OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE MATHEMATICS

(9260)

PAPER 1 – Extension Tier
Mark Scheme

Specimen 2018

Principal Examiners have prepared these mark schemes for specimen papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

Glossary for Mark Schemes

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

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

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.
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 …	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
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 student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

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

Questions which do not ask students to show working

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

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student 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.

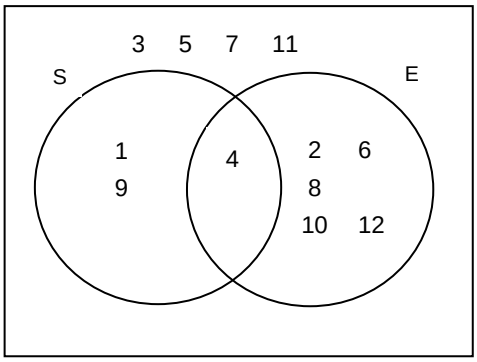
Premature approximation

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	$(x - 4)(x + 8) = 0$	B1	
2	60	B1	
3	$\frac{x}{3}$	B1	
4	$\begin{pmatrix} 7 \\ -5 \end{pmatrix}$	B1	
5	$5x + 20$ and $3x + 21$ (+ 2)	B1	
	$5x - 3x$ or $2x$ or $21 + 2 - 20$ or $23 - 20$	M1	their 21 + 2 – their 20 or their 23 – their 20
	$5x - 3x = 21 + 2 - 20$ or $5x - 3x = 23 - 20$ or $2x = 3$	M1dep	$5x - 3x$ = their 23 – their 20
	1.5	A1ft	oe
6	15.7×4 or 62.8	M1	
	their 62.8 = $\pi \times$ diameter	M1dep	oe their 62.8 = $2 \times \pi \times$ radius
	their 62.8 $\div \pi$	M1dep	their 62.8 $\div 2\pi$ radius = [9.95, 10]
	[19.9, 20]	A1	SC2 for [4.9, 5]

Q	Answer	Mark	Comments
7(a)	Correct product using at least one prime factor	M1	For example 2 (×) 126 or 3 (×) 84 or 7 (×) 36 or 2 (×) 2 (×) 63 or 2 (×) 3 (×) 42 May be implied eg in a factor tree or repeated division
	$2 \times 2 \times 3 \times 3 \times 7$ or $2^2 \times 3^2 \times 7$	A1	
7(b)	84	B1	

8	–1 and 2.5	B2	B1 for each

9(a)		B3	B2 Any 2 or 3 of the 4 sections correct B1 Any 1 of the 4 sections correct
9(b)	$\frac{1}{12}$	B1ft	oe ft their Venn diagram

Q	Answer	Mark	Comments
10	$\pi \times 40^2 \times 150$	M1	753982 or 240000π [753600, 754080]
	their 753982 ÷ 1000 or their 753982 ÷ 1000 ÷ 0.2	M1	753.982 or 240π [753.600, 754.080] 3770 [3768, 3770.4]
	their 3770 ÷ 60 (÷ 60) or (60 × 60 =) 3600 or 0.2 × 60 × 60 or 720	M1dep	62.83… or 1.04… [62.8, 62.84] or [1.04, 1.05]
	[62.8, 62.84] and Yes or [1.04, 1.05] and Yes or 3600 and 3770 and Yes or 753.9 and 720 and Yes	A1	oe
11(a)	375.112(1656)	B1	Condone if correctly rounded to 7 significant figures or better eg 375.1122
11(b)	20^2 or 400 or $\sqrt[3]{1000}$ or 10 or 5	M1	
	400 – 10 ÷ 5 = 398 or 400 – 2 = 398	A1	
12	$a = 6$	B1	Allow $6x$
	$b = 100$	B1	SC1 If values reversed $y = 6x + 100$ seen in script with no contradictory answers for a and b given allow B2

Q	Answer	Mark	Comments
13	**Alternative method 1**		
	20 ÷ (3 + 2) or 4	M1	
	their 4 × 3 × 2.8(0) or 33.6(0)	M1dep	
	their 4 × 2 × 3.5(0) or 28(.00) or 61.6	M1dep	dep on first M1
	61.60	A1	
	Alternative method 2		
	3 × 2.8(0) + 2 × 3.5(0) or 15.4(0)	M1	
	20 ÷ (3 + 2) or 4	M1	
	their 4 × their 15.4(0) or 61.6	M1dep	dep on M1 M1
	61.60	A1	

14(a)	[317,318]	B1	
14(b)	5.34×10^{24}	B2	B1 For 5.338×10^{24}

15	$\frac{40}{360} \rightarrow 2$ or 1 student = 20°	M1	oe Not 20% = 1 student
	2 × 9 or 360 ÷ 20 or 18	M1	Calculating number failing first time
	Their 18 ÷ 45 or 18 + 9	M1	
	27	A1	

Q	Answer	Mark	Comments
16(a)	$\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$	B2	B1 Rotation 180° (about/centre O) or indication that $\begin{pmatrix} 1 \\ 0 \end{pmatrix} \rightarrow \begin{pmatrix} -1 \\ 0 \end{pmatrix}$ or indication that $\begin{pmatrix} 0 \\ 1 \end{pmatrix} \rightarrow \begin{pmatrix} 0 \\ -1 \end{pmatrix}$ or $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} (\times) \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ or $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} (\times) \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ or reflection in $y = -x$ and $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$
16(b)	Correct square (vertices O, A" (–3, 0) B" (–3, –3) and C" (0, –3)) with correct labelling	B3	B2 Correct square with no or incorrect labelling or correct points plotted with correct labelling B1 3 by 3 square in wrong position (ignore labelling) or correct points plotted with incorrect or no labelling or enlargement scale factor –3 (centre O) or $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$ or $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \end{pmatrix} = \begin{pmatrix} -3 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} 0 \\ -3 \end{pmatrix}$

Q	Answer	Mark	Comments
17(a)	$\frac{4c^5}{3d^3}$ or $\frac{4c^5d^{-3}}{3}$	B3	B2 Any two of these three components • numerator having c^5 (no c in denominator) • denominator having d^3 (no d in numerator) or numerator having d^{-3} (no d in denominator) • number $\frac{4}{3}$ B1 Any one of these three components • numerator having c^5 (no c in denominator) • denominator having d^3 (no d in numerator) or numerator having d^{-3} (no d in denominator) • number $\frac{4}{3}$ or $\frac{40c^7d^3}{30d^6c^2}$ or $\frac{20c^7d^3}{15d^6c^2}$ or $\frac{8c^7d^3}{6d^6c^2}$ Always award SC1 if this is their final answer even if $\frac{4c^5}{3d^3}$ seen in working

Q	Answer	Mark	Comments
17(b)	$(m + 1)(m - 4)$ or $m^2 - 3m - 4$ Seen as a common denominator	B1	oe
	$5(m - 4) + 6(m + 1)$	M1	Allow one error in expansion if not showing brackets eg allow $5m - 20 + m + 6$
	$\frac{5m - 20 + 6m + 6}{\text{their common denominator}}$ or $\frac{5m - 206}{\text{their common denominator}}$ $\frac{6m + 6}{\text{their common denominator}}$	M1	Allow one error in expansion opf numerator(s) Their common denominator must be a quadratic
	$\frac{11m - 14}{(m + 1)(m - 4)}$ or $\frac{11m - 14}{m^2 - 3m - 4)}$	A1	
18	$\frac{1}{2}x^2 = 4$	M1	oe any letter
	$x^2 = 8$ or $\sqrt{8}$ or $2\sqrt{2}$	M1	
	(hypotenuse =) $\sqrt{\left(\sqrt{\text{their } 8}\right)^2 + \left(\sqrt{\text{their } 8}\right)^2}$ or $\sqrt{8+8}$ or $\sqrt{16}$ or 4	M1	
	$4 + 2\sqrt{8}$ or $4 + 4\sqrt{2}$ or $4 + 1\sqrt{32}$	A1	Condone $4 + \sqrt{32}$
19(a)	35	B1	
19(b)	100	B1	
	Angle at centre twice angle at circumference	B1	Must use words ‘centre’ and ‘circumference’ (or ‘perimeter’) Allow poor spelling even though both words given oe

Q	Answer	Mark	Comments
20	Cumulative frequency 46 should be 48	B1	oe
	Points should be plotted at end of class intervals	B1	oe
21	40 sin x	B1	
22	$7\sqrt{7}$	B1	
23(a)	*B* and *C* circled with no other letters circled	B1	
23(b)	$\frac{1}{2} \times 30 \times V = 270$	M1	oe
	18	A1	

Q	Answer	Mark	Comments
24	**Alternative method 1**		
	$(x + 3)^2 \pm 9$ or ± 7 or ± 11 (= 0)	M1	
	$(x + 3)^2 = 7$ or 11	M1dep	
	$x + 3 = \pm \sqrt{7}$	A1	
	$-3 \pm \sqrt{7}$	A1ft	ft on one error, ie $3 \pm \sqrt{7}$ or $-3 \pm \sqrt{11}$ SC3 $-3 + \sqrt{7}$
	Alternative method 2		
	$(x =) \frac{-6 \pm \sqrt{6^2 - 4 \times 1 \times 2}}{2}$	M1	Allow one sign error but not partial division or wrong formula
	$(x =) \frac{-6 \pm \sqrt{6^2 - 4 \times 1 \times 2}}{2}$	A1	No errors
	$(x =) \frac{-6 \pm \sqrt{28}}{2}$ or $\frac{6 \pm \sqrt{28}}{2}$ or $\frac{-6 \pm \sqrt{44}}{2}$	M1dep	
	$-3 \pm \sqrt{7}$	A1ft	ft on one error, ie $3 \pm \sqrt{7}$ or $-3 \pm \sqrt{11}$ SC3 $-3 + \sqrt{7}$
25	$(x - 4)(x + 4)$	B1	
	$(2x + 3)(x - 4)$ or $(2x + a)(x + b)$	M1	where $ab = \pm 12$ or $2b + a = -5$
	$\frac{x + 4}{2x + 3}$	A1	

Q	Answer	Mark	Comments
26	**Alternative method 1**		
	$\frac{8}{(3-\sqrt{5})} \times \frac{(3+\sqrt{5})}{(3+\sqrt{5})}$	M1	
	numerator = $24 + 8\sqrt{5}$ or denominator = $9 - 5$ or 4	A1	
	$6 + 2\sqrt{5}$	A1	
	Alternative method 2		
	$\frac{8}{(3-\sqrt{5})} = a + b\sqrt{5}$ or $8 = (a + b\sqrt{5})(3 - \sqrt{5})$ or $8 = 3a - 5b + 3\sqrt{5}\,b - a\sqrt{5} = 0$	M1	
	$3a - 5b = 8$ and $(3b - a)\sqrt{5} = 0$	A1	oe
	$a = 6$ and $b = 2$	A1	

27	$\frac{4}{9}$ or $\frac{5}{9}$ or $\frac{3}{8}$ or $\frac{5}{8}$ or $\frac{4}{8}$	M1	oe
	$\frac{4}{9} \times \frac{3}{8}$ or $\frac{4}{9} \times \frac{5}{8}$ or $\frac{5}{9} \times \frac{4}{8}$	M1	oe 0.166… or 0.277… or 0.17 or 0.28
	$\frac{4}{9} \times \frac{3}{8} + \frac{4}{9} \times \frac{5}{8} + \frac{5}{9} \times \frac{4}{8}$	M1	$1 - \left(\frac{5}{9} \times \frac{4}{8}\right)$
	$\frac{52}{72}$ or $\frac{13}{18}$	A1	oe 0.72(2…)

Q	Answer	Mark	Comments
28	$4^2 + 6^2$ or $16 + 36$ or 52 or $2^2 + 3^2$ or $4 + 9$ or 13	M1	Correct attempt at BD^2 or BX^2
	$\frac{1}{2} \times \sqrt{\text{their } 52}$ or $\sqrt{\text{their } 13}$ or [3.6, 3.61]	M1dep	Correct attempt at BD or BX
	tan (EBD =) $\frac{7}{\text{their } [3.6, 3.61]}$	M1	oe
	[62.7, 62.8]	A1	Accept 63 with correct method seen
29	$\frac{1}{3}$ (×) π (×) $(2p)^2$ (×) $5p$ $\left(\frac{20\pi}{3}p^3\right)$	B1	oe Missing brackets B0 unless recovered May be implied by working for M1
	their $\frac{1}{3}$ (×) π (×) $(2p)^2$ (×) $5p$ = $22\,500\pi$	M1	oe eg $\frac{20\pi}{3}p^3 = 22\,500\pi$ π may already be cancelled or value for π may be substituted in Must be equating two volumes
	Correctly rearranges to p^3 = eg $p^3 = 22\,500\pi \div$ their $\frac{20\pi}{3}$	M1dep	oe eg $p = \sqrt[3]{3375}$
	15	A1	SC3 [18.8, 18.9]

Q	Answer	Mark	Comments
30	**Alternative method 1**		
	$x^2 - 12$ or $x - 4y$	M1	
	$x^2 - 12 = 4x$ and $x - 4y = 8$	M1	These can still be in matrix form
	$(x - 6)(x + 2)$ (= 0)	A1	$x = \frac{-(-4) \pm \sqrt{\{(-4)^2 - 4 \times 1 \times 1 \times (12)\}}}{2(1)}$
	$x = 6$ and -2	A1ft	ft their quadratic if possible or $x = 6$ and $y = -\frac{1}{2}$
	$y = -\frac{1}{2}$ and $-2\frac{1}{2}$ or $-\frac{5}{2}$	A1ft	ft from their x values or $x = -2$ and $y = -2\frac{1}{2}$
	Alternative method 2		
	$x^2 - 12$ or $x - 4y$	M1	
	$x^2 - 12 = 4x$ and $x - 4y = 8$	M1	These can still be in matrix form
	$(4)(2y + 5)(2y + 1)$ (= 0) or $(8y + 20)(2y + 1)$ (= 0) or $(2y + 5)(8y + 4)$ (= 0)	A1	$y = \frac{-12 \pm \sqrt{12^2 - 4 \times 4 \times 5}}{2(4)}$ or $y = \frac{-48 \pm \sqrt{48^2 - 4 \times 16 \times 20}}{2(16)}$
	$y = -\frac{1}{2}$ and $-2\frac{1}{2}$ or $-\frac{5}{2}$	A1ft	ft from their quadratic if possible or $y = -\frac{1}{2}$ and $x = 6$
	$x = 6$ and -2	A1ft	ft from their y values or $y = -2\frac{1}{2}$ and $x = -2$

Q	Answer	Mark	Comments
31	$3x^2 + b$	M1	At least one term correct
	Substitutes -2 into their $\frac{dy}{dx}$ and equates to zero $3 \times (-2)^2 + b = 0$	M1dep	Must have x in term $12 + b = 0$
	$b = -12$	A1	
	$(-2)^3$ + their $b(-2) + c = 20$	M1dep	Dep on M2 having a value for b
	$c = 4$	A1ft	ft their b and M2 A0 M1 dep with no errors in final M1