

FUNCTION MACHINES

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

1.

11	(a)	(i)	7	4	<p>M2 for $3x + 15 = 2(x + 11)$ oe or M1 for $3x + 15$ or $2(x + 11)$ oe</p> <p>M1 for a productive step towards solving <i>their</i> linear equation</p> <p><u>Alternative method by trials:</u> M2 for at least two complete trials using the same inputs for both functions or M1 for one complete trial using the same input for both functions</p> <p>A1 for at least one correct evaluation for A and one for B</p>	<p>Starting equation must have x on both sides e.g. from $3x + 15 = 2(x + 11)$: M1 for $2x + 22$ or $x + 15 = 22$ or $3x = 2x + 7$ or $1.5x + 7.5 = x + 11$ e.g. from $3x + 15 = 2x + 11$: M1 for $x + 15 = 11$ or $3x = 2x - 4$</p>
		(ii)	Because $3x + 15$ and $2(x + 11)$ are <u>not equivalent</u> oe OR $3x + 15 = 2(x + 11)$ only has one solution oe	1		<p>If not using the words 'not equivalent', must clearly imply that the two expressions will not be equal for <i>all</i> values of x</p> <p>The mark is unlikely to be awarded unless algebra is used</p>
	(b)		$p = 5, q = 3$	3	<p>B1 for $p = 5$ or $q = 3$</p> <p>M1 for $q(x + p)$ oe or $[3x + 15 =] 3(x + p)$ or $[3x + 15 =] q(x + 5)$</p> <p>If no working SC1 for $p = 3$ and $q = 5$ as answers</p>	<p>May be seen with a particular value of x, eg. $q(2 + p)$</p>

OCR GSCE – Tuesday 5 November 2019 – Paper 4 (Calculator) Higher Tier

2.

9	(a)		6	3	<p>B1 for $3(k - 4) = k$ oe M1 for solving <i>their</i> equation to get k on one side and numbers on the other e.g. $3k - k = 12$</p>	<p>also $\frac{k}{3} + 4 = k$ condone use of other letters</p>
	(b)		$\frac{y}{3} + 4$ oe	2	<p>M1 for $+3$ and $+4$ e.g. $\frac{y+4}{3}$</p>	
	(c)		16	2	<p>B1 for output of first function as 36 or $3(3(n - 4) - 4) = 96$ or better</p>	<p>e.g. $9n - 48 = 96$</p>

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

3.

12	(a)	$\frac{x+2}{3}$ or $\frac{x}{3} + \frac{2}{3}$ final answer	2	<p>M1 for $y + 2 = 3x$ or $x + 2 = 3y$ or for $x = 3y - 2$ or for $[x=]\frac{y+2}{3}$</p> <p>If 0 scored, SC1 for answer $y = \frac{x}{2} - 7$</p>	<p>For 2 marks, condone answer $y = \frac{x+2}{3}$ Allow M1 for correct reverse flowchart with arrows reversed</p> <p style="text-align: center;">← + 3 ← + 2 ←</p>
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	(b)	-5	5	<p>M3 for $2(3x - 2 + 7) = 4x$ oe or $\frac{2x-7+2}{3} = x$ oe</p> <p>or M2 for $2(3x - 2 + 7)$ oe seen or $\frac{2x-7+2}{3}$ oe seen</p> <p>or M1 for $3x - 2$ or $3x + 5$ oe seen or $2x - 7$ or $2x - 5$ oe seen</p> <p>M1dep for correct rearrangement of <i>their</i> eqn with at least 2 terms in x to $ax + b = 0$ or better</p>	<p>For method marks, condone inclusion of multiplication signs Method must be seen in working space for part (b) If brackets omitted then allow recovery for method</p> <p>For M3 eg $2x - 7 = 3x - 2$</p> <p>M1dep on at least M1 earned previously e.g. $2(3x - 2) + 7 [= 4x]$ scores M1 and then can earn M1 dep if they then correctly rearrange to $ax = b$</p>
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OCR GSCE – Tuesday 6 November 2018 – Paper 4 (Calculator) Higher Tier

4.

11	(a)	7.5 oe	2	B1 for input to B as 19	Could be in diagram
	(b)	$3(2x + 3)$ oe	2	B1 for output from A as $2x + 4$ oe	Could be in diagram

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

5.

17	(a)	$\frac{x}{5} - 14$ oe	2	<p>M1 for $\frac{x}{5}$</p> <p>If 0 scored then SC1 for $\frac{x-14}{5}$ oe</p>	<p>Condone use of another letter for M1 max</p> <p>Must use x in SC1 0 for $x - 14 + 5$</p>
	(b)	-17.5 or $-\frac{35}{2}$ oe nfw	3	<p>M1 for $5('k' + 14) = 'k'$ or $'k' = \frac{k}{5} - 14$</p> <p>M1FT for $4'k' = -70$ or better or re-arrangement of <i>their</i> comparable $f(k) = g(k)$ equation into the form $ak = b$.</p> <p>M1FT solving their $ak = b$</p> <p><u>Alternative (FT as above):</u> M1 for $'k' = \frac{k}{5} - 14$</p> <p>M1FT for $\frac{4k}{5} = -14$ or better</p> <p>M1FT solving <i>their</i> $ak = b$</p> <p>Trials or no working: SC3 for -17.5</p>	<p>eg $5k+14=k$ becomes $4k=-14$ and then $k=-3.5$ scores M0 M1FT M1FT $k + 70 = k$ is not comparable</p> <p>Answers may be in decimal or fractional form but fractions equating to integers should be simplified</p>

OCR GSCE – Tuesday 13 June 2017 – Paper 6 (Calculator) Higher Tier

6.

14	a	<table border="1"> <tr> <td>x</td> <td>y</td> </tr> <tr> <td>-5</td> <td>-4</td> </tr> <tr> <td>2.5</td> <td>11</td> </tr> </table>	x	y	-5	-4	2.5	11	2 2 AO1.3a	B1 for one correct	
x	y										
-5	-4										
2.5	11										
	b	<p>$y = 5(x - 4)$ oe</p> <p>or</p>	2 1 AO1.1 1 AO1.3a	<p>M1 for correct operations in correct order but poor notation eg $y = x - 4 \times 5$ or $5(x - 4)$ oe</p> <p>(as minimum allow -4, $\times 5$ if intent clear)</p> <p>or for correct operations in reverse order eg implied by $y = 5x - 4$</p>	<p>For 2 marks and M1 condone x and y transposed in algebraic expression or transposed in flow diagram.</p> <p>M0 for wrong order and poor notation</p> <p>Mark right-to-left flow diagrams in a similar way</p> <p>Condone correct flow diagram followed by incorrect algebra or vice-versa</p>						

	c		$5p - 3$ as final answer	4 1 AO1.3b 3 AO3.1b	M1 for $2p + 4 - 4$ soi M1 for <i>their</i> $2p \times 5$ soi M1 for <i>their</i> $10p + 2$ M1 for <i>their</i> $5p - 3$ Maximum 3 marks if answer incorrect Alternative method: M1 for $2(m + 3)$ soi <i>their</i> $\frac{2(m+3)}{5} + 4$ soi M1 for $\frac{2(m+3)}{5} + 4 = 2p + 4$ or better M1FT for rearranging <i>their</i> equation to isolate m Maximum 3 marks if answer incorrect	Output of function A is $10p$ implies first M1M1 Use of function A Use of function B with output of A Equating their output of B with $2p + 4$ <i>Their</i> equation must be of form $\frac{am+b}{5} + 4 = 2p + 4$ oe where $a \neq 0$ and $b \neq 0$, leading to $(m =) \frac{10p-b}{a}$ and then simplified if possible Accept another letter used consistently for m or p but not m and p interchanged
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OCR GCSE – Sample Papers – Paper 4 (Calculator) Higher Tier

7.

8	(a)	(i)	-1	2 1 AO1.3a 1 AO3.1a	M1 for use of -5 and $+2$ soi Or M1 for answer 3	
		(ii)	-5	3 1 AO1.3a 2 AO3.1a	M1 for $2x + 5$ M1 for $x =$ <i>their</i> ' $2x + 5$ ' and solve	
	(b)		5, 10	3 1 AO1.3a 2 AO3.1a	M1 for $3a + b = 5$ and $7a + b = 25$ M1 for attempt to solve Or M1 input increases by 4; output increases by 20 M1 so one box must have $\times 5$ for the arithmetic sequence	Condone $\frac{x^2+1}{2}$ across the two boxes for 3 marks

AQA GCSE – Sample Paper 3 (Calculator) Higher Tier

8.

19	$x^2 + 6$ or $(x - 3)^2$	M1	
	$x^2 - 3x - 3x + 9$	M1	4 terms with 3 correct
	$6x < 3$	M1dep	oe linear inequality dep on two quadratic expressions ft their quadratic expressions
	$x < 0.5$	A1	oe