

GCSE Mathematics (1MA1)

Themed papers – Transformations of Functions

Compiled from student-friendly mark schemes

Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme

M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect.

P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question.

A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

B1 – working mark. This mark is usually given when working and the answer cannot easily be separated.

C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working.

Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Question 1 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		C2	These marks are given for a graph translated -2 in the y-direction (One mark is given for a graph translated by another amount in the y-direction)

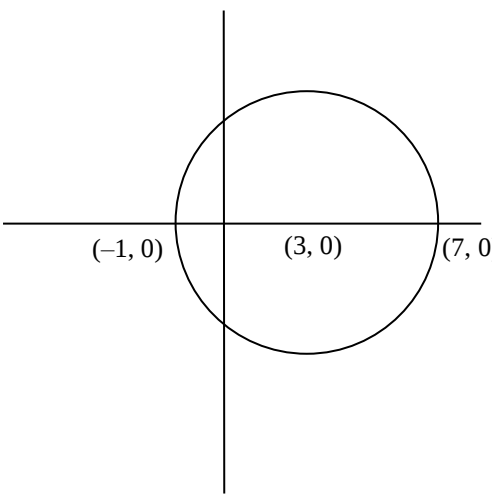
Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		C2	These marks are given for a fully correct sketch between 0° and 360° (C1 is given for a partially correct shape drawn)

Question 3 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$y = f(-x)$	B1	This mark is given for the correct answer only
(b)	$y = g(x) + 1$	B1	This mark is given for the correct answer only
(c)	$(180, -1)$	B1	This mark is given for the correct answer only

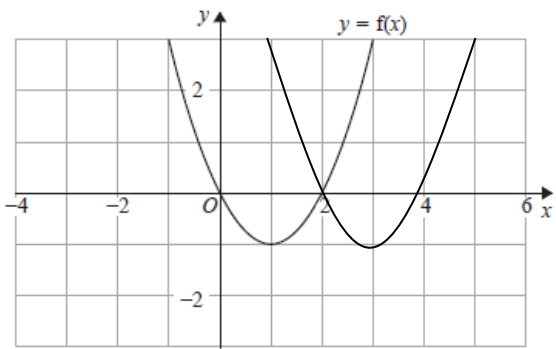
Question 20 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	The curve cuts the y axis at $x = 0$ $y = a^x = a^0 = 1$ $(0, 1)$	B1	This mark is given for the correct answer only
(b)		M1	This mark is given for any one of a circle with radius 4, centre (3, 0) or points $(-1, 0)$ and $(7, 0)$ labelled
		M1	This mark is given for any further element of a circle with radius 4, centre (3, 0) or points $(-1, 0)$ and $(7, 0)$ labelled
		A1	This mark is given for a fully correct sketch only: a circle with radius 4 and centre (3, 0) and with the points $(-1, 0)$ and $(7, 0)$ labelled

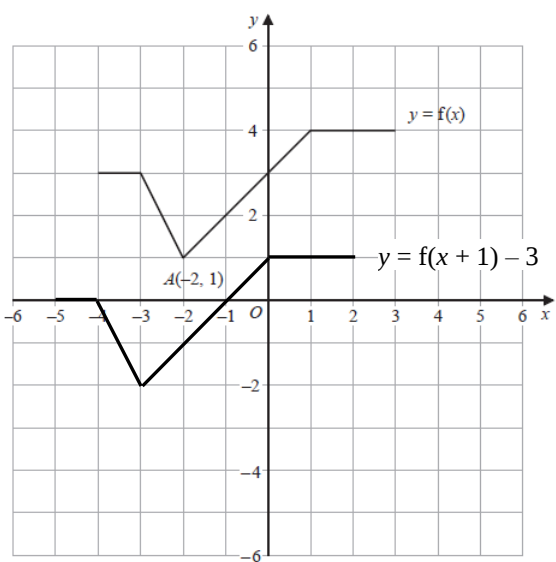
Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Translation $\begin{pmatrix} -x \\ -3 \end{pmatrix}$	M1	This mark is given for a method showing which type of transformation is required to give the graph of the curve S
	$(7 \times -1, 2 - 3)$ $= (-7, -1)$	A1	This mark is given for the correct answer only

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for a correct sketch with a curve that crosses the x-axis at (2, 0) and (4, 0), with minimum point (3, -1) and endpoints (1, 3) and (5, 3)
(b)	$y = g(-x)$	B1	This mark is given for the correct answer only

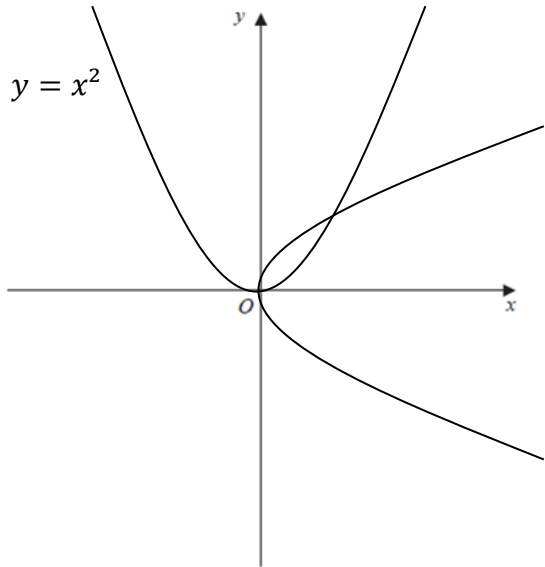
Question 7 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		C1	These marks are given for a graph drawn translated by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$ (C1 is given for a translation of the graph by vector $\begin{pmatrix} a \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -1 \\ b \end{pmatrix}$ where $a \neq 1$ or $b \neq -3$)
(b)	(2, 1)	B1	This mark is given for the correct answer only

Question 8 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sin(180 + a)^\circ = -1$, so $b = -1$	B1	This mark is given for the correct answer only
	$\sin(180 + a)^\circ = -1$, so $180 + a = 270$ so $a = 90$	B1	This mark is given for the correct answer only

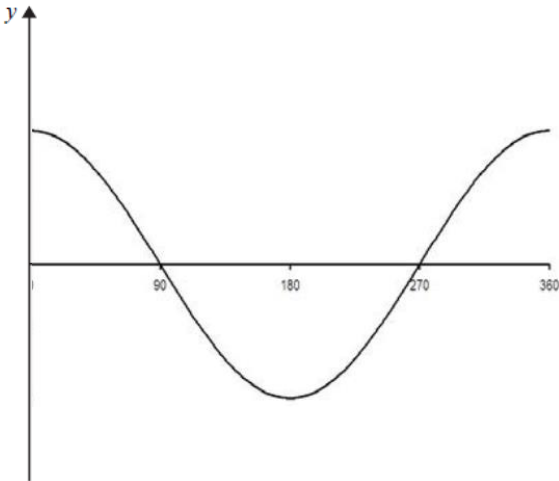
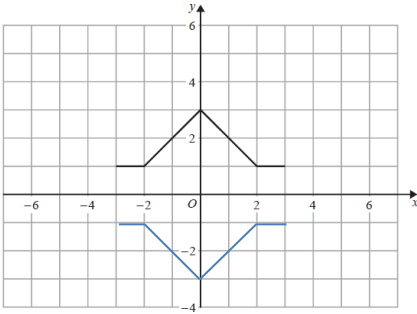
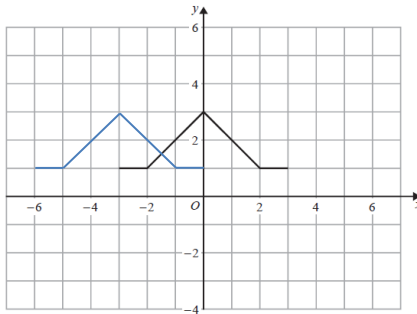
Question 9 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		M1	This mark is given for an approximate sketch of the graph $y = x^2$
		M1	This mark is given for a partially correct reflection of $y = x^2$
		A1	This mark is given for both curves sketched with the curves both passing through the origin

Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$y = -\cos x$ or $y = \cos(x + 180)$ or $y = \cos(x - 180)$ or $y = \sin(x - 90)$	B1	This mark is given for a correct equation
(b)	45 or 405 or -315	B1	This mark is given for a correct value given
	1	B1	This mark is given for a correct answer only

Question 11 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for the correct shape drawn
		B1	This mark is given for a fully correct sketch with labels
(b)		B1	This mark is given for a correct answer only
		B1	This mark is given for a correct answer only

Mark scheme for 1MA1 Higher themed papers: Transformations of Functions

Performance data:

Q	Taken from			Total Marks available	TOPIC	Spec Ref	AO	% Mean marks	Edexcel mean averages Marks of candidates who achieved grade:										
	Q	Series	Paper						ALL	9	8	7	6	5	4	3	2	1	U
1	18	June 2018	1H	2	Algebra	A13	2	55	1.10	1.91	1.69	1.44	1.13	0.82	0.53	0.29	-	-	0.16
2	11	Nov 2018	3H	2	Algebra	A12	2	5	0.10	1.90	1.47	0.61	0.22	0.04	0.01	0.00	-	-	0.00
3a	22a	Mock Set 1	1H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3b	22b	Mock Set 1	1H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3c	22c	Mock Set 1	1H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4a	20a	June 2017	3H	1	Algebra	A14	1	20	0.2	0.81	0.49	0.22	0.1	0.05	0.03	0.03	-	-	0.03
4b	20b	June 2017	3H	3	Algebra	A13	2	25	0.76	2.66	2.01	1.1	0.44	0.14	0.04	0.02	-	-	0.01
5	15	June 2019	3H	2	Algebra	A13	1	28	0.56	1.62	1.17	0.73	0.4	0.22	0.13	0.08	-	-	0.05
6a	18a	Nov 2018	1H	1	Algebra	A13	2	12	0.12	0.9	0.67	0.57	0.31	0.13	0.03	0.01	-	-	0.01
6b	18b	Nov 2018	1H	1	Algebra	A13	2	13	0.13	0.9	0.58	0.29	0.18	0.17	0.11	0.06	-	-	0.03
7a	20a	Nov 2019	1H	2	Algebra	A13	2	13	0.25	2	1.62	1.06	0.47	0.26	0.04	0	-	-	0.02
7b	20b	Nov 2019	1H	1	Algebra	A13	2	10	0.1	1	0.7	0.33	0.2	0.09	0.03	0.02	-	-	0.01
8	18	Mock Set 3	3H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	16a	Mock Set 4	2H	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10a	22a	Mock Set 4	3H	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10b	22b	Mock Set 4	3H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11a	19a	Spec Set 2	2H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11b	19b	Spec Set 2	2H	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				30					3.32	13.7	10.4	6.35	3.45	1.92	0.95	0.51	-	-	0.32