OCR
Oxford Cambridge and RSA

GCSE

Applications of Mathematics (Pilot)

Unit **A381/01:** Foundation Tier

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

1. 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

2. **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.

3. 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.

4. 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.

5. 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.

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

   i. **cao** means **correct answer only**.
   ii. **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.
   iii. **isw** means **ignore subsequent working** (after correct answer obtained).
   iv. **nfww** means **not from wrong working**.
   v. **oe** means **or equivalent**.
   vi. **rot** means **rounded or truncated**.
   vii. **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.
   viii. **soi** means **seen or implied**.

7. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

8. As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).

9. 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.

10. 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.

11. If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

    If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

    If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

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.

Question			Answer	Marks	Guidance	
1	(a)	i	462	1		
		ii	$\frac{3}{4}$	2	**B1** for $\frac{75}{100}$ oe isw	
		iii	25%	1		Must be %
		iv	1 496 186	1		Condone 1,496,186 oe
		v	1 496 000	1FT		Condone 1,496,000 oe
	(b)*					
			1 each, max of 3 (CAO) [Total area] 99 (m^2) [Area for books] 48 or 32 x 1.5 seen [other things] 34 (m^2) or 14 + 20 soi [area left for computers] 17 FT (m^2) **And** *Their* "17" must have derived from a calculation (possibly erroneous) *Their* "17" ÷ 3 rot **And** Comment/assumption **And** [labelled calculation]	3 1 1 1		Effectively 4 arithmetic marks based on key numbers) 1 for labelling any one calculation [for example oe] 1 for general comment/assumption (as before) e.g. "space for walking needed, prams " e.g. shelves …… or total area … but must be more than repeat of given data – a calculation Just answer gets max. of 4 (implied 4 calculation marks)

Question			Answer	Marks	Guidance	
	(c)		C with valid reason (easier to "do" or best to round price up oe)	**2**	1 for C without valid reason or B chosen + reference to rounding **closest** to *numbers in calculation*.	Must refer to numbers involved in the actual calculation, not the result of multiplying them.
	(d)		Total length of shelving is 13 . (...) or 14 m.	**1** **1** **1FT** **1FT**	HD DVD holds 15 000 books Or 28 000 000 (Mb) seen Total number of HD DVDs needed is 933, 935 , 933.3, 950 or 1000 ... Total thickness of these is *Their* "(933, 935 or 933.3 ...)" x 14 mm =13. .... metres	Can be assumed by correct total of HD DVDs needed i.e. 2nd mark implies the first Full credit for 13. … iff some relevant working This mark is for changing *their* mm in metres, If zero scored SC2 for 13.00 or 14
2	**(a)**	**(i)**	15	**2**	**B1** for **a**ny two of these operations seen in a calculation [10] [× 0.5] [× 3] soi or figs 15	e.g. for soi 5, 30, 1.5
		(ii)	[*d* =] 3*Mh*	**1**		Order not crucial (e.g. *h* X 3 X *M* etc.), condone: $3 \times M \times h$

Question			Answer	Marks	Guidance	
	(b)	**(i)**	98	**2**	**M1** for $2 \times 7 \times 7$ Or **B1** for 49 seen	
		(ii)	A D E F H	**2**	**B1** for at least 4 correct and no more than 1 wrong	i.e. 4 correct out of 4 or 4 correct out of 5
		(iii)	Q I	**2**	**B1** for one correct and one wrong or two correct and 1 extra (wrong)	i.e. at least one right and no more than 1 wrong
	(c)	**(i)**	50°	**1**		
		(ii)	50°	**1FT**	Follow through from part (i)	
		(iii)	Parallelogram	**1**	Mark for intent not spelling	
		(iv)	Circle the letter(s) which show an acute angle. p q r (s) Circle the letter(s) which show an obtuse angle. p (q) (r) s Circle the letter(s) which show a reflex angle. (p) q r s	**2**	**B1** Two correct lines	
	(d)	**(i)**	(2.4, 48.9)	**1**		
		(ii)	(3.1, 50.6) indicated	**1**		Condone lack of label, mark by intent but don't allow e,g. L and associated ambiguity See overlay
		(iii)	(20 to 24)°	**2 FT**	**B1** Straight line connecting Paris and Lille (FT) or answer of 200 to 204	Condone "straight-by-eye" Leading zero not necessary Follow through on a wrong Lille.
	(e)	**(i)**	40	**1**		
		(ii)	2400	**1FT**	Follow through from part (i)	60 × e(i)
		(iii)	120 [times faster]	**1FT**	Follow through from part (ii)	*Their* "2400" ÷ 20 rot

Question			Answer	Marks	Guidance	
	(f)	**(i)**	17	**1**		
		(ii)	3	**1**		
	(g)	**(i)**	(6 to 10)	**1**		
		(ii)	(2 to 6)	**1**		
		(iii)	1844	**1**		
	(h)	**(i)**	64	**1**		
		(ii)	12.9	**1**		
		(iii)	109	**1**		
3	**(a)**	**(i)**	2.6	**2**	**B1** for 5.6 or 5.2 or 26 seen	The 5.2 for radius/diameter problems
		(ii)	1.3	**1FT**	Full follow through	
	(b)		D E A B C or 1.4 1.7 3.1 6.1 9.0/0.9	**2**	**B1** Correct but reverse order C B A E D or only the first and last correct D and C (as letters) or correct letters but with MR for the 0.9/9 C D E A B	5 letters in total

Question			Answer	Marks	Guidance	
	(c)		[Iron:] 61 to 62 **and** [Zirconium:] 81 to 82	**3**	**B2** for 61 to 62 **or** 81 to 82 Or **B1** for $\frac{1.85\times100}{1.73^2}$ $\frac{1.85\times100}{1.73^2}$ **and** $\frac{1.85\times150}{1.84^2}$ $\frac{185\times150}{1.84^2}$ or 185 or 2.9929 or 277.5 .. or 3.3(856 ...) seen	Both values nfww Need both
			Zirconium Or *their* choice of harder metal FT *their* calculated figures seen and clearly related to the metals	**And** **1**	If **B0** then **SC1** for 33… **and** 44… **Or** 106 to 107 **and** 150 to 151	Allow Iron is the **softer** metal Zirconium with no working scores zero

Question			Answer	Marks	Guidance	
	(d)		49 to 49.2	**4**	**B3** for [*Z* =] 10.16 to 10.2 OR **B2** for [*W* =] 0.64 to 0.65 OR **M1** for 87.4 to 87.5 or 9.3 to 9.4 or $10-\sqrt{10^2-3.54^2}$ oe seen If B2 or M1 then also **M1** for 1.57 x 10 x *their* 0.647 ... or 500 ÷ *their Z* (10.1664...) seen If **0** scored then **SC3** for $\frac{500}{1.57\times10\times\left(10-\sqrt{10^2-3.54^2}\right)}$ $\frac{500}{1.57\times10\times(10-\sqrt{10^2-3.54^2})}$ Or **SC2** for $\frac{P}{1.57\times D\times(D-\sqrt{D^2-d^2})}$	Answer 49 to 49.2 with no working shown scores full marks *Their Z* could be, as an example: (*Z*=) 1.57 + *their D* + *their W* but would still gain for 500 ÷ *their W*.

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