SOLVING SIMULTANEOUS EQUATIONS GRAPHICALLY

Pearson Edexcel – Monday 8 June 2020 - Paper 3 (Calculator) Higher Tier

1.

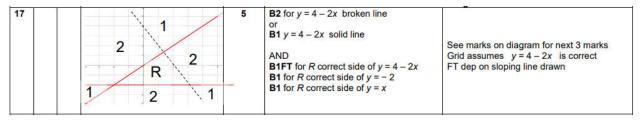| 6	(a)	−2, 4	B1	cao	
	(b)	0.55 to 0.65, 3.35 to 3.45	M1	for correct method, eg marking intercepts with x-axis or one correct answer or both solutions given as a coordinate eg (0.6, 3.4) or (0.6, 0) (3.4, 0)	If answers are stated as coordinates, award M1 for both coordinates and M0 for one coordinate.
			A1	for answers in the ranges 0.55 to 0.65 and 3.35 to 3.45	With no extras

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Higher Tier

2.

10	$x = 2.2$ to 2.3 $y = −1.3$ to $−1.4$	M1	for recognition of use of intersection point, one of the solutions given, solutions reversed or solutions given as a coordinate.	
		A1	x given in the range 2.2 to 2.3, y given in the range −1.3 to −1.4	

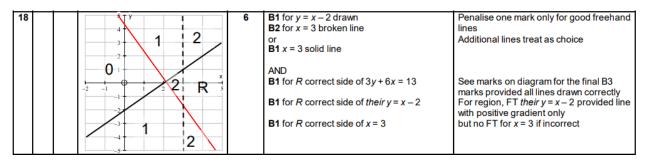## OCR GSCE – Thursday 5 November 2020 – Paper 5 (Non-Calculator) Higher Tier

3.

17		5	**B2** for $y = 4 – 2x$ broken line or **B1** $y = 4 – 2x$ solid line AND **B1FT** for R correct side of $y = 4 – 2x$ **B1** for R correct side of $y = − 2$ **B1** for R correct side of $y = x$	See marks on diagram for next 3 marks Grid assumes $y = 4 – 2x$ is correct FT dep on sloping line drawn

OCR GSCE – Monday 9 November 2020 – Paper 6 (Calculator) Higher Tier

4.

19	(a)		[x =] -3, 1.5	2	**B1** for 1 correct	
	(b)	(i)	[a =] 2 [b =] -5	2	**B1** for each or for $2x – 5$ seen	

		(ii)	$y = 2x – 5$ or FT $y = $ their $ax + $ their b ruled on grid	M2	**M2** and **M1** apply to $y = 2x – 5$ or FT $y = $ their $ax + $ their b **M1** for 'correct' y-intercept or for 'correct' gradient or for freehand or broken 'correct' line or for at least 3 'correct' plots and no 'incorrect' plots	For **M2** line must cross curve For **M2** and **M1**, accuracy 1 small square at y-intercept (extended if necessary provided it fits on the grid) and gradient ±1 small square vertically for a run of 1 unit horizontally **Do not FT** if $a = 0$ or $b = 0$
			1.1 to 1.3 and -1.8 to -1.6	A1		Only award if **M2** scored

OCR GSCE – Thursday 7 November 2019 – Paper 5 (Non-Calculator) Higher Tier

5.

| 18 | | | 6 | **B1** for $y = x - 2$ drawn
 B2 for $x = 3$ broken line <br> or
 B1 $x = 3$ solid line

 AND
 B1 for R correct side of $3y + 6x = 13$

 B1 for R correct side of *their* $y = x - 2$

 B1 for R correct side of $x = 3$ | Penalise one mark only for good freehand lines
 Additional lines treat as choice

 See marks on diagram for the final B3 marks provided all lines drawn correctly
 For region, FT *their* $y = x - 2$ provided line with positive gradient only <br> but no FT for $x = 3$ if incorrect |

OCR GSCE – Tuesday 21 May 2019 – Paper 4 (Calculator) Higher Tier

6.

| 18 | | Three correct lines and region R correctly labelled with an 'R' or unambiguous wording or shading | 6 | **B1** for line $y = 3$ and **B1dep** indicates correct side
 B1 for line $y = x$ and **B1dep** indicates correct side
 B1 for line $x + y = 9$ and **B1dep** indicates correct side <br> to a maximum of 5 marks

 Condone good freehand lines, which can be dashed or solid.
 Mark the region which is labelled, but if no labelling mark the single region which is shaded (or unshaded).
 Condone regions that are just in the first quadrant.
 <u>Region mark depends on the line being a close attempt.</u>

 Note : lines need only be one square long for line mark but they must be fit for purpose to define their region up to the intersections and the *y*-axis. |

OCR GSCE – Thursday 6 June 2019 – Paper 5 (Non-Calculator) Higher Tier

7.

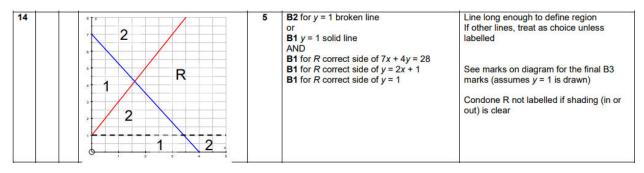| 19	(a)		1.7 **cao**	1		Mark at most accurate i.e. do not allow 1.65 = 1.7
	(b)	(i)	$[a =] -5$ $[b =] 4$	2	**B1** for each or for $-5x + 4$ seen	
		(ii)	Correct line ruled on grid	M2	**Strict FT** $y = $ *their ax* + *their b* **M1** for correct *y*–intercept (**FT** *their b*) or correct gradient (**FT** *their a*) or for freehand or broken 'correct' line **FT** $y = $ *their ax* + *their b* or for at least 3 correct plots and no incorrect plots **FT** $y = $ *their ax* + *their b*	For M2 line must cross curve For M2 or M1, accuracy ± 1 small square at *y* – intercept (extend line if necessary provided it fits on the grid) and gradient ± 1 small square vertically for a run of 1 unit horizontally Do not follow through if $a = 0$ and/or $b = 0$
			1.1 or 1.2	A1		Only award if M2 scored previously

OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

8.

10			−3 2		2	**B1** for each	

OCR GSCE – Thursday 8 November 2018 – Paper 5 (Non-Calculator) Higher Tier

9.

14				5	**B2** for $y = 1$ broken line or **B1** $y = 1$ solid line AND **B1** for R correct side of $7x + 4y = 28$ **B1** for R correct side of $y = 2x + 1$ **B1** for R correct side of $y = 1$	Line long enough to define region If other lines, treat as choice unless labelled See marks on diagram for the final B3 marks (assumes $y = 1$ is drawn) Condone R not labelled if shading (in or out) is clear

OCR GSCE – Tuesday 12 June 2018 – Paper 6 (Calculator) Higher Tier

10.

9	(a)	-6	1		
	(b)	[$x = 4$,] $y = 24$ Change of sign, so p lies between 3 and 4 oe	2	**B1** for 24 seen If using $3.27 < x < 4$ rather than 4: **SC2** evaluate y correctly (see table in (c)), state change of sign oe and that because $3 < p <$ their x-value, then so $3 < p < 4$. **0** for just evaluating y.	After $x = 4$, $y = 24$ scored: Examples just sufficient for second mark include: change of sign $-6 < 0 < 24$ $x = 3$ gives an answer < 0 and $x = 4$ gives an > 0 Examples insufficient for second mark: so p lies between 3 and 4
	(c)	Examples: when $x = 3.5$, $y = 6.4$, so $3 < p < 3.5$ when $x = 3.1$, $y = $-3.9, so $3.1 < p < 4$ when $x = 3.1$, $y = $-3.9 and when $x = 3.5$, $y = 6.4$, so $3.1 < p < 3.5$	3	**M2** for one further value of y evaluated correctly, possibly rot to 2 or more sf, for a value of x such that $3 < x < 4$ **OR** **M1** for working shown to calculate one further value of y for a value of x such that $3 < x < 4$ Note after SC considered in (b): if SC2 was awarded then they must use a value of x that produces a smaller interval than $3 < x <$ their x-value in (b); if SC2 was not awarded then $3 < x < 4$ applies If **0** scored, award **SC1** or **SC2** if evidence for M1 or M2 has not yet been credited in (b)	Solution is approx. 3.2670 Common values: | x	y		x	y
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3.1	-3.909		3.5	6.375
3.2	-1.632		3.6	9.456
3.25	-0.422		3.7	12.75
3.26	-0.174		3.75	14.48
3.27	0.0758		3.8	16.27
3.3	0.837		3.9	20.02
3.4	3.504				 A correct narrower range scores **0** unless accompanied by the relevant correct calculation(s). eg **M2** only for when $x = 3.1$, $y = $-3.9 so $3.1 < p < 3.5$ (as 3.5 has not been correctly justified) Calculations in support of $x = 3$ or $x = 4$ need not be repeated from parts (a) or (b).

OCR GSCE – Wednesday 8 November 2017 – Paper 6 (Calculator) Higher Tier

11.

18	(a)	$y \leq 2$	1		If **both** inequalities are wrong way round, condone once (max penalty 1 mark)
			and		
		$y \geq -2x + 18$ oe	3	**B1** for ['gradient'=] -2 soi and **M1** for suitable method to find equation of line eg. $y - 8 = (their - 2) \times (x - 5)$ or $y - 2 = (their - 2) \times (x - 8)$	Or **M1** for $y = their -2x + c$ with a point from the line substituted in to find c For **M1** allow use of an inequality symbol in place of =
	(b)	$y = 6$ shown as a solid line and correct region shaded	2	**B1** for line drawn at $y = 6$ OR **B1** for correct squares shaded but no line	Accept dashed line for **B1**
	(c)	$\dfrac{8}{5}$ oe	5	**M1** for $\dfrac{1}{2} \times 4 \times (8 + 6)$ soi by 28 **M1** for $\dfrac{1}{2} \times 4h = their\ 28 - 23$ oe **A1** for [h =] 2.5 AND **M1** for [k =] 4 ÷ their 2.5 oe Alternative method **M1** for $\dfrac{1}{2} \times 4 \times (8 + 't')$ **M1** for their $\dfrac{1}{2} \times 4 \times (8 + 't') = 23$ oe **A1** for [t =] 3.5 AND **M1** for [k =] 4 ÷ (6 – their 3.5) oe	'h' is 'top of triangle' 't' is 'top of trapezium' Must be a trapezium

AQA GSCE – Thursday 8 June 2020 – Paper 3 (Calculator) Higher Tier

12.

| 19 | $x < 1$ and $y > -3$ | B1 | |

AQA GSCE – Thursday 6 November 2017 – Paper 2 (Calculator) Higher Tier

13.

	Draws $y = 3x$ and $(x =)$ [–0.1, 0.1] and $(x =)$ [1.4, 1.6]	B2	B1 Draws $y = 3x$ or states $y = 3x$ $\pm\dfrac{1}{2}$ square tolerance for drawing graph Graph must be seen for x values from 0 to 1.5	
21(a)	**Additional Guidance**			
	Ignore any y values seen			
	Solutions from a non-graphical method			B0
	Ignore other lines drawn on grid			

	Full evaluation of method and answer	B2	eg1 Cannot divide by x as it could be zero eg2 Should have factorised and then he would have also found that $x = 0$ eg3 Should have used the formula and then he would have also found that $x = 0$ eg4 Should have used a graphical method then he would have also found that $x = 0$ eg5 Should have completed the square then he would have also found that $x = 0$ B1 Partial evaluation eg1 $x = 0$ has been omitted eg2 Should have factorised eg3 Should have used the formula eg4 Should have drawn a graph eg5 Only found one solution eg6 Cannot divide by zero	
21(b)	**Additional Guidance**			
	For B2 there needs to be an evaluation of the method and an indication that $x = 0$ has been omitted from the answer			
	$x(2x + 5) = 0$ $x = 0$ and $x = –2.5$			B2
	Should be two solutions			B1
	What about $x = 0$			B1
	The answer is wrong			B0
	Ignore non-contradictory further work			

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

14.

23	Line $x = 3$ should be dashed or not included	B1	oe eg vertical line should be dotted
	R is in the wrong place	B1	oe eg region is not correct May be shown on diagram
	Additional Guidance		
	x is not equal to 3		B1
	R does not include $x = 3$		B1
	Straight line should be less than 3		B1
	$x = 3$ is not in the region		B1
	Line at $x = 3$ is closed not open		B1
	Lines are not drawn correctly (not enough)		B0
	Should have shaded above the dotted line ($y > 3 - x$)		B1
	R should be where (2, 2) is		B1
	R should be shaded		B0

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

15.

29	–3 –2 –1 0 1 2	B2	B1 for 5 correct and 0 incorrect or 6 correct and 1 incorrect
	Additional Guidance		
	Do not accept coordinates		

AQA GSCE – Tuesday 13 June 2017 – Paper 3 (Calculator) Higher Tier

16.

21	$-2.5 < x < 1$	B1	
	Additional Guidance		