OCR
Oxford Cambridge and RSA

GCSE

Applications of Mathematics

Unit **A381/01:** Applications of Mathematics 1 (Foundation Tier)

General Certificate of Secondary Education

Mark Scheme for November 2015

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

Annotations used in the detailed Mark Scheme.

Annotation	Meaning
✓	Correct
×	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
∧	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A, B**, etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are for a correct final answer, a partially correct answer, or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^2$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** after correct answer obtained and applies as a default.
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.
   - **soi** means **seen or implied**.

6. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

(ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

8. In questions with a final answer linefor

(i) If one answer is provided on the answer line, mark the method that leads to that answer.

(ii) If more than one answer is provided on the answer line and there is a single method provided, award method marks only.

(iii) If more than one answer is provided on the answer line and there is more than one method provided, award zero marks for the question unless the candidate has clearly indicated which method is to be marked.

9. In questions with no final answer linefor

(i) If a single response is provided, mark as usual.

(ii) If more than one response is provided, award zero marks for the question unless the candidate has clearly indicated which response is to be marked.

10. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

11. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

12. Ranges of answers given in the mark scheme are always inclusive.

13. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

14. 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.

MARK SCHEME

Question			Answer	Marks	Guidance	
1	(a)	(i)	763	1		Do not allow 763.0 etc.
		(ii)	Integer in range 75 to 80	2	**M1** for 76.305 **or** 76.3 or $n/10$ where n 750 to 800	Evidence of 763. ... ÷ 10
		(iii)	228.207 rot	1		At most to nearest whole number.
	(b)	(i)	624.[241 ...]	2	**M1** for 'number' ÷ 5.767 **or** 3600 ÷ rot 5.767	
		(ii)	633.[468 ...] or 633.46 to 633.5	2	**M1** for 11.(...) seen in working **or** (7200)÷(5.67+5.599) **or** **SC1** for (7200÷5.767) + 5.599 soi **or** (7200÷5.599) + 5.767 soi **or** 3600 ÷ (their 'b(i)' + 5.599) soi	May be evidenced by 1254. (.....) 1291. (.....) or 1292 5.7 .... (for example)
		(iii)	16.[09 ...] [cm]	2	**M1** for 1609.344 ÷ (10 000 × 100) oe **or** **B1** for 0.16 .... seen	Must show the correct calculation
	(c)	(i)	19800 [N(ewton)s]	2	**M1** for figs 198 **or** 2 200 **or** 220 **or** 22000 x 0.9 soi	
		(ii)	$\frac{21}{22}$	2	**B1** for $\frac{21000}{22000}$ or better isw	
	(d)		415.[692 ... ...] [mph] 415 or 416 or 415.6 to 415.7	3	**B1** for figs 1728 seen **M1** for $\sqrt{their}$ '172800'	Effectively credit for using calculator to find a square root (allowing for rounding in the answer)

Question			Answer	Marks	Guidance	
	(e)	**(i)**	192 [kg]	**1**		
		(ii)	20 [seconds]	**2**	**M1** for $\frac{960}{48}$ **or** $[t =]\frac{'f'}{48}$ **or** better soi	Essentially *their* 'number' ÷ 48
2	**(a)**	**(i)**	Ruled regular hexagon Ruled regular rectangle	**1** **1**		Penalise obviously unruled 'straight line' just once.
		(ii)	Ruled 30° angle (28 to 32)° Ruled 15° angle (13 to 17)°	**1** **1**		Non-obvious angles will need use of angle measurer overlay (hence generous range but must pass through at least three dots – isolated angles with no obvious relationship to dots gain no credit.
	(b)	**(i)**	78 to 82 [mm]	**1**		
		(ii)	(3, 2)	**1**		
3*			Correct total of **£3.88 + £1.50** = **£5.38** giving profit of **£9.12**. Jake **not correct**	**4**	**B1** for (£)3.88 **M1** for *their* '£3.88'+ 1.50 **M1** for £14.50 - *their* '£3.88+ 1.50' **B1FT** for Appropriate yes/no o.e. based on *their* final evaluated product Mark reverse order calculation in the same spirit	If the addition of the £1.50 for postage in omitted can get B1 M0 M1 B1FT Costings with all and with 1 coin missing for coins £3.88 £3.87 £3.86 £3.83 £3.78 incl. pp £5.38 £5.37 £5.36 £5.33 £5.28 profit £9.12 £9.13 £9.14 £9.17 £9.22 coins £3.68 £3.38 £2.88 £1.88 incl. pp £5.18 £4.88 £4.38 £3.38 profit £9.32 £9.62 £10.12 £11.12

Question			Answer	Marks	Guidance	
4	(a)	(i)	[£]60	2	**M1** for '20' x 3 seen in working	Operation (×3) must be seen
		(ii)	[£]600	1FT	**FT** on *their* '£60'	10 × 4(a)(i)
		(iii)	Wendy would save money (FT on *their* '(£)600') by joining the club oe and supported by full correct working with at least 4 relevant correct calculations including total cost £480	5	**4** for full correct working giving total cost as £480 with incorrect or missing conclusion **or** Correct for 1 hour lessons ((£)360) or other lesson time but not stated explicitly or strongly implied as 1 hour lessons, but need a correct conclusion consistent with their previous '£600' course cost. **3** for at least 3 relevant correct calculations shown (see list) **2** for at least 2 relevant correct calculations shown (see list) **1** for 1 relevant correct calculation shown (see list) **Approach 3** – cost per hour × hours + joining club fee **Cost of flying per hour** • 30 × 60 soi [£]18 or 1800[p] **Cost of launches per hour** • 3** x [£]6 soi [£]18 **Total cost for flying for 10 hours** • *Their* '(cost of flying **+** launches)' ×10 soi [£]360 **Total cost of learning to fly** • *Their* 'three component costs' (previous cost + [£]120 joining fee)	Each bullet point indicates "one relevant correct calculation" **Allow FT in a • iff candidates state or strongly imply lesson time different to 20 mins **Approach 1** – launches cost + flying mins cost + joining club **Launch cost** • 10 × 3** soi by **30 [lessons]** • *Their* '30' × 6 soi by [£]**180** (can imply the first •) **Flying time** • 10 × 60 soi by **600**[mins] • *Their* '600' × 0.30 soi by [£]**180** or **18000** [p]] (implies the first •) **Total cost** • *Their* '180' + *Their* '180' + 120 (3 components) **Approach 2** – cost per lesson × lessons + joining club • 20** × 0.30 soi by [£]**6 or 600**[p] [cost per lesson] • *Their* '6' + 6 soi by [£]**12** [total cost per lesson] • 10** × 3 soi by **30** [number of lessons] • *Their* 12 × *their* 30 soi by **360** [total flying and take off] • *Their* 360 + 120 (must be 3 components) [total cost] •

Question			Answer	Marks	Guidance	
	(b)		(Each adult pays £) 80 (Each youngster pays £) 16	**4**	**B1** for 80 **and** **M2** for (400 – 4 × *their* '80') ÷ 5 may be soi by (400 – 320) ÷ 5 or better **or** **M1** for 400 – 4 × *their* '80' soi	
	(c)	**(i)**	1.5 to 3	**1**		
		(ii)	20 to 60	**1**		
	(d)	**(i)**	7 [m^2]	**2**	**B1** for 3.5 seen **or** **M1** for 5×0.7×2 o.e. **or** **SC1** for 7.42 from 10.6 × 0.7	
		(ii)	16.[051 ...]	**3FT**	**Full FT** for 10.6^2 ÷ *their* 'wing area **or** **B2** for 112.36 (10.6^2) **or** **B1** for 10.6 **or** **M1** for $(5+5+.6)^2$ soi	
		(iii)	109 to 111 [miles per hour /mph]	**1**		

Question			Answer	Marks	Guidance	
	(e)	(i)	<table><tr><td>*h* (km)</td><td>0</td><td>5</td><td>10</td><td>15</td></tr><tr><td>*d* (°C)</td><td>0</td><td>**32**</td><td>**64**</td><td>96</td></tr></table>	1		Must have both correct
		(ii)	Single straight line ruled from (0,0) to (15, 96) and no incorrect points	2	**M1** for 'their' 3 or 4 correct points plotted corectly (± ½ a "square") **or** **M1** for single straight line ruled from (0,0) to (15, 96)	
		(iii)	30 000 ÷ 1000 × 0.3 [Temperature change =] 57 to 58 Incorrect	**M1** **B1** **A1**	soi by 9 [km] Could be indicated on graph Only earned if 57 to 58 value quoted If M1 B0 then also SC1 for *their* correcteading from graph.	Allow M1 for 9000 m
	(f)		[0]66[°] to [0]70 [°]	2	**M1** for straight line linking two towns	
	(g)		[£]150	2	**M1** for figs 15 **or** 0.05 x 3000 soi	

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