OCR
Oxford Cambridge and RSA

GCSE

Applications of Mathematics (Pilot)

Unit **A381/01:** Foundation Tier

General Certificate of Secondary Education

Mark Scheme for June 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.

   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**.

6. 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'.

7. 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).

8. 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.

9. 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.

10. 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.

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

12. 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.

13. 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

1	**(a)**		4	**2**	**M1:** ÷5 seen in working soi	Condone (for full credit) 4 000 000 000 Condone, for **1**, figs 4
	(b)		(£)1.44	**4**	**M1:** 1000 x 65 or better **M1:** ÷ 45000 or better **A1:** 1.444… seen in working	**B2** for figs 144 If zero scored award **B1** for (£)1.4(0)
	(c)		(£)2.15	**2**	**M1:** 2.75 or 60 or 0.6(0) seen in working	B1 for figs 215
	(d)	**(i)**	$\frac{1}{20}$	**1**		ISW if a clear attempt is made to incorrectly simplify the correct response. (1/20 = 1/10 is OK, but 1/20, 1/10 gains zero)
		(ii)	5(%)	**1FT**	Follow through *their* **d(i)**	

	(e)*		Area of billboard is **36m^2**, which weighs **4.32 kg (o.e.)**, (about **10 kg)** is easy to carry (o.e.) so **can/cannot be carried** as its not/too heavy o.e.	**4**	**3:** Area of billboard 36m^2 which weighs 4.32 kg. o.e. **2:** figs 432 **1:** Area of billboard is figs 36 **or** figs 12 x figs 3 seen**. or** Sensible reference to weight or size linked to *their* conclusion (stating 1000 kg could be lifted is not counted as sensible) _____ **or** if zero scored _____ **1:** 96 x 120 ("taking unit poster is 1 m^2" which gives 11520)	See LIST after coordination To gain credit for comparison, units must be attached to *their* quantity _____ **or** _____ Partial credit (maximum of 3) for candidate taking the size route: **1 each** for:- **1** "Too big to carry" o.e. (i.e. "no"+) **1** "Measures 12 m (or 3 m)" o.e. **1** "Average person only about 2 m tall" o.e. The two dimensions above may be in mm – but essential both in same units to be compared. Condone the equivalent imperial argument. _____ **or if zero gained** _____ Condone for 1 "the poster is too big" as a minimum
	(f)		4 to 6 m/metres (o.e.)	**1** **1**	**SC2:** 12 to 18 feet (need both number and unit correct) **or** **SC1:** feet in range 10 to 20	For the units mark, only award if single digit metres or single digit hundreds with cm or single digit thousands with mm
	(g)		10^5 10^4 10^9 10^3 or 1000	**1** **1** **1FT** **1FT**	Follow through on *their* 10^5 , 10^4 Follow through on *their* second line answer	Must be from 1st line

	(h)*	**4**	20/28 /29/30/31 days in month giving 2 676 (000) **or** 3 746 (400) **or** 3 880 (200) **or** 4 014 (000) **or** 4 147 (800) Stating number of people in each car. Sensible comparison with 5 million. (Allow sensible rounding at any point) To gain full credit must see the calculation	**4**	**3:** 2 676 (000) **or** 3 746 (400) **or** 3 880 (200)or 4 014 (000) **or** 4 147 (800) Compare with 5 million (i.e. no reference to number of passengers) **2:** 2 676 000 to 8 208 000 (viewings) **and** any reasonable qualification **or** reference to number of people in car **or** **2:** Correct "number" (see 3 above) with no or incorrect comparison. **1:** 2 600 000 to 8 300 000 or better seen in working **or** correct calculation shown but no evaluation **or** 1: Statement based on *their* incorrect figures	(20 days for "working month") Condone "company's figure" or "claims" or similar in place of "5 million". To allow for 2 per vehicle but not stated Number days for 5 million to pass = 37.3… or 37.4 gains this M2 (for those who work back from 5 million in a month – how many days are required) for further credit: need a comparison of days in a month and also number of passengers in car(**2**), or just "more than 31 days" compared with number of days needed to get 5 million (**1**)
	(i)		25.8 to 27.0 (m)	**3**	**M1:** 8.6 to 9.0 (height) **M1:** "height" × 3 soi	
	(j)*		"*D*" = 3 "*h*" where "*D*"=distance from billboard "*h*" = height of letters	**2**	**1:** $D = 3 \times h$ or better **1:** variables correctly defined	("letter" = "letter" x 3 o.e.) Units not needed when defining the variables.
	(k)	**(i)**	75 to 79 (m)	**1**		
		(ii)	150 to 158 (m)	**1FT**	**1:** Follow through 2 x part (i)	This is not a strict follow through.

	(l)		21 to 23 cm	**3**	**B1:** In view for 63 to 69 (metres) **and** **M1:** (*h*=) "*their* distance" ÷ 3 where *their* distance is from 60 to 70	May be seen on graph Allow M mark if *their* distance first "converted" to cm
2	**(a)**	**(i)**	51 (years)	**1**		
		(ii)	50 (years)	**1FT**		
		(iii)	[a=] 60° [b=] 120° [c=] 90°	**1** **1FT** **1**	 FT 180 – *their* value for a Condone "a right angle"	
		(iv)	(310 to 315)	**2**	**B1:** 45 to 50 seen	**SC1:** Read protractor wrong scale but added 180 to give answer in range 225 to 230 **or** 360 – "an angle" = "correct" seen in full (i.e. knowledge of 360° in circle demonstrated).
	(b)		412 500 **or** 411 184 to 416 666 if conversion £s to $s seen	**4**	**M3:** 625 000 x 0.66 (or ÷ 1.5 to 1.52) **or** **M2:** $1 = £0.66 or equivalent £1 = $1.5 to 1.52 **or** **M1:** (10% of 1 000 000 =) ($)100 000 **or** 66 000 x 10 = 100%	**SC2:** figs 412 … as answer **or** figs 411… to 416 … e.g. (£)660 000 "=" 1 000 000 or 66 000 = 100 000 seen) If M0 then SC1: 625 000 (x *their* 0.66) or 625 000 (÷*their* 1.5 to 1.52)
	(c)		C and E D and F	**3**	**3:** all correct **2:** at least 3 correct minimum of 1error/omission **1:** at least 2 correct minimum of 2 errors/ omissions	

	(d)		All crosses (or equivalent NAMBI) within 2 mm	**2**	**1:** each within range NAMBI maximum of 2.	Use overlay to check by-eye
	(e)		T and U	**1**	cao	
3	**(a)**		[C for A=] 0.45 and [for B =] 0.36 (must show working, unsupported 0.45/0.36 can only gain the comparison mark) *Their* "yes" o.e.	**4** **1FT**	**1:** 3.6 seen **1:** perimeter of A = 8 soi **1:** perimeter of B = 10 soi **1:** C_A **or** C_B = 0.45 **or** 0.36 **1:** Consistent conclusion based on candidates C_A and C_B	Only need be seen once. This is from the $\sqrt{4} \times 1.8$ Only need see one correct Mark alternative methods in the same spirit. See LIST after coordination.
	(b)		0.48 (17 …)	**2**	**1:** 1.5(…. **or** 3.2(…	**SC1:** 0.48 (17 …) seen in working
	(c)		$"C" = \frac{"A"}{0.6 \times "p"^2}$ or better with variables defined	**2**	**1:** At least two of the three variables defined. **1:** $C = A \div (0.6 \times p \times p)$ or better	Allow $C = A \div 0.6 \div p^2$
				60		

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