



General Certificate of Secondary Education

Mathematics

M2

Calculator Paper

Foundation Tier

[GMC21]

Assessment

**MARK
SCHEME**

GCSE MATHEMATICS

Introduction

The mark scheme normally provides the most popular solution to each question. Other solutions given by candidates are evaluated and credit given as appropriate; these alternative methods are not usually illustrated in the published mark scheme.

The marks awarded for each question are shown in the right hand column and they are prefixed by the letters **M**, **W** and **MW** as appropriate. The key to the mark scheme is given below:

M indicates marks for correct method.

W indicates marks for working.

MW indicates marks for combined method and working.

The solution to a question gains marks for correct method and marks for an accurate working based on this method. Where the method is not correct no marks can be given.

A later part of a question may require a candidate to use an answer obtained from an earlier part of the same question. A candidate who gets the wrong answer to the earlier part and goes on to the later part is naturally unaware that the wrong data is being used and is actually undertaking the solution of a parallel problem from the point at which the error occurred. If such a candidate continues to apply correct method, then the candidate's individual working must be **followed through** from the error. If no further errors are made, then the candidate is penalised only for the initial error. Solutions containing two or more working or transcription errors are treated in the same way. This process is usually referred to as "follow-through marking" and allows a candidate to gain credit for that part of a solution which follows a working or transcription error.

Positive marking:

It is our intention to reward candidates for any demonstration of relevant knowledge, skills or understanding. For this reason we adopt a policy of **following through** their answers, that is, having penalised a candidate for an error, we mark the succeeding parts of the question using the candidate's value or answers and award marks accordingly.

Some common examples of this occur in the following cases:

- (a) a numerical error in one entry in a table of values might lead to several answers being incorrect, but these might not be essentially separate errors;
- (b) readings taken from candidates' inaccurate graphs may not agree with the answers expected but might be consistent with the graphs drawn.

When the candidate misreads a question in such a way as to make the question easier only a proportion of the marks will be available (based on the professional judgement of the examining team).

General Marking Advice

- (i) If the correct answer is seen in the body of the script and the answer given in the answer line is clearly a transcription error, full marks should be awarded.
- (ii) If the answer is missing, but the correct answer is seen in the body of the script, full marks should be awarded.
- (iii) If the correct answer is seen in working but a completely different answer is seen in the answer space, then some marks will be awarded depending on the severity of the error.
- (iv) Work crossed out but not replaced should be marked.
- (v) In general, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered (with no solution offered on the answer line), mark the poorest answer.
- (vi) For methods not provided for in the mark scheme, give as far as possible equivalent marks for equivalent work.
- (vii) Where a follow through mark is indicated on the mark scheme for a particular part question, the marker must ensure that you refer back to the answer of the previous part of the question.
- (viii) Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures seen, e.g. the answer in the mark scheme is 4.65 and the candidate then correctly rounds to 4.7 or 5 on the answer line. Allow full marks for 4.65 seen in the working.
- (ix) Anything in the mark scheme which is in brackets (...) is not required for the mark to be earned, but if present it must be correct.
- (x) For any question, the range of answers given in the mark scheme is inclusive.

			AVAILABLE MARKS
1	February 2017	A1	1
2	(a) 4	A1	
	(b) $(14 + 10 + 10.5 + 13 + 12.5) \div 5$ M1 includes addition and division, A1 for accurate values 12 correct answer gains 3 marks even without work shown	M1 A1 MA1	4
3	(a) $200 \div 7.5$ (evidence of knowing to do this) 26.666 ... (this value gains first 2 marks even if in answer space) 26	MA1 MA1 A1	
	(b) $26 \times 7.5 = 195$ (follow through for integer answer in (a)) 5	MA1 A1	
	(c) $\text{£}10 - \text{£}4.70 = \text{£}5.30$ (mark gained for sight of 5.30) Pastie, Chips, Soft Drink	MA1 A1	7
4	(a) 24	A1	
	(b) 2 correct lines drawn (vertical and horizontal lines through middle of shape)	A1	2
5	(a) Correct face drawn (rectangle 4 across and 5 down attached to right-hand edge)	A1	
	(b) Evidence of 5, 2 and 4 $5 \times 2 \times 4$ 40	MA1 MA1 A1	4

		A1 A1	AVAILABLE MARKS
6	(a) Correct points plotted	A1 A1	
	(b) Point plotted at $(x, -2)$ where $-5 \leq x < 5$	A1	3
7	$4 \times 5 = 20$ $3 + 20 = 23$ with indication of Zach	A1 A1	2
8	(a) 16	A1	
	(b) 32	A1	
	(c) 12	A1	
	(d) $9n = 54$ 6	MA1 A1	5
9	(a) 0, 1, 2, 6, 11 (entries L to R, row by row) (award [1] for any 3 correct)	A2	
	(b) 7	A1	3
10	$8e - 9w$	A1 A1	2
11	$1400 \div 100 \times 4$ (oe) (or equivalent) 56 $56 \times 3 = 168$ ans 168 gains 3 marks, ans 56 gains 2 marks, with or without work shown	M1 MA1 A1	3

			AVAILABLE MARKS
12 (a) (i)	45	A1	
(ii)	38	A1	
(b) (i)	Stay the same	A1	
(ii)	Stay the same (2nd mark for reaching this stage)	A1	
(iii)	Increase	A1	5
13	Evidence of 160 cm and 80 cm as dimensions 160 + 160 + 80 + 80 (= 480 cm) 4.8 480 as answer gains 2 marks	MA1 MA1 A1	3
14	$38 \times 9.80 = 372.40$ $473.90 - 372.40 = 101.50$ $101.50 \div 14.50 = 7$ follow through for numerical errors	MA1 MA1 A1	3
15	17:42 to 18:00 = 18 mins 18:00 to 20:00 = 2 hours 18 mins + 2 hours + 11 mins = 2 hours 29 mins correct ans of 2hrs 29min or 149min gains 3 marks	MA1 MA1 A1	3
16	$12.8 \div 100 \times 5$ (oe) 0.64 or 64p 13.44	MA1 MA1 A1	3

			AVAILABLE MARKS
17 (a)	6 points plotted correctly ((4, 43), (1, 41), (9, 48), (6, 45), (5, 46), (5, 42)) (award [1] for 3, 4 or 5 correct)	A2	
(b)	5	A1	
(c)	more, higher	A1	
(d)	line drawn (roughly direction from (1, 40) to (9, 48) with approximately same number of points on either side)	A1	
(e)	reading from graph (where this line has 8 as first coordinate)	A1	6
18 (a)	$4t$	A1	
(b) (i)	$4t + 21 = 49$ (or similar, accept $4t = 28$ but not $t = 7$)	A1	
(ii)	$4t = 28$ 7	MA1 A1	4
19	Garden Store: $480 \div 32 = 15$ $15 \times 27 = 405$ Perfect Patio: $480 \div 80 = 6$ $6 \times 70 = 420$ 10% discount so final price 378 Quinn's Paving: $480 \div 16 = 30$ Needs to buy 25 boxes to get 30 $25 \times 17 = 425$ Perfect Patio is the cheapest follow through for numerical errors, but not for use of incorrect methods in any of the three calculations	MA1 MA1 MA1 MA1 MA1 A1	6
20	$3(x + 2)$	A1	1

			AVAILABLE MARKS
21 (a)	QPR = QRS = 65° (mark gained for angle QRS as 65 in diagram)	MA1	5
	TSR = 77° (may be marked in diagram)	MA1	
	$x = 180 - (77 + 65) = 38^\circ$ (3 marks for correct ans)	MA1	
(b)	No because $50 + 142 \neq 180^\circ$		
	or because $65 + 103 \neq 180^\circ$		
	or because the angles between the two lines do not add up to 180 so not parallel		
	or because $38 \neq 50$, corresponding.		
	Allow A1 for numerical error but correct argument	A2	
22	$6x - 2 + 5 = 4x + 8$ (1st mark for multiplying out correctly)	MA1	
	$6x - 4x = 8 - 5 + 2$		
	$2x = 5$ (2nd mark for reaching this stage)	MA1	
	$x = 2.5$	MA1	
	follow through for numerical errors only if work equally difficult, e.g .error in 2nd line giving $2x = 6$ – do not follow, but error in 2nd line giving $2x = 7$ – follow to last line for $x = 3.5$		
23	Median class = $80 < W \leq 90$	A1	
	Mean = $\frac{1 \times 65 + 5 \times 75 + 4 \times 85 + 6 \times 95}{16}$	MA1	
	= $\frac{1350}{16} = 84.375$	A1	
	Yes his statement is correct.	A1	
24	11 yes – only 2 factors (1 and itself)		
	111 no – divides by 3		
	1111 no – divides by 11	A2 for 3 correct, A1 for 2 correct	
	Reason required in each case		

		AVAILABLE MARKS		
25 (a)	after 1 year = £20 400	MA1		
	after 2 years = £17 340	MA1		
(b)	No because the overall depreciation is £6660	MA1		
	which is $\frac{6660}{24000} \times 100 = 27.75\%$ change	MA2		
or				
	No because 30% of £24 000 = £7200 and the caravan has only depreciated by £6660	MA2 MA1		
or				
	No because 30% of £24 000 = £7200 So value would be £16 800, still £17 340	MA2 MA1		5
26 (a)	all points correctly plotted straight line	MA1 A1		
	(b) (i) 40	A1		
	(ii) 20	A1		
(c)	£40 + 450 × 20p	M1		
	130	A1	6	
27	Area of large circle = $\pi \times 6^2 = 113.0973355$	M1 A1		
	Area of each semicircle = $\frac{1}{2} \times \pi \times 2^2 = 6.283185307$	MA1		
	Shaded area = $113.0973355 - 3 \times 6.283185307$ (must use 3 semicircles)	M1		
	= 94.24777961	A1	5	
		Total	100	