AQA Qualifications

GCSE
Mathematics
Unit 3 43603H
Mark scheme

43603H
November 2014

Version/Stage: v1.1

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for Quality of Written Communication
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.149.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a candidate has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the candidate. In cases where there is no doubt that the answer has come from incorrect working then the candidate should be penalised.

Questions which ask candidates to show working

Instructions on marking will be given but usually marks are not awarded to candidates who show no working.

Questions which do not ask candidates to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Candidates often copy values from a question incorrectly. If the examiner thinks that the candidate has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments
1	**Alternative method 1**		
	$x +\ x - 3 +\ x\ + x - 3$ or $4x - 6$	M1	oe
	$4x - 6 = 40$ or $4x = 46$	M1dep	Equating to 46 and collecting like terms
	11.5	A1	
	Algebraic method used Expression for perimeter shown and equation set up and solved	Q1	Strand (ii) Must see working for the method marks to award
	Alternative method 2		
	$x +\ x - 3$ or $2x - 3$	M1	oe
	$2x - 3 = 20$ or $2x = 23$	M1dep	Equating to 23 and collecting like terms
	11.5	A1	
	Algebraic method used Expression for semi-perimeter shown and equation set up and solved	Q1	Strand (ii) Must see working for the method marks to award

1	Additional Guidance	
	11.5 with no working or from using trial and improvement.	M1 M1 A1 Q0
	$2x - 3 = 40$ (40 implies using Alt. Method 1)	M0 M0 A0 Q0

2	$9 \times 2 + 9 \times 2 + 7 \times 2$ or $18 + 18 + 14$ or $11 \times 9 - 7 \times 7$ or $99 - 49$ or $11 \times 2 + 7 \times 2 + 7 \times 2$ or $22 + 14 + 14$	M1	Fully correct method for working out area *A*
	50	A1	
	$\frac{1}{2}(6 + 9)7$ or $6 \times 7 + \frac{1}{2} \times 3 \times 7$ or $42 + 10.5$ or $9 \times 7 - \frac{1}{2} \times 3 \times 7$ or $63 - 10.5$	M1	oe Fully correct method for working out area *B*
	52.5	A1	
	B and 2.5	A1ft	dependent on M1 scored

3	6×35 or 210	M1	
	$210 + 60$ or 270	M1	
	27	A1	SC1 for 33

3	**Additional Guidance**
	SC1 comes from $35 \times 3 = 105$, $105 + 60$, $165 \div 5 = 33$

4	(155 – 15) ÷ 2 or 2x + 15 = 155 or 2x = 155 – 15 or 2x = 140	M1	oe
	(x =) 70	A1	
	500 – 120 – 155 (– 15) or 225 or 210 or 500 – 120 – 2 × their 70 – 2 × 15 or 2y + 15 + 120 + 155 = 500 or 2y = 500 – 15 – 120 – 155	M1	oe
	210 ÷ 2 or 2y = 210	M1dep	
	(y =) 105	A1	SC4 for correct answers reversed

5(a)	225 – 180 or 45 or North East or NE	M1	oe
	045	A1	

5a	Additional Guidance		
	Answer 45 is M1 A0		

5(b)	285°	B1	

6(a)	$25 \div \pi$ or [7.9, 8] or $25 \div 2\pi$	M1	
	[3.97, 4]	A1	Accept $\dfrac{25}{2\pi}$

6(b)	$32 \div 4$ or 8 or recognise that 90° implies ¼ of the circle	M1	$32 \times 2 \div 4$ or 16
	$32 \div 4 \times 3 \ (\times 2)$ or 24 $(\times 2)$ or $32 \div 4 \times 3 \times 2$	M1dep	oe $64 \div 4 \ \times 3$
	48	A1	

7	$3x - 25 + \ 2x + 5 + 50 + \ x \ = 360$	M1	oe
	$3x + 2x + \ x \ = 360 +25 - 5 - 50$ or $6x = 330$	M1dep	oe
	$(x =) \quad 55$	A1	
	55, 55 and 70	B1ft	ft their 55 + 15 and 180 – their 125
	Isosceles	Q1ft	Must see three angles for the triangle

8	Correctly evaluated trial	M1	e.g. 17^3 = 4913
	Obtains $18 \leq x \leq 19$	M1dep	18^3 = 5832… 19^3 = 6859…
	Obtains $18.1 \leq x \leq 18.2$ or Two correct trials [18.15, 18.25] which bracket 6000	A1	18.1^3 = 5929… 18.2^3 = 6028… 18.15^3 = 5979… 18.25^3 = 6078…
	Test 18.15 and concludes 18.2 or Two correct trials [18.15, 18.25] which bracket 6000 and 18.2 for final answer	Q1	Strand (ii) Using 2 dp to ensure 1 dp

9	20^2 and 9^2 or 400 and 81 or 319	M1	oe
	$\sqrt{20^2 - 9^2}$ or $\sqrt{400 - 81}$ or $\sqrt{319}$	M1dep	
	17.86… or 17.9	A1	Accept 18 if working shown

10(a)	Tangent chosen	M1	
	Tan $L = \dfrac{4}{7}$	M1dep	
	29.7… or 30	A1	

10(b)	Cosine chosen	M1	
	$\cos 32 = \dfrac{8}{x}$ or $x = \dfrac{8}{\cos 32}$	M1dep	oe
	9.4…	A1	Accept 9 if working seen

11(a)	$\dfrac{3}{4}$ or 0.75 or 75%	B1	oe

11(b)	5 × their 0.75 or 3.75	M1	oe 8 : 6 or 4 : 3
	40 and 22.5	A1ft	$4^2 : 3^2$ oe
	16 : 9	A1ft	ft their (a) SC2 for 9 : 16

12	$2x \times x \times 6x$ or $6x \times 6x \times 6x$ or 12 and 216	M1	oe
	$\dfrac{2x \times x \times 6x}{6x \times 6x \times 6x}$ or $\dfrac{12}{216}$	M1 dep	oe
	$\dfrac{1}{18}$	A1	

13(a)	Correct line drawn	B1	Must be full line

13(b)	$y = -x + 3$	B2ft	oe B1 for $y = -x + c$ B1 for gradient of new line $= -1$ B1 for y intercept is $+ 3$

14(a)	$\pi \times 9.2 \times 9.2$ or 265.(...)	M1	oe
	$\dfrac{125}{360} \times \pi \times 9.2 \times 9.2$	M1dep	oe
	[92, 92.5]	A1	

14(b)	½ × 9.2 × 9.2 × sin 125	M1	oe
	[34.6, 34.7]	A1	
	[57, 58]	A1ft	ft their (a) – [34.6, 34.7] Allow rounding of final answer

15(a)	70	B1	

15(b)	$ADE = 34$ or $AED = 180 - 70$ or 110 or $ADC = 180 - 70 - 34$ or 76	M1	Angles seen on diagram must be in correct place
	$ADE = 34$ and $AED = 180 - 70$ or 110	M1dep	
	36	A1	

16	180 – 28 – 74 or 78	M1	
	$\dfrac{BC}{\sin 28} = \dfrac{9}{\sin 78}$	M1dep	their 78
	$\dfrac{9\sin 28}{\sin 78}$	M1dep	their 78
	4.3 …	A1	Accept 4 is working seen

17(a)	D	B1	

17(b)	C	B1	

17(c)	E	B1	

18	$(x+3)(x-5) = 4x+1$	M1	oe
	$x^2 + 3x - 5x - 15$ or $x^2 - 2x - 15$	M1	
	$x^2 - 6x - 16 = 0$	A1	oe
	$(x+2)(x-8)$ or $x=-2$ or $x=8$	M1	ft their quadratic $(x+a)(x+b)$ where $ab = \pm16$ or $a+b = -6$ Quadratic formula: Allow one error
	$x=-2$ and $x=8$ or $x=-2$ and $y=-7$ or $x=8$ and $y=33$	A1	
	$x=-2$ and $y=-7$ and $x=8$ and $y=33$	A1	

19(a)	$MN = ½\mathbf{x} + ½\mathbf{y}$	B1	oe $MN = ½BC + ½CD$ $MN = MC + CN$
	$BD = \mathbf{x} + \mathbf{y}$	B1	oe $BD = BC + CD$
	BD is a multiple of MN	Q1	oe

19(b)	2 : 1	B1	