**General Certificate of Secondary Education
2019**

Mathematics

M2

Calculator Paper

Foundation Tier

[GMC21]

TUESDAY 21 MAY, MORNING

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).

1 (a) $2900 \div 5 \times 4 = 2320$ M1 A1

   (b) $\frac{3}{4}$, because $\frac{3}{4} = \frac{9}{12}$ which is larger than $\frac{2}{3} = \frac{8}{12}$ A1, A1

   (c) Una   A1   5

2 $£57 - £5 = £52$ MA1

   2 adult   A1

   3 senior citizen   A1   3

3 $<$ A1

   $>$ A1   2

4 (a) 2   A1

   (b) No (must also have a valid reason)   A1

        40 males but only 38 females (or 2 more)   A1   3

5 (a) $21 \times 8 \times 12.5$ MA1

        $2100 \, \text{cm}^3$ A1 A1 (units)

   (b) $15000 \div 2100$ or $15 \div 2.1$ $(= 7.142\ldots\ldots)$ MA1

        7   A1   5

6 (a) $10c + 3e$ A1 A1

   (b) 14   A1

   (c) 45   A1

   (d) $(5 \times 4) - (2 \times 7)$ or $20 - 14$ MA1

        6   A1   6

7 $8 \times 4 = 32$ (m^2)   MA1

   £64   A1   2

AVAILABLE MARKS

8 **(a)** 30   A1

   (b) sight of 'number of people' × 12   MA1

   angles 60 , 132 , 96 , 72   A1

   sectors drawn correctly and labelled correctly   A2

   (sectors drawn correctly, not labelled   A1)

   (c) 4   A1

   (d) (3 × 5) + (4 × 11) + (5 × 8) + (6 × 6)   MA1

   135   A1   8

9 £67 – £25 = £42   MA1

   £42 ÷ £1.20   MA1

   35   A1   3

10 2% of £1500 = £30   MA1

   3 × £30   MA1

   £90   A1   3

11 **(a)** 360 – (110 + 130 + 52)   MA1

   68   MA1

   112   A1

   (b) (180 – 32) ÷ 2   MA1

   74   A1   5

12 3.2 × £6 = £19.20   MA1

   £20.46 – £19.20 = £1.26   MA1

   £1.26 ÷ 1.8   MA1

   70p   A1   4

			AVAILABLE MARKS
13	70% , 64% , 68%	M1 A1	
	No (must also have a reason) ⎫ Her best mark was in Geography ⎬	A1	
	Alternative No because Geography 70% is higher than English 68%	M1 A1 A1	3
14	$\frac{35}{100} \times 880 = 308$	MA1	
	$880 - 308 = 572$ so not 570	A1 A1	3
15	**(a)** 8% of £840 = £67.20	MA1	
	£840 + £67.20 = £907.20	MA1	
	£75.60	A1	
	(b) 5% of £840 = £42 and £840 – £42 = £798	MA1	
	£907.20 – £798 = £109.20	A1	5
16	**(a)** 3 points plotted correctly	A1	
	all 5 points plotted correctly	A1	
	(b) suitable line drawn	A1	
	(c) follow from candidate's line	A1	4
17	One card must be 5 to allow mode to be 5	A1	
	Total of cards $5 \times 6 = 30$	MA1	
	Last card $= 30 - (3 + 5 + 8 + 5) = 9$	MA1	
	Range $= 9 - 3 = 6$	MA1	4
18	35 in overlap	MA1	
	$(95 - 35 =)$ 60 in French only	MA1	
	$(75 - 35 =)$ 40 in German only	MA1	
	$200 - (35 + 60 + 40) = 65$	A1	4
19	QSP = 110	MA1	
	TUP = 50 so QPU = 50 (alternate)	MA1	
	PQS $= 180 - (50 + 110) = 20$, $x = 180 - 20 = 160$	MA1	3

			AVAILABLE MARKS
20	$2.5 \times 7 + 7.5 \times 8 + 12.5 \times 5 + 17.5 \times 5 + 22.5 \times 4 + 27.5 \times 1 \ (= 345)$	M1 A1	
	$\dfrac{345}{30}$	MA1	
	$= 11.5$	A1	4
21	$8x - 12 - 2x + 10$	MA1	
	$= 6x - 2$	MA1	2
22	$200 = 2 \times 2 \times 2 \times 5 \times 5$	M1 A1	
	$2^3 \times 5^2$	A1	3
23	$2x + 10 + 2x + x + 20 = 180$	M1	
	$5x = 150$	MA1	
	$x = 30$	MA1	
	Smallest angle $= 50$	A1	4
24	Diagram correctly set up	M1	
	$4^2 + x^2 = 12^2$	MA1	
	$x^2 = 128$	MA1	
	$x = 11.3$	MA1	
	Perimeter $= 4 + 12 + 11.3 = 27.3$	MA1	5
25 (a)	20% increase, e.g. 120% of 150 = 180	M1 A1	
	20% decrease, e.g. 80% of 180 = 144 = decrease	MA1	
(b)	% decrease = 4%	M1 A1	
(c)	(20% decrease) $= 0.8 \times 1.2$ (20% increase) $=$ same **(or similar explanation/calculation to justify answer)**	M1 A1	7
	Alternative		
	20% decrease $= 0.8$ 20% increase $= 1.2$ $0.8 \times 1.2 = 0.96$		
	Total		**100**