OCR
RECOGNISING ACHIEVEMENT

GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/02:** Higher Tier

Mark Scheme for January 2012

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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.

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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 awarded for a correct final 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.

   - **cao** means **correct answer only**.
   - **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).
   - **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. 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.

Question			Answer	Marks	Part Marks and Guidance	
1	(a)		Dave is wrong with a correct estimation	2	**M1** for 400 × 30 (or 35) × 10 = 120000 (or 140000) **or** 420 (or 410) × 30 × 10 = 126000 (or 143000)	
	(b)		5.0	2	**B1** for 5.02(…) or a final answer of 5 or their pre-rounded answer seen and corrected to 2 sf	
	(c)		Ann + $\frac{15}{36}$ **and** $\frac{14}{36}$ **oe** seen or Ann because she saves $\frac{1}{36}$ more	2	**M1** for $\frac{15}{36}$ or $\frac{14}{36}$ **oe** denominator must be multiple of 36	Accept decimals 0.41(6...), 0.417, or 0·42 and 0.38(8...) or 0.39 Accept percentages Condone fractions of a quantity which must be correct Condone $\frac{5}{12}$ for Ann
2	(a)		69.5 – 69.9	1	Ignore subsequent rounding	
	(b)		Line passing through (12, 53) and through (22, 73)	3	**B2** for 3 correct points plotted (± 1mm) **or** **B1** for 2 correct pairs of coordinates (may be seen in the table) 12 16 22 53 61 73	
	(c)		0.4 - 1.2	2 **FT**	**B1** for one correct length seen 16·4 - 16.6 (man), 17 (woman)	Allow fractional answers such as 16½ etc

Question			Answer	Marks	Part Marks and Guidance	
3			(£)301.02	4	**M3** for (157.35 + 78.5 + 7.5 × 2) × 1.2 **oe** or 292.02 **or** **M2** for 157.35 + 78.5 + 7.5 × 2 or 188.82, 94.2 and 9 or (157.35 + 78.5 + 7.5) × 1.2 or (157.35 + 78.5) × 1.2 or 283.02 **or** **M1** for 157.35 + 78.5 or 235.85 or 188.82 or 94.2 or 9	Accept (188.82 + 94.2 + 9) × 2 Missing delivery/collection Accept 250.85 Individual prices incl VAT Missing delivery/collection Missing delivery and collection
4	(a)		6 **nfww**	2	**M1** for multiples of 80 and 30 or multiples of 40 and 15 **or** **SC1** for an answer of 3 nfww	Lists of multiples of each number containing a common multiple
	(b)		240	1 **FT**	or 40 × *their* (a)	
5	(a)		0.45	1		
	(b)	(i)	135, 270, 540, 72	2 **FT**	**B1** for one correct	
		(ii)	6	2 **FT**	**M1** for 135 ÷ 25 or 5.4 **FT** *their* (b)(i), must be rounded up	5 × 25 = 125 and 6 × 25 = 150 followed by an answer of 5 scores **M1**

Question			Answer	Marks	Part Marks and Guidance	
6	(a)		15	2	**M1** for $\frac{54\times1000}{60\times60}$ **oe** or answer with **figs** 15	
	(b)	(i)	138·6(…) or 139	3	**M2** for $\frac{545\times1.6\times159}{1000}$ **or** **M1** for 545 × 1.6 × 159 **oe** or **figs** 1386(…) or **figs** 139 or $\frac{545\times159}{1000}$ (= 86.6(…) or 86.7)	
		(ii)	49.7 - 50.2	2 **FT**	**M1** for 832 × 0.0534 × 2 or 88.8 – 88.9 **FT** their (b)(i) **SC1** for answer of 94.2 - 94.3 or answer to (b)(i) – 44.4(…)	**FT** dependent on b(i) > b(ii) One person
7	(a)		627 480	3	**M2** for 4500 × 168 × *their* 0·83 **oe** **or** **M1** for 4500 × 168 × *their* 0·97 (or 0.94 or 0.92) **oe** **soi** (= 733 320, 710 640, 695 520) or 4500 × *their* 0·83 **oe** or 3735 or 765	756 000 × 0.83

Question			Answer	Marks	Part Marks and Guidance	
	(b)		14	4	**M1** for $\frac{650000 \times 200}{350}$ (= 371428) **and** **M1** for $\frac{\textit{their}\ 371428}{28 \times 1000}$ **oe** or figs 132(…) or 133 **A1** for 13(.2…) or 13.3 **B1** for rounding up	Total weight of flour used Accept rounded to 2 or more sf if given Number of tanker loads Dep on either M1
8			$x = 1.25$, $y = 0.6$	5	**M1** for area of rectangle = $\frac{9}{6}$ **oe** **and** **M1** for $2x + 0.5 = 3$ or better **A1** for $x = 1.25$ **and** **M1** for $2 \times$ *their* $x \times y = 1.5$ or better <u>Alternative</u> **M1** for expression for area of any section eg $\frac{9}{6}$ **oe** , $2xy$, $x(3 - 3y)$, $3(3 - 2x)$ **M1** for equating two areas **M1** for obtaining $x =$ … or $y =$ … as a value or expression **M1** Substituting x (or y) to find y (or x)	Accept equivalent versions At least one correct and involving x and y

Question			Answer	Marks	Part Marks and Guidance	
9	(a)		Triangle + circle = 59 Two squares = 92	1	Reference to both lines needed	
	(b)		140	3	**M2** for circle = 24 and triangle = 35 **or** **M1** for circle = 24 or triangle = 35 or T + 3C = 107 and T + C = 59	Accept any 2 correct equations from first 3 lines (allow symbols)
10			$\frac{9}{4x^2}$	3	**M1** for dealing with the cube root **and** **M1** for dealing with the square **and** **M1** for dealing with the reciprocal **or B1** for each of 9, $\frac{1}{4}$ or $\frac{1}{x^2}$	Method marks may appear in any order
11			279.9(…) or 280	3	**M2** for $\frac{362.5}{1.09^3}$ or $\frac{305.1}{1.09}$ **or** **M1** for $\frac{362.5}{1.09}$ or 332.5(…) or 332.6 If 0, **SC1** for answer of 285.4(…)	

Question			Answer	Marks	Part Marks and Guidance	
12			1620 with a complete and correct solution with explanations of calculations given	3	**3:** Six <u>angles at a point</u>, total = 6 × <u>360</u> = <u>2160</u> Angles in a <u>kite</u> and a <u>triangle</u>, total = <u>360</u> + <u>180</u> = <u>540</u> Sum of exterior angles = <u>2160 – 540 = 1620</u> **or** **2:** As for 3 but with either 'angles at a point' missing or 'angles in a kite' or 'angles in a triangle' missing but all calculations shown or all explanations given but one numerical slip in the calculations **or** **1:** All calculations correct but without any explanation or <u>angles at a point</u>, total = <u>6 × 360</u> or <u>2160</u> or ∠'s in a <u>kite</u> = <u>360</u> **and** angles in a <u>triangle</u> = <u>180</u> or total <u>kite</u> and <u>triangle</u> = <u>540</u> or exterior ∠'s of kite = <u>1080</u> and exterior ∠'s of triangle = <u>900</u> If 0 then **SC1** for answer of 1620 from incorrect assumptions or measurement	Accept quadrilateral for kite Underlined elements must be seen although 2160 and 540 may be implied by one complete calculation, eg <u>6 × 360 – 360 – 180 = 1620</u> <u>Alternative method</u> **3:** <u>Angles in a triangle, angles at a pt</u> (360 – e) + (360 – f) + (180 – d) = 180 ⇒ 720 = e + f + d Angles in a <u>kite</u> (360 – a) + (360 – b) + (360 – c) + (180 – g) = 360 ⇒ 900 = a + b + c + g Adding 1620 = a + b + c + d + e + f + g **or** **2:** As in middle column **or** **1:** All calculations correct but without any explanation or angles in a <u>triangle</u>, <u>angles at a pt</u> with (360 – e) + (360 – f) + (180 – d) = 180 or angles in a <u>kite</u> and (360 – a) + (360 – b) + (360 – c) + (180 – g) = 360

Question			Answer	Marks	Part Marks and Guidance	
13			0.34 - 0.342	4	**nfww** **M3** for $12.6 \times \left(\sqrt{\frac{0.55}{6.1}}\right)^3$ **oe** **or** **M2** for **figs** $\left(\sqrt{\frac{0.55}{6.1}}\right)^3$ or 0.027(…) or **figs** $\left(\sqrt{\frac{6.1}{0.55}}\right)^3$ or 36.9(…) or 37 **or** **M1** for **figs** $\left(\frac{0.55}{6.1}\right)$ or figs 9(01)-9(02) or **figs** $\left(\frac{6.1}{0.55}\right)$ or figs 11(09) or 111 **soi**	Accept $12.6 \times 0.027(\ldots)$ Volume factor and reciprocal Area factor and reciprocal

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