Cambridge International Examinations
Cambridge International General Certificate of Secondary Education (9–1)

MATHEMATICS **0626/06**

Paper 6 (Extended) **For Examination from 2017**

SPECIMEN MARK SCHEME

2 hours

MAXIMUM MARK: 96

This syllabus is regulated in England as a Cambridge International Level 1/Level 2 (9–1) Certificate.

This document consists of **9** printed pages and **1** blank page.

Marking instructions

MARKING - GENERAL

1. Where a candidate has crossed out a complete part of a question, it should be marked provided that it has not been replaced.

2. If two or more methods are offered, mark the method that leads to the answer on the answer line.

3. Method marks are for a full correct method but may be lost if subsequent incorrect method is shown.

4. Unless a particular method has been specified in the question, full marks may be awarded for any correct method. However, if a calculation is required then no marks will be awarded for a scale drawing.

5. Where the answer in the answer space is incorrect because of a clear transcription error, then marks may be awarded.

6. Occasionally a candidate will misread a number in a question and use that value consistently throughout. Provided that number does not alter the difficulty or method required, award all marks earned and penalise 1 mark. **M** marks are still awarded in any case. Record this by using the **MR** annotation.

7. Unless specified in the question, answers may be given as fractions, decimals or in standard form. Ignore superfluous zeros provided that the degree of accuracy is not affected.

8. Allow any sensible notation. Watch out for commas being used for decimal points and dots being used for products. Brackets may be seen to represent inequalities.

9. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

10. FT – A correct answer will score or follow through after an error.
    Strict FT – you must follow through from their error. These will be indicated in the mark scheme.

ABBREVIATIONS IN MARK SCHEME

Abbreviation	Meaning
M	Method marks – for a correct method applied to appropriate numbers
A	Accuracy marks – depend on M marks. Hence M0 A1 is not possible
B	Independent of method marks – for a correct final answer or intermediate stage
SC	Marks given in special cases only when indicated in mark scheme
FT	Work can be followed through after an error
isw	Ignore subsequent working (after correct answer obtained)
cao	Correct answer only
nfww	Not from wrong working
oe	Or equivalent
soi	Seen or implied
eeo	Each error or omission
dep	Dependent on the previous mark(s)

ACCURACY

1. If a question asks for a particular level of accuracy then the mark scheme will include specific details.

2. In other cases, the following apply:
   - More than 3 sf in the answer but correct (either rounded or truncated to 4 or more figure accuracy) – allow full marks.
   - Less than 3 sf in the answer but correct to 3 or more sf seen in the working – allow full marks even if rounded incorrectly.
   - 3 sf incorrect in the answer but 3 or more correct seen in the working – allow full marks.
   - If the third sf is zero after the decimal point (e.g. 15.0) then allow marks for 2 sf answers providing no wrong working is seen.

3. General principles are:
   - 2 sf answers will not imply method in most cases.
   - If the final answer on the answer line has clearly been spoiled from the 3 sf or more answer seen in the working (more than just rounding errors) don't allow the marks.
   - Mark at most accurate which is usually where the answer is first seen.
   - If the most accurate answer is incorrect then it scores zero, even if it has been correctly rounded into a correct answer.
   - If this answer is then used in another part of the question then any **M** marks are available.
   - If an accuracy FT is also available in the new part, then give the FT mark for a correct follow through from a value which has lost the accuracy mark in the first part.
   - However, a correct value from the first part may have been given the accuracy mark but has then been rounded incorrectly and this has been condoned. If the wrongly rounded value is used in the new part and leads to an incorrect answer, even if correctly followed through, then this should not receive the accuracy mark here and should not be treated as a FT case.

4. **Exact answers involving π and $\sqrt{}$**

- Exact answer 2.345 π — Unless question is set in context (where some appreciation of appropriate accuracy is required),
  allow **A1** for 2.345 π on the answer line,
  allow **A0** for 2.35 π.
  Mark scheme will indicate in final column if marks to be allowed.
- Exact answer $\sqrt{23}$ — Scores **A1** if the question is not set in context and the √(prime number) is given on the answer line.
  Scores **A0** if the question is set in context (where some appreciation of appropriate accuracy is required).
  Surd answers which simplify need not be implied e.g. $\sqrt{12}$ or $2\sqrt{3}$ are acceptable but not irrational denominators – if simplified, mark the simplified answer i.e. not isw.
  Mark scheme will indicate in final column if marks to be allowed.

Qu.			Answers	Mark	Part Marks	Notes
1	(a)		50.27	6	**B3** for 53.2[0] seen or **M2** for $2 \times 6\ (6 + 4 \times 2) + 3 \times (3.60 + 4 \times 1.20)$ or **M1** for $6 + 4 \times 2$ and $3.60 + 4 \times 1.20$ or better seen **M1** for *their* 53.2[0] × 1.05 oe [63.84] and **M1** for multiplying *their* costs at any stage by 0.90	
	(b)		11 cao	4	**B2** for 201 or **M1** for $2 \times \pi \times 32$ or $2 \times \pi \times 0.32$ **M1FT** for 2400 ÷ *their* 201 oe If 0 scored **SC3** for answer 11.9 or **SC2** for figs 119 as answer	Accept 2.01 or 64π or 0.64π for **B2**
	(c)		11.6	3	**M2** for 40 × [0].29 or **M1** for $\frac{360}{9} \times 29$ soi by 1160	
2	(a)	(i)	798 or 798.4 to 798.41	2	**M1** for $10712 \div 13\frac{25}{60}$ or 10712 ÷ 13.4...	
		(ii)	1.82×10^5 or 1.815×10^5 to 1.816×10^5	4	**B3** for 182 000 or 181 500 to 181 600 seen or **M2** for 10 712 000 ÷ 59 oe or **M1** for figs 10 712 ÷ figs 59 soi by figs 182 or figs 1815 to 1816 and **B1FT** for *their* number of litres correctly converted to standard form rounded to 3sf or better	
	(b)		8600	3	**M2** for 10148 ÷ 1.18 oe or **M1** for 10148 associated with 118[%]	
3	(a)	(i)	640×1.02^6 oe = 720.7…	**M1** **B1**	Must be seen	
		(ii)	3.02 or 3.020 to 3.024… nfww	4	**M3** for $[x =] \sqrt[4]{721 \div 640}$ or better (implied by answer of 1.03[02…] or $r = 0.0302[4\ldots]$ or **M2** for $(\textit{their } x)^4 = 721 \div 640$ or **M1** for $640 \times (\textit{their } x)^4 = 721$ oe	

Qu.			Answers	Mark	Part Marks	Notes
	(b)		874.80 final answer	**2**	**M1** $1200 \times (1 - 0.1)^3$ oe	
4	**(a)**		$\frac{2(s-ut)}{t^2}$ oe nfww	**3**	**M1** for a correct rearrangement to isolate the a term **M1** for a correct multiplication by 2 **M1** for a correct division by t^2	
	(b)	**(i)**	$\frac{16}{5}$ or better [3.2]	**1**		
		(ii)	280	**3**	**M2** for $\frac{1}{2}$ (25 + 10)16 oe or **M1** for correct attempt to find one relevant area	
5	**(a)**	**(i)**	(100 – 70) × 0.4 [= 12] or better	**1**	Accept $\frac{24}{78} \times 39$ oe	Not enough for $\frac{x}{0.4} = 30$ then $x = 12$ Must arrive at 12 and not use it – no reverse method
		(ii)	60.9 or 60.89... nfww	**5**	**B1** for 3 or 4 correct extra frequencies 3, 6, 10, 8 soi **M1** for at least 4 of mid-interval values 15, 40, 55, 65, 85 soi **M1** for Σfx where x is any value in each interval allow *their* frequencies provided integers and they must be shown [3 × 15 + 6 × 40 + 10 × 55 + 8 × 65 + 12 × 85] [2375] **M1 (dependent on second M1)** for ÷ 39 or ÷ (3 + 6 + 10 + 8 + 12)	e.g. 30 × 0.1 for 3 Condone one error or omission Including either boundary and condone one further error or omission
	(b)		60.5	**3**	**M2** for 20 × 70 – 19 × 70.5 oe or **M1** for either 20 × 70 or 19 × 70.5	**M1** implied by 1400 or 1339.5 seen

Qu.			Answers	Mark	Part Marks	Notes
6	(a)		45.[0] or 45.01 to 45.02 nfww	4	**M2** for $55^2 + 70^2 - 2 \times 55 \times 70 \cos 40$ or **M1** for correct implicit equation **A1** for 2026.[...]	
	(b)		84.9 or 84.90 to 84.91	4	**B1** for angle $BDC = 40$ soi **M2** for $\frac{70 \sin (\textit{their } 40)}{\sin 32}$ or **M1** for correct implicit equation	
	(c)		4060 or 4063 to 4064 nfww	3	**M2** for $\frac{1}{2}(55 \times 70 \sin 40)$ $+ \frac{1}{2}$ ($70 \times$ *their* **(b)** $\sin (180 -$ *their* $40 - 32)$) oe or **M1** for correct method for one of the triangle areas	
	(d)		35.4 or 35.35... nfww	2	**M1** for $\sin 40 = \frac{\textit{distance}}{55}$ or better or for $\frac{1}{2}(55 \times 70 \sin 40) = (70 \times \text{distance}) \div 2$ or better	
7	(a)		(0, 16) (4, –16)	6	**M1** for $3x^2$ or $12x$ **A1** correct $3x^2 - 12x$ **B1** setting *their* $\mathrm{d}y/\mathrm{d}x = 0$ **M1** for factorising *their* $\mathrm{d}y/\mathrm{d}x$ **A1** $x = 0$ and $x = 4$ **A1** (0, 16) and (4, –16)	
	(b)		(0, 16) maximum with correct reason (4, –16) minimum with correct reason	3	**B2** for both correct with no/one reason or **B1** for one correct (with no reasons) or **M1** correct attempt to find e.g. second derivative or gradients	

Qu.			Answers	Mark	Part Marks	Notes
8	(a)		(5, –3) (–3, 5)	6	**M2** for $x^2 + (2 - x)^2 = 34$ or $(y - 2)^2 + y^2 = 34$ or **M1** for $y = 2 - x$ or $x = 2 - y$ **M1FT** for $2x^2 - 4x - 30 = 0$ oe **M1FT** for $(x - 5)(x + 3) = 0$ **A1** for $x = 5$, $x = -3$ **A1FT** for $y = -3$, $y = -5$	Rearranging their quadratic to = 0 Factorising their quadratic equation FT correctly substituting their x into $x + y = 2$
	(b)		$\sqrt{(their\ x_A - their\ x_B)^2 + (their\ y_A - their\ y_B)^2}$ $\sqrt{(-3-5)^2 + (5-(-3))^2}$	**M1** **A1**		
9	(a)	(i)	90 ÷ (42/360 × π × 8^2) oe 3.836 to 3.837	**M3** **A1**	**M2** for 42/360 × π × 8^2 × h = 90 or **M1** for 42/360 × π × 8^2	
		(ii)	131 or 130.75 to 130.9 nfww	**5**	**M2** for 42/360 × π × 2 × 8 × 3.84 oe [22.48 to 22.53] **or** **M1** for 42/360 × π × 2 × 8 oe soi [5.86 to 5.87] and **M1** for 2 × (8 × 3.84) [61.37 to 61.44] and **M1** for 2 × (42/360 × π × 8^2) [46.88 to 47]	

Qu.			Answers	Mark	Part Marks	Notes
	(b)		2.42 or 2.416 to 2.419...	**3**	**M2** for $3.84 \times \sqrt[3]{\frac{22.5}{90}}$ oe or $h = \sqrt[3]{\frac{3.84^3 \times 22.5}{90}}$ or **M1** for $\sqrt[3]{\frac{22.5}{90}}$ oe or $\sqrt[3]{\frac{90}{22.5}}$ oe seen or $\frac{3.84^3}{h^3} = \frac{90}{22.5}$ oe	
10	**(a)**		2^{n-1} oe	**2**	**B1** for 2^k seen	
	(b)		$[a =] \frac{1}{2}$ oe, $[b =] \frac{3}{2}$ oe	**6**	**B1** for 12 or 30 seen but if 30 clearly only from diagram 4 then **B0**. **M1** for any 1 of $a + b + 1 = 3$ oe, $8a + 4b + 2 = 12$ oe, $27a + 9b + 3 = 30$ oe **M1** for a 2nd of the above equations **M1** (indep) for correctly eliminating a or b from pair of linear equations **A1** for one correct value	

BLANK PAGE