

**Methods in Mathematics (Pilot)**

General Certificate of Secondary Education

Unit **B392/01**: Foundation Tier

**Mark Scheme for June 2013**

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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.

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## 1 Annotations

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.

## 2 Subject-specific Marking Instructions

- i) **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.

- ii) 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.

- iii) 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  $180 \times (\textit{their} '37' + 16)$ , or FT  $300 - \sqrt{(\textit{their} '5^2 + 7^2)}$ . Answers to part questions which are being followed through are indicated by eg FT  $3 \times \textit{their} (a)$ .

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.

- iv) 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.

- v) 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).
- **nfw** 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**.
- vi) 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'.
- vii) 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).
- viii) 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.
- ix) 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.
- x) 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.
- xi) Ranges of answers given in the mark scheme are always inclusive.
- xii) 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.
- xiii) 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 mark and guidance	
1	(a)	Three thousand four hundred [and] sixty seven	1		
	(b)	7634	1		
	(c)	$76 - 34 = 42$	1		
	(d)	$73 \times 64 = 4672$	2	<b>B1</b> for $74 \times 63 = 4662$ or <b>M1</b> for $73 \times 64$	
2	(a)	9.4	1		Condone fraction
	(b)	31	1		
	(c)	5832	1		
3		3 1½ oe 300 540 225 225	3	<b>M2</b> for 5 correct responses <b>OR</b> <b>M1</b> for evidence of $\times 3$ eg 3 kg or 300 g and <b>B1</b> 1½ oe	
4	(a)	90 [°]	1	Accept right - angle	
	(b)	96 [°]	2	<b>M1</b> for $360 - (their\ 90 + 104 + 70)$ If 2 not scored then <b>SC1</b> for 96 seen.	If answer line blank 96 on diagram scores 2
	(c)	27	2	<b>M1</b> for $5.2 + 6.2 + 7.1 + 8.5$	Addition may be implied
	(d)	135	1	<b>Or FT</b> $5 \times their\ (c)$	

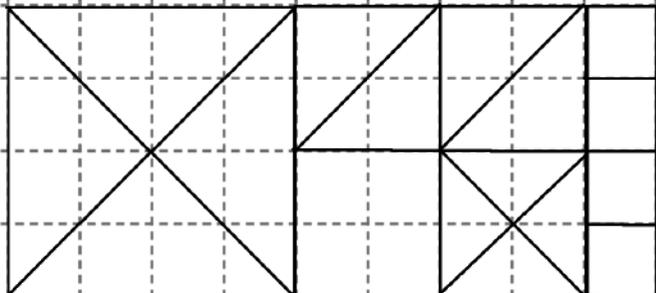
Question		Answer	Marks	Part mark and guidance	
5	(a)	£1 50p 10p 10p and 50p 50p 50p 20p	3	<b>M2</b> for 1 correct set <b>or</b> <b>M1</b> for [ £] 1.70 or 170 or 1.7 <b>or</b> <b>SC2</b> for correct sets but missing units  From £2.70 <b>SC2</b> for 2 correct sets, <b>SC1</b> for 1 correct set or units missing on 2 correct sets	Condone 1 instance p missing
	(b)	Orange drink 70[p] Flapjack bar 40[p]	3	<b>M2</b> for either Orange drink 70 or Flapjack bar 40 <b>or</b> <b>M1</b> for 1 drink and 1bar £1.10 or 2 bars 3.30 – 2.50 <b>SC2</b> 0.70 and 0.40 without £	
6	(a)	(i) 4 7 10 13	3	<b>M2</b> for 3 correct terms <b>or</b> <b>M1</b> for 2 correct terms	
		(ii) 31	2	<b>M1</b> for correct diagram or +3 used or [nth term] $3n + 1$	$n + 3$ only, scores 0
*	(b)	28 with explanation eg The base of the triangle is 7 dots and then number of dots in each line goes down by 1.	3	<b>2</b> 28 with partial explanation eg the bottom line is 7 dots or triangle numbers or $7 + 6 + 5 + 3 + 3 + 2 + 1$ or $+2, +3, +4$ seen <b>or</b> total wrong but with full explanation.  <b>1</b> 28 correct or some recognition of pattern Eg diagram for 7 <sup>th</sup> pattern drawn or 2 correct 4 <sup>th</sup> , 5 <sup>th</sup> or 6 <sup>th</sup> patterns or 2 correct totals.	Exemplars provided

Question		Answer	Marks	Part mark and guidance	
7	(a)	0.07	1		
	(b)	0.45	1		
	(c)	0.666... or $0.\dot{6}$	1		0.6667 scores 1 mark
8	(a)	[£] 21	2	<b>M1</b> for $\frac{1}{4}$ or 0.25 or 25/100 used or 10% 10% 5% correct then error in addition	<b>SC1</b> 63
	(b)	[£]43.40	2	<b>M1</b> for $0.35 \times 124$ <b>or</b> eg 10% 10% 10% 5% used with at least one correct <b>or</b> <b>B1</b> for 43.4	<b>SC2</b> 80.60 from 43.4[0] or use of 0.65
9	(a)	A (2, 7) B(5, 9) C(8, 7) plotted	2	<b>M1</b> for 2 correct plots or all using coordinates reversed	
	(b)	Isosceles	1		
	(c)	(5,1)	2	Or <b>FT</b> <i>their</i> (a) <b>M1</b> for position of D identified	
10	(a)	[x =] 65 [y =] 25	1 2	<b>M1</b> for $180 - (40 + 115)$ or their $65 - 40$ <b>SC2</b> for reversed 25, 65	
	(b)	[z =] 108	2	<b>M1</b> for $180 - 72$	

Question		Answer	Marks	Part mark and guidance	
11	(a)	80	2	<b>M1</b> for $10 \times 4 \times 2$	
	(b) (i)	1 1 80 or 2 2 20 or 4 4 5	2	<b>M1</b> for base 1 1 or 2 2 or 3 3 or 4 4 <b>FT</b> from (a) for 2 marks (if possible)	
	(ii)	1 1 80 or 2 2 20 or 4 4 5 [not repeat of (i)]	1	<b>FT</b> from (a) if possible If (b)(i) 0, then <b>SC1</b> for any dimensions (other than 10,4,2) which give volume their (a) or 80	
12	(a) (i)	13	1	Condone embedded	
	(ii)	40	1	Condone embedded	
	(iii)	3	3	<b>M1</b> for $2x + 10$ <b>and</b> <b>M1</b> for $9x - 2x = 10 + 11$ or better <b>FT</b> their 1 <sup>st</sup> step from $kx + n = px + m$ <b>M1</b> for <b>FT</b> their 2 <sup>nd</sup> step  Maximum 2 method marks	
	(b)	Always ..... eg $25x^2$ bigger than $5x^2$	2	<b>M1</b> for $25x^2$ or correct evaluation of both expressions with same $x$ even if decision missing /incorrect <b>or</b> always with partial explanation  Condone 'sometimes' if refers to $x = 0$ 2 correct substitutions with always can score 2	

Question		Answer	Marks	Part mark and guidance	
13		1500 900 1200	3	<b>B2</b> for any 2 correct or 3 correct but misordered or <b>M1</b> for $3600/12 (=300)$	NB 720 1200 900 implies wrong working so scores 0
14	(a)	Straight line through (20, 215), (40, 430), (60,645) and (100, 1075) but condone one error	2	<b>B1</b> for any 2 correct plots (within correct square)	0 for bar charts
	(b) (i)	70 [m <sup>2</sup> ]	1		
	(ii)*	[£] 6290 to 6460 with working eg $70\text{m}^2 = 740$ to $760\text{ft}^2$ from graph or table and <i>their</i> area in $\text{ft}^2 \times 8.50$	3	<b>2</b> 6290 to 6460 <b>nfw</b> but with inadequate working shown or full working with incorrect answer  <b>1</b> their conversion eg $740$ to $760$ [ $\text{ft}^2$ ] or <i>their</i> $70 \times 8.5 [=595]$	eg full working $34\text{m}^2 = 360\text{ft}^2$ from graph or table and $360 \times 8.50$ scores 2  NB 34 in <b>(b)(i)</b> gives 289 and then 3060 and either of these or 360 without working scores 1

Question		Answer	Marks	Part mark and guidance	
15	(a)	3	1		As Higher 5
	(b)	56[.25]	4	<p><b>M1</b> for area 64 (or 16 if using a quarter of shape or 32 if using half of shape)  <b>and</b>  <b>M1</b> for shaded area 36 (or 9 or 18)  <b>and</b>  <b>M1</b> for <i>their</i> 36 oe  <i>their</i> 64</p>	<p><i>Their</i> 36 bod (for shaded area) but <i>their</i> 64 area must be justified (by eg 8x8 =62)</p> <p>36/64 or 9/16 or 18/32 implies M3</p> <p>36 on answer line scores M1  NB 64,30,ans = 47%  scores M1, M0,M1</p>
	(c)	2.83	4	<p><b>M2</b> for <math>\sqrt{8}</math> OR <math>\sqrt{2^2 + 2^2}</math> or <math>2\sqrt{2}</math> or <math>2 \times 1.41</math>.  <b>or</b>  <b>M1</b> for any Pythagoras statement  <b>A1</b> for 2.82[8427...]</p> <p><b>B1</b> for rounding <i>their</i> answer correctly to 2dp</p>	<p>Answer of 2.8 only without working scores 0 marks</p> <p>2.82[84...] may imply M2A1</p>

Question	Answer	Marks	Part mark and guidance
(d)	<p>All shapes drawn in with no overlap, none missing and no extras. eg</p> 	3	<p><b>B2</b> for all five shapes used within the rectangle but maximum of 4 missing 'repeats' in total. <b>B1</b> for 4 of one shape <b>and</b> at least 1 of each of three (or four) of the other shapes drawn.</p> <p>If several attempts, mark to the candidate's advantage</p> <p>For B2 and B1 shapes do not have to be joined.</p> <p>For 3 marks, condone missing lines for small squares.</p>

Question		Answer	Marks	Part mark and guidance	
16	(a)	[5], 1, [-1], -1, 1, 5	2	<b>B1</b> for 2 values correct	As Higher 4
	(b)		2	<b>B1</b> for at least four points correctly plotted (may be ft their table) <b>and</b> <b>B1</b> for smooth curve through correct points, (below $y = -1$ at vertex)	Half small square tolerance  Need to see daylight between turning point of curve and $y = -1$ .  Ignore curve before $x = -2$ and after $x = 3$
	(c)	-0.6, 1.6 ( $\pm 0.1$ )	2	<b>B1, B1</b> (OR <b>FT</b> <i>their</i> graph) After 0 scored, <b>M1</b> for evidence of reading a value from $y = 0$	Could come from one value only.
17		[2 x 3 x 3 =] 18 nfw	3	<b>M1</b> for one correct set of numbers with product (not already in table) <b>and</b> <b>M1</b> for a different set of numbers with product > 15	As Higher 7 If answer space is blank then 18 must be clearly identified elsewhere for 3 marks. Negative numbers do not score. Allow 2 x 3 x 3 on answer line for 3 marks if 18 given in table. If 18 not seen then 2 x 3 x 3 scores <b>SC2</b>

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