RECOGNISING ACHIEVEMENT

GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/01:** Foundation Tier

Mark Scheme for June 2013

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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
	Benefit of doubt
	Follow through
	Ignore subsequent working (after correct answer obtained), provided method has been completed
	Method mark awarded 0
	Method mark awarded 1
	Method mark awarded 2
	Accuracy mark awarded 1
	Independent mark awarded 1
	Independent mark awarded 2
	Misread
	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 – $\sqrt{}$(*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 line:

   (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 line:

   (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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)	(i)	D	1		
		(ii)	2	1		
	(b)*		There are round about 15 to 40 rough diamonds. Each one is about (1 to 4) points. No (They are too small)	3	**2** for attempt to compare *their* average points with 10 to 150 points with an appropriate judgement **1** for attempt to compare 50 points with 10 to 150 points with an appropriate judgement **0** for no comparison If zero **SC1** for an average or an estimate for the number of diamonds (in range 10 to 40)	This may be implied or embedded Average must **not** involve money e.g. £s per point etc Must be supported by a number (seen or implied), ie "too small" without some quantification gains zero. 50 seen and 10 or 150
	(c)	(i)	23 25 10	3	**1** for each correct answer	
		(ii)	*There are three possible approaches (see Appendix 2 at end of this document where these are compared side by side)*	4		
			Method based on number of minutes in a year compared with 10 million minutes of trials [Column A in Appendix 1]		**B1** for 10 000 000 **M1** for 24 × 60 =1440 **M1** for 1440 × (360-366) = 518400 to 527040 **1** for comparison with 10 000 000	**M1**s may gained by correct answers (525600 = **M2**)

Question			Answer	Marks	Part Marks and Guidance	
			Method based on years to try all combinations starting from total minutes of trying [Column B in Appendix 1]		**B1** for 10 000 000 (mins) **M2** for 10 000 000 ÷ 60 (= 166 666 hours) 166 666 ÷ 24 (= 6 944.4 days) 6 944.4 ÷ (360 – 366) (= 18 to 20 years) **1** for comparison involving years	**M1** for each line (method or answer) maximum of **M2** (19.02 = **M2**) Must gain at least two marks above (out of a possible three)
			Method based on years to try all combinations starting from number of calls per hour [Column C in Appendix 1]		**B1** for 6 codes an hour **M2** for 6 × 24 (=144 codes per day) 144 × 360 to 366 (=51800 – 52800 codes year) 1000000÷ (51800 – 52800) (= 18 to 20 years) **1** for comparison involving years	**M1** for each line (method or answer) maximum of **M2** (19.02 = **M2**) Must gain at least two marks above (out of a possible three)

Question			Answer	Marks	Part Marks and Guidance	
	(d)	**(i)**		1	**1** for acute angle indicated	Condone triangle indicated
		(ii)		1	**1** for kite indicated	
		(iii)		1	**1** for octagon indicated	
		(iv)		1	**1** for pair of congruent shapes indicated	
	(e)	**(i)**	(42 to 44)°	1		
		(ii)	50°	1		
		(iii)	210°	2	**M1** for sight of "150" or 360 – "number" or 330 or 180 + 30	
	(f)		B H E are similar	3	**1** for each correct tick and -1 for each wrongly located tick	Focus on ticks
	(g)	**(i)**	4.8 (mm)	1		
		(ii)	4.4 (mm)	2	**M1** for 0.8 or 0.55 × 8 **oe** or **figs** 44 **seen**	Check method used for possible **M1** (may be embedded)
	(h)	**(i)**	12.7	1		
		(ii)	42.42 (mm)	2	**M1** for sight of 13.5 × 3.142 or 42.4 …	
2	**(a)**	**(i)**	7485 (g)	1		
		(ii)	1250	2	**M1** for **figs** 125 or 1000 ÷ 0.8 **seen**	
	(b)		8	1		

Question			Answer	Marks	Part Marks and Guidance	
	(c)	**(i)**	$\frac{1}{8}$ or 0.125	1		
		(ii)	$\frac{1}{16}$ or 0.0625	2	**2** for follow through from part **(i)** **M1** for "number" ÷ 2 seen in working	
	(d)	**(i)**	33 (± 2 mm) and 36 (± 2 mm)	1	1 for both correct	Condone cm if mm crossed out and cm added
		(ii)	14 (p)	2	**M1** for **figs** 28 or "number" ÷ 2 **seen** or **figs** 14 **seen**	
		(iii)	100	2	Full follow through on **(ii)** **M1** for 1400 ÷ 14 or 14 ÷ 0.14	
3	**(a)**		8*x* - 20	2	**B1** for 2*x* + 20 or 8*x* or – 20	
	(b)		25	2	**M1** for 8*x* - 20 = 180 or better Follow through on *their* equation	Can be solved **(a)** The equation must be ….. = 180
	(c)		70, 70, 40	3	**B1** for each correct If **B0 SC1** for angle sum of 180°	No negative angles permitted.
	(d)		Isosceles	1	Follow though *their* angles for scalene	Regardless of **(c)** for isosceles

Question			Answer	Marks	Part Marks and Guidance	
4	(a)		6 to 10 metres	1 1		Condone imperial equivalents providing appropriate imperial units given (18 to 30) Only award the units mark (feet) if 13 to 17 or 31 to 35 given as the number of feet.
	(b)	(i)	300 305	2	**1** for each correct	
		(ii)	All 4 points correctly plotted Correct straight line drawn	1 1	If total of zero scored **1** for two correct points **or** line of best fit drawn for the four points.	
		(iii)	8 or 2008	1		
		(iv)	0.5	1		
		(v)	1000 × *their* **(a)** ÷ *their* 0.5 evaluated	2FT	**M1** for **figs** (*height* ÷ *rate*) or **B1** for **figs** (12 to 20)	ie **figs 4(a)** ÷ **4(b)iv)**
	(c)		11.7 12.01 12.45 ____ 12.07 ____	1		

APPENDIX 1

Question 1(c) ii –side by side comparison of methods

Method	A	B	C
B1	10 000 000	10 000 000 mins	6 codes an hour
M2 (M1 for any one answer or operation seen)	24 × 60 =1440 1440 × (360-366) = 518400 to 527040 (525600= M2)	10 000 000 ÷ 60 (= 166 666 hours) 166 666 ÷ 24 (= 6 944.4 days) 6 944.4 ÷ (360 – 366) (= 18 to 20 years) (19.02 = M2)	6 × 24 (=144 codes per day) 144 x 360 to 366 (=51800 – 52800 codes year) 1000000÷ (51800 – 52800) (= 18 to 20 years) (19.02 = M2)
1 (dependent on gaining at least 2 marks above)	Comparison with 10 000 000	Comparison involving years	Comparison involving years

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553