}{3}\right)^2 = \frac{49-56y+16y^2}{9}$ or $\left(\frac{7-3x}{4}\right)^2 = \frac{49-42x+9x^2}{16}$	Expansion may not be in simplest form but must be correct Note we do not need to see “= 0”; just the LHS is sufficient. Can be implied by both x values correct or both y values correct. Answers must be correctly paired. Accept coordinate pairs
		M1	for correct expansion and substitution eg $\frac{49-56y+16y^2}{9} - 4y^2 = 9$ or $x^2 - 4\left(\frac{49-42x+9x^2}{16}\right) = 9$	
		A1	for forming quadratic ready for solving eg $-20y^2 - 56y - 32 (= 0)$ or $5y^2 + 14y + 8 (= 0)$ oe or $5x^2 - 42x + 85 (= 0)$ oe	
		M1	fit a 3 term quadratic, factorising eg $(5y + 4)(y + 2) (= 0)$ or $(5x - 17)(x - 5) (= 0)$ or correct use of formula eg $(y =) \frac{-14 \pm \sqrt{14^2 - 4 \times 5 \times 8}}{2 \times 5}$ or $(x =) \frac{-42 \pm \sqrt{42^2 - 4 \times 5 \times 85}}{2 \times 5}$ or completing the square, eg $(y + \frac{7}{5})^2 - \frac{9}{25} (= 0)$ or $(x - \frac{21}{5})^2 - \frac{16}{25} (= 0)$	
		A1	correctly pairs x and y values: $x = 3\frac{2}{5}, y = -\frac{4}{5}$ oe, $x = 5, y = -2$	

Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Higher Tier

2.

6	$x = 4.5, y = -1.5$	M1	correct process to eliminate one variable (condone one arithmetic error)	Fractions do not need to be in simplest form
		M1	(dep) for substituting found value in one of the equations OR correct process after starting again (condone one arithmetic error)	
		A1	for $x = 4.5, y = -1.5$ oe	

Pearson Edexcel - Monday 12 November 2018 - Paper 3 (Calculator) Higher Tier

3.

19	$x = -\frac{23}{7}, y = \frac{15}{7}$ $x = 3, y = -1$	M1 M1 A1 M1 A1	for substitution of a rearrangement eg for $2(1-2y)^2 - y^2 = 17$ or $2x^2 - \left(\frac{1-x}{2}\right)^2 = 17$ or expansion of $(1-2y)^2 = 1 - 4y + 4y^2$ or $\left(\frac{1-x}{2}\right)^2 = \frac{1-2x+x^2}{4}$ for expansion of bracket and substitution eg $2(1-4y+4y^2) - y^2 (= 17)$ or $8x^2 - (1-2x+x^2) (= 68)$ for forming quadratic ready for solving eg $7y^2 - 8y - 15 (= 0)$ or $7x^2 + 2x - 69 (= 0)$ fit a 3 term quadratic, factorising eg $(7y-15)(y+1) (= 0)$ or $(7x+23)(x-3) (= 0)$ or correct use of formula eg $\frac{8 \pm \sqrt{64+420}}{14}$ or $\frac{-2 \pm \sqrt{4+1932}}{14}$ or completing the square $x = -\frac{23}{7}$ oe, $y = \frac{15}{7}$ oe and $x = 3, y = -1$	Can be implied by both x values correct or both y values correct. Answers must be correctly paired. (Maybe in the body of the working) Accept for x between -3.29 and -3.28 and for y between 2.14 and 2.15 Answers only award 0 marks
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Pearson Edexcel - Thursday 2 November 2017 - Paper 1 (Non-Calculator) Higher Tier

4.

11		Tea £1.40 Coffee £1.80	P1 M1 M1 A1	for setting up two appropriate equations eg $3t + 2c = 7.80, 5t + 4c = 14.20$ for method to eliminate one variable, condone one arithmetic error for method to substitute found variable or start again Tea £1.4(0) and Coffee £1.8(0) with amounts linked to correct drinks
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Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

5.

20		$x = -\frac{24}{5}$ $y = -\frac{7}{5}$ $x = -3,$ $y = 4$	M1 M1 M1 M1 A1	for substitution of a rearrangement of $y - 3x = 13$ e.g. $(3x + 13)^2 + x^2 = 25$ (dep M1) for expansion of bracket after substitution (at least 3 terms correct out of the 4 terms) e.g. $9x^2 + 39x + 39x + 169$ for forming quadratic ready for solving e.g. $10x^2 + 78x + 144 (= 0)$ for factorising e.g. $(5x + 24)(x + 3) (= 0)$ oe $x = -\frac{24}{5}, y = -\frac{7}{5}$ and $x = -3, y = 4$ SC: B1 (if M0) for all 4 values mis-associated or one correct pair of values or values given as coordinates.
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Pearson Edexcel - Tuesday 13 June 2017 - Paper 3 (Calculator) Higher Tier

6.

2		$x = -\frac{2}{3}$ $y = -2$	M1 M1 A1	for a method to eliminate one variable (condone one arithmetic error) (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) $x = -\frac{2}{3}$ oe and $y = -2$
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Pearson Edexcel - Specimen Papers Set 2 - Paper 3 (Calculator) Higher Tier

7.

11		$x = 4.5$ $y = -2.5$	M1 for a correct process to eliminate one variable (condone one arithmetic error) A1 cao for either x or y M1 (dep) for substituting found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao
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Pearson Edexcel - Sample Paper 2 - (Calculator) Higher Tier

8.

20		$x=0, y=5$ $x=-4, y=-3$	M1 Initial process of substitution eg $x^2 + (2x + 5)^2 (=25)$ M1 for expanding and simplifying eg $x^2 + 4x^2 + 10x + 10x + 25 (=25)$ M1 Use of factorisation or correct substitution into quadratic formula or completing the square to solve an equation of the form $ax^2 + bx + c = 0, a \neq 0$ A1 correct values of x or y C1 $x = 0, x = -4, y = 5, y = -3$ correctly matched x and y values
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Pearson Edexcel - Thursday 26 May 2016 - Paper 1 (Non-Calculator) Higher Tier

9.

19	(a)(i)	-0.4 to -0.5 4.4 to 4.5	3	B1 for value in range -0.4 to -0.5 and value in range 4.4 to 4.5 NB: condone values given as part of coordinates.
	(ii)	-1.0 to -1.2 5.0 to 5.2		M1 for $x^2 - 4x - 2 = 4$ or line $y = 4$ drawn on graph or points marked with a y coord. of 4 or a value in range -1.0 to -1.2 or a value in range 5.0 to 5.2 A1 for value in range -1.0 to -1.2 and value in range 5.0 to 5.2 ; do not accept coordinates.
	(b)	-1.6 to -1.8 4.6 to 4.8	3	M1 for $x + y = 6$ drawn on graph A2 for value in range -1.6 to -1.8 and value in range 4.6 to 4.8 (A1 for one correct value or both values given as coordinates)

Pearson Edexcel - Wednesday 4 November 2015 - Paper 1 (Non-Calculator) Higher Tier

10.

17		$x = 3\frac{1}{3}$ $y = -2$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) or to rearrange and substitute for elimination A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equation or appropriate method after starting again (condone one arithmetic error) A1 cao
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Pearson Edexcel - Friday 7 November 2014 - Paper 2 (Calculator) Higher Tier

11.

15		$3x + y = 30$ $x + 3y = 22$	8.50 4.50	4	M1 for forming two algebraic equations M1 for a correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for 8.5(0) and 4.5(0)
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Pearson Edexcel - Monday 9 June 2014 - Paper 1 (Non-Calculator) Higher Tier

12.

18			$x = 7$ $y = -3$	3	M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for $x = 7$ and $y = -3$
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Pearson Edexcel - Friday 13 June 2014 - Paper 2 (Calculator) Higher Tier

13.

26		$y(5y + 24) = 0$ $\frac{-24 \pm \sqrt{(24)^2}}{10}$	$x = 6, y = 0$ $x = -3.6, y = -4.8$	5	M1 for substitution for elimination eg $(2y + 6)^2 + y^2 = 36$ M1 (dep on M1) for expansion eg $4y^2 + 12y + 12y + 36$ (3 out of 4 terms correct) A1 for $4y^2 + 24y + 36 + y^2 = 36$ oe M1 for a correct attempt to solve a 2 or 3 term quadratic equation eg by factorising or correct substitution into a quadratic formula A1 for $x = 6, y = 0$ and $x = -3.6$ oe, $y = -4.8$ oe SC: B1 (if M0 scored) for all 4 values mis-associated or one correct pair of values.
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Pearson Edexcel - Wednesday 6 November 2013 - Paper 1 (Non-Calculator) Higher Tier

14.

15		$6x + 8y = 10$ $6x - 9y = 27$ $y = -1$ $3x - 4 = 5$ $3x = 9$ $x = 3$ OR $9x + 12y = 15$ $8x - 12y = 36$ $x = 3$ $9 + 4y = 5$ $4y = -4$ $y = -1$	$x = 3, y = -1$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao Trial and improvement scores 0 marks unless both x and y are correct
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Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

15.

18		$12x + 21y = 3$ $12x + 40y = 60$ $19y = 57$ $y = 3$ $3x + 10 \times 3 = 15$ $3x = -15$ Alternative method $x = \left(\frac{1-7y}{4}\right)$ $3\left(\frac{1-7y}{4}\right) + 10y = 15$ $3 - 21y + 40y = 60$ $19y = 57$ $x = \left(\frac{1-7 \times 3}{4}\right)$	$x = -5, y = 3$	4	M1 for a correct process to eliminate either x or y or rearrangement of one equation leading to substitution (condone one arithmetic error) A1 for either $x = -5$ or $y = 3$ M1 (dep) for correct substitution of their found value A1 cao
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Pearson Edexcel - Friday 14 June 2013 - Paper 2 (Calculator) Higher Tier

16.

25			$x = 2.87,$ $y = -0.87$ and $x = -0.87,$ $y = 2.87$	6	M1 for $x^2 + (2-x)^2 = 9$ M1 for $4 - 4x + x^2$ A1 for $2x^2 - 4x - 5 = 0$ oe 3 term simplified quadratic M1 for a correct method to solve their quadratic Eg $x = \frac{4 \pm \sqrt{(16 - 4 \times 2 \times -5)}}{4}$ A1 for $x = 2.87, y = -0.87$ or better A1 for $x = -0.87, y = 2.87$ or better Award marks for equivalent algebraic expressions. Apply the same scheme as above for y first.
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Pearson Edexcel - Tuesday 6 November 2012 - Paper 1 (Non-Calculator) Higher Tier

17.

22		$12x + 8y = 16$ $12x + 15y = 51$ $7y = 35$ $3x + 2 \times 5 = 6$ Alternative method $x = \frac{4-2y}{3}$ $4\left(\frac{4-2y}{3}\right) + 5y = 17$ $16 - 8y + 5y = 17$ $7y = 35$ $x = \frac{4-2 \times 5}{3}$	$x = -2$ $y = 5$	4	M1 for a correct process to eliminate either x or y or leading to substitution (condone one arithmetic error) A1 for either $x = -2$ or $y = 5$ M1 (dep) for correct substitution of their found value A1 cao SC If M0 scored B1 for $y = -2$ and $x = 5$
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Pearson Edexcel - Monday 11 June 2012 - Paper 1 (Non-Calculator) Higher Tier

18.

20	$15x + 6y = 33$ $8x - 6y = 36$ $23x = 69$ $5 \times 3 + 2y = 11$ OR $x = \frac{11 - 2y}{5}$ $4 \times \left(\frac{11 - 2y}{5} \right) - 3y = 18$ $44 - 8y - 15y = 90$ $-46 = 23y$ $y = -2$	$x = 3$ $y = -2$	4	<p>M1 for coefficients of x or y the same followed by correct operation (condone one arithmetic error) A1 cao for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao for second solution</p> <p>OR M1 for full method to rearrange and substitute to eliminate x or y, (condone one arithmetical error) A1 cao for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao for second solution</p> <p>Trial and improvement 0 marks unless both x and y correct values found</p>
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Pearson Edexcel - Monday 5 March 2012 - Paper 4 (Calculator) Higher Tier

19.

18	$3x + 5y = 19$ $4x - 2y = -18$ $12x + 20y = 76$ $12x - 6y = -54$ Subtract $26y = 130$ $y = 5$ Substitute $3x + 25 = 19$ $3x = -6$	$x = -2$ $y = 5$	4	<p>M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error A1 for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again. A1 for second solution</p> <p>OR M1 for full method to rearrange and substitute to eliminate x or y, allow one arithmetical error A1 for first solution M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again. A1 for second solution</p> <p>Trial and improvement 0 marks unless both x and y correct values found</p>
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Pearson Edexcel - Wednesday 9 November 2011 - Paper 3 (Non-Calculator) Higher Tier

20.

12	$9x + 12y = 600$ $8x + 12y = 576$ $x = 24$ $3 \times 24 + 4y = 200$ $6x + 8y = 400$ $6x + 9y = 432$ $y = 32$ $3x + 4 \times 32 = 200$	$x = 24$ $y = 32$	4	<p>M1 correct process to eliminate either x or y (allow one arithmetical error) A1 either $x = 24$ or $y = 32$ M1 (dep on 1st M1) correct substitution of their value of x or y into one of the equations OR M1 (indep of 1st M1) correct process to eliminate the other variable (allow one arithmetical error) A1 cao for both $x = 24$ and $y = 32$</p>
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Pearson Edexcel - Monday 6 June 2011 - Paper 3 (Non-Calculator) Higher Tier

21.

19	$\begin{array}{r} 4x + y = 10 \\ \underline{4x - 6y = 38} \quad - \\ 7y = -28, \quad y = -4 \\ 4x - 4 = 10, \quad x = 3.5 \end{array}$ <p>or</p> $\begin{array}{r} 12x + 3y = 30 \\ \underline{2x - 3y = 19} \quad + \\ 14x = 49, \quad x = 3.5 \\ 7 - 3y = 19, \quad y = -4 \end{array}$ <p>Alternative</p> $\begin{array}{l} y = 10 - 4x \\ 2x - 3(10 - 4x) = 19 \\ 14x - 30 = 19; \quad x = 3.5 \\ 4 \times 3.5 + y = 10; \quad y = 4 \end{array}$	$\begin{array}{l} x = 3.5 \\ y = -4 \end{array}$	3	<p>M1 for full method to eliminate x or y, allow one error in calculation</p> <p>M1(dep) for substitution of one variable into one of the equations, or by appropriate method after starting again</p> <p>A1 3.5 and -4</p> <p>Alternative</p> <p>M1 for full method to rearrange and substitute to eliminate x or y, allow one error in calculation</p> <p>M1 (dep) for substitution of one variable into one of the equations, or by appropriate method after starting again</p> <p>A1 for 3.5 and -4</p>
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Pearson Edexcel - Tuesday 9 November 2010 - Paper 3 (Non-Calculator) Higher Tier

22.

21	<p>Equation (1) $\times 3$ then add equation (2) $\times 2$ leads to $26x = 13$</p> $3 + 2y = -3$	$\begin{array}{l} x = \frac{1}{2} \\ y = -3 \end{array}$	4	<p>M1 for coefficients of x or y the same followed by correct operation, condone one arithmetic error</p> <p>A1 for one correct answer</p> <p>M1 (dep) for substituting found value in one equation</p> <p>A1 cao for other correct answer</p> <p>(SC: B2 for one correct answer only if M's not awarded)</p>
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Pearson Edexcel - Monday 7 June 2010 - Paper 3 (Non-Calculator) Higher Tier

23.

21	$\begin{array}{l} 6x + 4y = 16 \\ 6x + 15y = -6 \\ -11y = 22 \\ 6x + 4 \times -2 = 16 \end{array}$ <p>Alternative method</p> $x = \frac{8 - 2y}{3}$ $2\left(\frac{8 - 2y}{3}\right) + 5y = -2$ $16 - 4y + 15y = -6$ $11y = -22$ $x = \frac{8 - 2 \times -2}{3}$	$x = 4, \quad y = -2$	4	<p>M1 for correct process to eliminate either x or y (condone one arithmetic error)</p> <p>A1 for either $x = 4$ or $y = -2$</p> <p>M1 (dep on 1st M1) for correct substitution of their found variable</p> <p>OR</p> <p>M1 (indep of 1st M1 for a correct process to eliminate the other variable (condone one arithmetic error)</p> <p>A1 cao for both $x = 4$ and $y = -2$</p> <p>[SC: B1 for $x = 4$ or $y = -2$ if M0 scored]</p>
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Pearson Edexcel - Thursday 5 November 2009 - Paper 3 (Non-Calculator) Higher Tier

24.

20	$\begin{array}{ll} 4x + y = -1 & 12x + 3y = -3 \\ \underline{4x - 3y = 7} & \underline{4x - 3y = 7} \\ 4y = -8 & 16x = 4 \\ y = -2 & x = 1/4 \end{array}$	$\begin{array}{l} x = \frac{1}{4} \\ y = -2 \end{array}$	3	<p>M1 for correct process to eliminate either x or y (condone one arithmetic error)</p> <p>M1 (dep on previous M1) for substituting found value into an appropriate equation, or further elimination</p> <p>A1 cao</p>
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OCR GSCE – Tuesday 3 November 2020 – Paper 4 (Calculator) Higher Tier

25.

20		<p>[x =] -5 [y =] -3 [x =] 3 [y =] 5 with some algebraic working</p>	6	<p>M1 for $x^2 + (x + 2)^2 = 34$</p> <p>M1 for expanding <i>their</i> square term e.g. $x^2 + 4x + 4$</p> <p>M1 for simplifying <i>their</i> quadratic expression e.g. $2x^2 + 4x + 4 = 34$ or better</p> <p>M1 for correctly factorising <i>their</i> quadratic expression $ax^2 + bx + c = 0$ e.g. $(x + 5)(x - 3)$ or $(2x + 10)(x - 3)$ or use of quadratic formula with no more than two errors</p> <p>B1FT for either one correct point or two correct x values B1FT for the other correct point or two correct y values</p> <p>If insufficient working B2 for 4 correct answers or B1 for 2 correct answers</p>	<p>e.g. $x^2 + 2x - 15 = 0$</p> <p>$a, b, c \neq 0$</p> <p>Alternative : M1 for $(y - 2)^2 + y^2 = 34$ or better M1 for $y^2 - 4y + 4$ M1 for $2y^2 - 4y + 4 = 34$ or better M1 for $(y - 5)(y + 3)$ or use of quadratic formula with no more than two errors</p> <p>Both B1s are strict FT from <i>their</i> method to solve <i>their</i> quadratic equation e.g. they must FT correctly from <i>their</i> factorisation</p>
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OCR GSCE – Tuesday 5 November 2019 – Paper 6 (Calculator) Higher Tier

26.

8		<p>[adult =] 12[.00] [child =] 4.5[0]</p>	5	<p>B1 for $5a + 4c = 78$ B1 for $3a + 6c = 63$ M1 for multiplying/dividing both equations to get the coefficient of one variable equal (allow one error) M1 for correctly adding or subtracting both equations to eliminate one variable (allow one error)</p>	one error in total
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OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

27.

5		28 or [£][0] .28	5	<p>B1 for $7r + 15c = 7[00]$ or $[r =] c + [0.]12$</p> <p>M1 for $7(c + [0.]12) + 15c = 7[00]$ or better oe or $r - c = [0.]12$ M1 for $7c + 84 + 15c = 7[00]$ or better oe or $7r - 7c = [0.]84$ M1 for $15c + 7c = 7[00] - [0.]84$ or better</p>	<p>Allow any pair of letters, see AG Trial-and-improvement will score 0 or 5 only allow work in pence or pounds i.e. removing brackets</p> <p>i.e. rearranging their equation</p>
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OCR GSCE – Tuesday 6 November 2017 – Paper 5 (Non - Calculator) Higher Tier

28.

19			$x = \frac{1}{2}$ oe $y = 1$ $x = 5$ $y = 19$	nfw	<p>6</p> <p>M1 for $2x^2 - 7x + 4 = 4x - 1$ oe M1 for $2x^2 - 11x + 5 = 0$ oe 3 term eqn</p> <p>M2 for $(2x - 1)(x - 5) = 0$</p> <p>or M1 for $(2x + a)(x + b) = 0$ where $ab = 5$ or $2b + a = -11$</p> <p>A1 for $x = \frac{1}{2}$ oe and $x = 5$</p>	<p>Implies previous M1</p> <p>FT <i>their</i> 3 term quadratic equation M2 for complete the square or for formula condone 1 error</p> <p>M1 for $\left(x - \frac{11}{4}\right)^2$ oe or for correct formula used with 2 errors</p>
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AQA GSCE – Tuesday 19 May 2020 – Paper 1 (Non - Calculator) Higher Tier

29.

18	Alternative method 1: substitutes for 4y in first equation then substitutes value of x		
	$2x + 2(4x - 7) = -9$ or $10x = 5$	M1	oe correct elimination of y
	$(x =) \frac{1}{2}$ or $(x =) 0.5$	A1	oe eg $(x =) \frac{5}{10}$
	$2 \times \text{their } \frac{1}{2} + 4y = -9$ or $2y = 4 \times \text{their } \frac{1}{2} - 7$	M1dep	oe substitution of their x into either equation
	$(y =) -\frac{5}{2}$ or $(y =) -2\frac{1}{2}$ or $(y =) -2.5$	A1	oe eg $(y =) -\frac{10}{4}$
	Alternative method 2: equates coefficients		
	Equates coefficients for one unknown and if necessary, rearranges into appropriate form and adds or subtracts equations appropriately	M1	eg 1 changes 1st equation to $4x + 8y = -18$, rearranges 2nd equation to $2y - 4x = -7$ and adds to eliminate x eg 2 changes 2nd equation to $4y = 8x - 14$ and subtracts to eliminate y
	Correct value for x or y	A1	
	Substitutes their value into an equation	M1dep	
	Both values correct	A1	

Mark scheme and Additional Guidance continues on next page

18 cont	Alternative method 3: substitutes for 4x in second equation then substitutes value of y		
	$2y = 2(-9 - 4y) - 7$ or $10y = -25$	M1	oe correct elimination of x
	$(y =) -\frac{5}{2}$ or $(y =) -2\frac{1}{2}$ or $(y =) -2.5$	A1	oe eg $(y =) -\frac{25}{10}$
	$2x + 4 \times \text{their } -\frac{5}{2} = -9$ or $2 \times \text{their } -\frac{5}{2} = 4x - 7$	M1dep	oe substitution of their y into either equation
	$(x =) \frac{1}{2}$ or $(x =) 0.5$	A1	oe eg $(x =) \frac{2}{4}$
	Alternative method 4: solves each unknown separately - substitutes for 4y in first equation then substitutes for 4x in second equation		
	$2x + 2(4x - 7) = -9$ or $10x = 5$	M1	oe correct elimination of y
	$(x =) \frac{1}{2}$ or $(x =) 0.5$	A1	oe eg $(x =) \frac{5}{10}$
	$2y = 2(-9 - 4y) - 7$ or $10y = -25$	M1	oe elimination of x
	$(y =) -\frac{5}{2}$ or $(y =) -2\frac{1}{2}$ or $(y =) -2.5$	A1	oe eg $(y =) -\frac{25}{10}$
	Additional Guidance		
	Note that in alt 4 the 2nd M mark is not dependent		
	In alt 4, allow alt 2 method for each unknown		
Both answers correct		M1A1M1A1	

30.

21	Alternative method 1: substitution of $2x + p$ for y		
	$2x + 3(2x + p) = 5p$	M1	oe equation eg $2x + 6x + 3p = 5p$
	$6x + 2x = 5p - 3p$ or $8x = 2p$	M1dep	oe equation with terms collected condone incorrect expansion before rearrangement
	Correct simplified terms $(x =) \frac{p}{4}$ or $\frac{1}{4}p$ or $0.25p$ and $(y =) \frac{3p}{2}$ or $\frac{3}{2}p$ or $1\frac{1}{2}p$ or $1.5p$	A2	A1 one correct simplified term or otherwise correct terms for both with 'p' omitted eg $x = 0.25$ and $y = 1.5$ or correct unsimplified terms for both eg $x = \frac{2p}{8}$ and $y = \frac{6p}{4}$
	Alternative method 2: substitution of $y - p$ for $2x$		
	$y - p + 3y = 5p$	M1	oe equation
	$y + 3y = 5p + p$ or $4y = 6p$	M1dep	oe equation with terms collected
	Correct simplified terms $(x =) \frac{p}{4}$ or $\frac{1}{4}p$ or $0.25p$ and $(y =) \frac{3p}{2}$ or $\frac{3}{2}p$ or $1\frac{1}{2}p$ or $1.5p$	A2	A1 one correct simplified term or otherwise correct terms for both with 'p' omitted eg $x = 0.25$ and $y = 1.5$ or correct unsimplified terms for both eg $x = \frac{2p}{8}$ and $y = \frac{6p}{4}$
	The mark scheme for question 21 continues on the next page		

21 (cont)	Alternative method 3: elimination of x		
	$y - 2x = p$	M1	oe with multiplication of both equations
	$y + 3y = 5p + p$ or $4y = 6p$	M1dep	oe addition must be seen if result is incorrect
	Correct simplified terms $(x =) \frac{p}{4}$ or $\frac{1}{4}p$ or $0.25p$ and $(y =) \frac{3p}{2}$ or $\frac{3}{2}p$ or $1\frac{1}{2}p$ or $1.5p$	A2	A1 one correct simplified term or otherwise correct terms for both with ' p ' omitted eg $x = 0.25$ and $y = 1.5$ or correct unsimplified terms for both eg $x = \frac{2p}{8}$ and $y = \frac{6p}{4}$
	Alternative method 4: elimination of y		
	$3y - 6x = 3p$	M1	oe with multiplication of both equations
	$2x - (-6x) = 5p - 3p$ or $8x = 2p$	M1dep	oe subtraction must be seen if result is incorrect
	Correct simplified terms $(x =) \frac{p}{4}$ or $\frac{1}{4}p$ or $0.25p$ and $(y =) \frac{3p}{2}$ or $\frac{3}{2}p$ or $1\frac{1}{2}p$ or $1.5p$	A2	A1 one correct simplified term or otherwise correct terms for both with ' p ' omitted eg $x = 0.25$ and $y = 1.5$ or correct unsimplified terms for both eg $x = \frac{2p}{8}$ and $y = \frac{6p}{4}$

AQA GCSE – Tuesday 6 November 2018 – Paper 1 (Non - Calculator) Higher Tier

31.

19(a)	$2(x + 5) = y + 8$ or $2x + 10 = y + 8$	M1	oe eg $\frac{x+5}{y+8} = \frac{1}{2}$ or $\frac{y+8}{x+5} = 2$
	$2x + 10 = y + 8$ and $y = 2x + 2$	A1	

19(b)	$x + 10 = y + 1$	M1	oe
	Eliminates x or y from their $(x + 10) = y + 1$ and $y = 2x + 2$	M1	their $(x + 10) = y + 1$ must be an equation in x and y eg $x + 10 = y - 1$ (and $y = 2x + 2$) followed by $x + 11 = 2x + 2$
	$x = 7$ and $y = 16$	A1	
	Additional Guidance		
	$x = 7$ or $y = 16$ with no value or an incorrect value for the other unknown and no working worth M marks		MOM0A0

AQA GCSE – Wednesday 8 November 2017 – Paper 3 (Calculator) Higher Tier

32.

28	$p \times q^{1-1} = 10$ or $p \times q^0 = 10$ or $p \times q^{6-1} = 0.3125$ or $p \times q^5 = 0.3125$	M1	oe
	$p = 10$ or $10 \times q^{6-1} = 0.3125$ or $q^5 = 0.3125 \div \text{their } 10$ or $q^5 = 0.03125$	M1dep	
	$\sqrt[5]{\text{their } 0.03125}$ or 0.5	M1dep	oe
	their $10 \times \text{their } 0.5^2$ or their $10 \times \text{their } (\sqrt[5]{\text{their } 0.03125})^2$ or their $10 \times \text{their } 0.03125^{\frac{2}{5}}$	M1dep	
	2.5	A1	
	Additional Guidance		

AQA GCSE – Wednesday 25 May 2017 – Paper 1 (Non - Calculator) Higher Tier

33.

10	Alternative method 1		
	$2x + x = 18 + 6$	M1	oe Eliminates a variable Implied by $3x = n$, where $n > 18$
	$3x = 24$ or $x = 8$	A1	oe
	$x = 8$ and $y = 2$	A1	
	Alternative method 2		
	$y - 2y = 18 - 2 \times 6$ or $y - 2y = 18 - 12$ or $y + 2y = 18 - 2 \times 6$ or $y + 2y = 18 - 12$	M1	oe Eliminates a variable Implied by $2x - 2y = 12$ followed by $3y = m$, where $m < 18$
	$3y = 6$ or $-3y = -6$ or $y = 2$ or $-y = -2$	A1	oe
	$x = 8$ and $y = 2$	A1	
	Alternative method 3		
	$\frac{18 - y}{2} = y + 6$ or $18 - 2x = x - 6$	M1	oe Eliminates a variable
	$3x = 24$ or $x = 8$ or $3y = 6$ or $y = 2$	A1	oe Collects terms
	$x = 8$ and $y = 2$	A1	

10 cont	Alternative method 4		
	Correctly evaluated trial of at least one pair of values in one equation for which they do not work	M1	eg $9 - 2 = 7$ The pair of values must not be given as the answer
	Correctly evaluated trial of at least three pairs of values in one equation for which they do not work	M1dep	eg $9 - 2 = 7$ $2 \times 11 + 5 = 27$ $10 - (-2) = 12$ With none of the three pairs of values given as the answer
	$x = 8$ and $y = 2$	A1	
	Additional Guidance		
	One correct value with one incorrect value (or no second value) and no working eg $x = 6$ and $y = 2$ eg $y = 2$		M1A1A0 M1A1A0 M1A1A0
	(8, 2) or 8, 2 on answer line (with or without working)		M1A1A1
	(2, 8) or 2, 8 on answer line with no working		M0A0A0
	Embedded correct values in one equation only eg $2 \times 8 + 2 = 18$ Embedded correct values in both equations ie $2 \times 8 + 2 = 18$ and $8 - 2 = 6$		M1A0A0 M1A1A0
	Please check crossed out work, which may indicate correct rejection of a trial in this question, as covered in alternative method 4		

AQA GCSE – Sample Paper 1 (Non - Calculator) Higher Tier

34.

25	$2(cx + 5) + c$ or $2cx + 10 + c$	M1	
	their $2cx = 6x$ or their $2c = 6$ or $c = 3$	M1	Must have attempted $fg(x)$
	13	A1	SC2 for 11