

OGCSE

Applications of Mathematics (Linked Pair Pilot)

93701H

Unit 1: Higher Tier

Mark scheme – Additional Guidance

9370

June 2014

Version 1.0 Final

General Points.

1 **Completely crossed out responses**

Examiners should mark a candidate's final attempt even if crossed out.

2 **Answers not written on answer line**

If answer line is blank, mark working space for up to full marks.

If fully correct working seen or answer seen followed by a transcription error onto the answer line, award full marks.

3 **Candidate indicates they have completed a solution on an additional sheet**

If the candidate has written that they have continued or replaced the response on an additional sheet you should **still mark what you see** (A senior examiner will record any additional marks seen on the additional sheet at a later stage.)

Do NOT escalate these clips.

4 **Candidate seems to have continued a solution outside the area you can see**

If a candidate indicates that they have written further work somewhere else on the paper e.g. an arrow going below your clip or 'see back page'.

Senior examiners are able to view these other areas and pages **so please DO escalate in this situation.**

5 **Marking Using Alternate Schemes**

Choose the scheme that gives the candidate the most marks.

Do **not** combine marks from different schemes.

6 **Special Cases (SC)**

Special Case (SC) marks are **not** added to any other marks awarded but replace them where it would benefit the candidate.

- a response is worthy of no marks from scheme but gets SC1 the final mark is SC1.
- a response is worthy of M1 and SC1 the final mark for this response is M1.
- a response is worthy of M2 and SC1 the final mark for this response is M2.
- a response is worthy of M1 and SC2 the final mark for this response is SC2

7 Percentage Build-up methods

The general rule is that build-up methods must be complete and either correct method must be shown or values used must be correct (without truncation or rounding).

For example: 35% of 600

- (a) 10% = 60 *Value correct so method not needed*
3.5 × 60 = 220 Value incorrect but correct method shown so M mark gained
1% = 6 *Value correct so method not needed*
35 × 6 = 220 Value incorrect but correct method shown so M mark gained
- (b) **10% = 50 Value incorrect and no method shown so M mark lost here**
10% = 60 *Value correct so method not needed*
1% = 5 Value incorrect and no method shown so M mark lost here
- (c) 10% = 600 ÷ 10 = 50 *Value incorrect but method shown*
20% = 100 *Value correct for their 10% so method not needed*
5% = 25 *Value correct for their 10% so method not needed*
35% = 175 Value correct for their 10% so M mark gained
3.5 × 50 = 175 Value correct for their 10% so M mark gained
1% = 5 *Value correct for their 10% so no method needed*
35 × 5 = 175 Value wrong but correct method shown so M mark gained

8 Money notation

Where an answer line showspence
Accept 20p or £0.20 on answer line but do not accept 0.20 on answer line
Accept £0.20p on answer line (except on QWC question) unless otherwise instructed.

Where an answer line shows £.....
Accept 525p on answer line with £ sign crossed out
Accept £5.25p on answer line (except on QWC question) unless otherwise instructed.

On a QWC question, where an answer line showspence
Do **NOT** accept £0.20p on answer line for Q mark

On a QWC question, where an answer line shows £.....
Do **NOT** accept £5.25p on answer line for Q mark

Copyright © 2014 AQA and its licensors. All rights reserved.

AQA retains the copyright on all its publications. However, registered schools/colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Q	Additional Guidance											
1(b)	Look for working next to table.											
	89 seen is not enough for M1											
2(a)	Do not accept criticisms such as the groups are different sizes or that 21 + is a large group											
2(b)	<p>Do not accept 'biased' on its own. The reason it is biased must be stated.</p> <p>As we will accept they need a bigger sample accept any sample size of at least 10.</p> <p>'They may all have similar tastes' is not a valid reason – it is about the number of downloads – not their taste in music.</p>											
3	Zeros for pence may be omitted throughout the method but a missing zero for the answer is A0											
	<p>150 x35p + 20 would achieve M1 but units must be added consistently for the A mark</p> <p>The units may be seen or implied later eg 5250 seen at the beginning but 52.5(0) used later would gain the first A mark</p>											
	<p>168 seen gets 2 marks or 198 seen gets 3 marks (2nd, 3rd and 4th method marks)</p> <p>For the final method mark all values must be in the same monetary units.</p>											
	<p>Beware $150 \div 5 = 30$ does not get the 4th M mark automatically. It may be just part of their working to get to $\frac{4}{5}$. If this 30 is multiplied by (£)1 or added on to 168 then this implies that they understand that it is the other 30 cakes and can then be awarded M1</p> <p>For example</p> <table data-bbox="244 1420 724 1709"> <tbody> <tr> <td>$150 \times 0.35 + 20 = 72.50$</td> <td>M1A1</td> </tr> <tr> <td>$150 \div 5 = 30$</td> <td></td> </tr> <tr> <td>$30 \times 4 = 120$</td> <td>M1</td> </tr> <tr> <td>$120 \times 1.40 = 168$</td> <td>M1</td> </tr> <tr> <td>$168 - 72.50$</td> <td>M0M0</td> </tr> <tr> <td>95.50</td> <td>A0</td> </tr> </tbody> </table>	$150 \times 0.35 + 20 = 72.50$	M1A1	$150 \div 5 = 30$		$30 \times 4 = 120$	M1	$120 \times 1.40 = 168$	M1	$168 - 72.50$	M0M0	95.50
$150 \times 0.35 + 20 = 72.50$	M1A1											
$150 \div 5 = 30$												
$30 \times 4 = 120$	M1											
$120 \times 1.40 = 168$	M1											
$168 - 72.50$	M0M0											
95.50	A0											

4(a)	6, 6, 4, 3 or 6, 6, 4, 2 or 6, 6, 4, 1 or 5, 5, 3, 2 or 5, 5, 3, 1 or 4, 4, 2, 1 gains 2 marks (all in any order)
	<p>Mark the answer line first. If there is a set of 4 numbers on the answer line award B2 or B1 if possible. Only consider working to indicate the median of their chosen 4 numbers</p> <p>If there are less than 4 numbers on the answer line (usually it's a single digit) look in the working to award a possible B1</p> <p>Example 5 5 3 1 in working then answer 5 is B1 B0</p>
	<p>A set of 4 numbers with 2 modes is SC1 if the median is one less than one of the modes. Otherwise award B0 unless they identify the median</p> <p>Example 1 1 5 5 B0</p> <p>Example 1 1 5 5 median 3 B1</p> <p>Example 1 1 ↓ 5 5 B1 3</p>
4(b)	An attempt at $\sum f$ could be a total under the frequency column
5	<p>The accuracy mark is for showing that more than 3 are needed. This can be implied by an answer of 4 if correct working is seen</p> <p>Example 5000 seen then $5000 \div 1500$ Answer 4 award M1M1A1B1</p> <p>An answer of 4 with no working or invalid working scores SC2</p> <p>4 can come from division by 11 ($=3.66$ rounded up to 4) If working is seen it would be awarded M0 for 5500, M1 for $5500 \div 1500$ and B1ft for answer 4</p> <p>Sight of 5500 can imply use of 11</p> <p>Remember that the final B1 mark is a ft mark for rounding whatever method/answer is seen. Their answer must be a decimal or fraction and must be rounded up to the nearest integer</p>
6(a)	<p>Answer of -7.5 (from $74 - 80$) award M1M1A0</p> <p>8.1 comes from using $6/74$. If method is seen then award M1 for 6. If no method seen award SC1. This can also come from $80 \div 74 = 1.081... \rightarrow$ ans 8.1</p>
7(a)	<p>Allow £ signs in either or both terms eg £10 -6x, £10 -£6x, £10 - 6£x</p> <p>Allow $10 - 6 \times x$ or $10 - (6 \times x)$</p>

7(b)	<p>Check working carefully. An answer of 1.25 does not imply full marks in this question.</p> <p>1.25 with no working scores 3 marks</p> <p>The algebraic method must be convincing and clearly used to find the value of x</p> <p>Beware of those who set up the equation correctly but then cannot solve it so revert to T&I. Only award 3 marks.</p> <p>Some are also finding 1.25 by T&I then using $6x$ and $4x$ to check their answer. Again award 3 marks</p>
	<p>Alternative method 1</p>
	<p>The first M1 is for a correct equation stated relating Bens change to twice Marys change</p> <p>The 2nd M mark is for dealing with the bracket correctly.</p> <p>The 3rd M mark is for simplification to $ax = b$, allow one error in finding either a or b</p>
	<p>Mutliplying the wrong equation by 2 can gain 2 marks</p> <p>$10 - 6x = 2(10 - 4x)$ M0</p> <p>$10 - 6x = 20 - 8x$ M1</p> <p>$2x = 10$ M1</p> <p>$x = 5$ A0</p>
	<p>Using $10 + 6x$ and $10 + 4x$ leads to an answer of -1.25. this can score M0M1M1A0</p> <p>But beware those students who realise that the answer cannot be negative and give 1.25 as the answer from this incorrect equation.</p>
	<p>Alternative method 2</p>
	<p>The first M1 is for a correct pair of simultaneous equations. Allow any letter except x to represent the change</p> <p>The 2nd M1 is for equating coefficients</p> <p>The 3rd M1 is for subtracting the equations</p>
	<p>Alternative method 3</p>

	<p>Note a maximum of 3 marks are available for a T& I solution.</p> <p>A possible alternative for a trial is to try a price for Mary, find the change, double the change and then see if this gives the same price for Ben's bars. A very long winded approach.</p> <p>Example- tries £1.50 for Mary $10 - 6 \times 1.50 = 9$ so £1 change</p> <p>Ben £2 change $10 - 4x = 2$</p> <p>$4x = 8$ so $x = 2$ not the same as Mary This is just one trial so only award M1</p>
8	<p>For use of 16/80 and 12/52 (adding wins and races as total) treat as MR-1</p> <p>Any equivalents are acceptable –fractions, decimals, ratio, multiples eg multiplying up to the same number of races or to the same number of wins.</p>
9(a)	<p>Any attempt to join ends to axes or to make a polygon can be ignored.</p> <p>Histogram with frequency polygon drawn on top-mark the frequency polygon</p> <p>Histogram on its own B0B0</p>
9(b)	<p>Award marks for two correct comparisons seen anywhere in the working lines (ie they don't have to be one under comparison 1 and one under 2.Ignore incorrect comparisons.</p> <p>Must be comments in context eg not just the female mode is bigger or the highest frequency for females is 55 but for males is 45 This scores B0</p> <p>If they claim that on average the males are older they must state that they are comparing means or medians (although the actual figures need not be seen)</p> <p>Do not award marks for comparisons of a single group</p> <p>Some examples</p> <p>there are more 30-40 year old men than women B0</p> <p>there aren't any female members who are 60 to 70 whereas there are for the males B0 (just one group -there could be females who are 80)</p> <p>There are males over 60 but no females over 60 B1 (this covers all age groups over 60 and implies men are older than the women)</p> <p>After 40 -50 less and less males are members as they get older. For the females there are more and more as they get older B1</p>

13(b)

Allow 12×25 used in formula in place of 300

If 0.4 or 0.04 is used then either it must be used consistently or the other value of i must be 0.004. They must also use 300 for N . This is to give credit to those who are consistent **and** those who perhaps change one value but forget to change the other.

The correct answers are as follows:

0.4 used twice $\rightarrow 50\,000$

0.4 in numerator only $\rightarrow [71600, 71700]$

0.4 in denominator only $\rightarrow 500$

0.04 used twice $\rightarrow 50\,000$ (..)

0.04 in numerator only $\rightarrow [7160, 7170]$

0.04 in denominator only $\rightarrow 500$

Examples of awards of B3 down to B1

$$\frac{0.004 \times 125000}{1 - (1 + 0.004)^{-25}} = 5263.2$$

B3 (correct evaluation using 25 instead of 300)

$$\frac{0.004 \times 125000}{1 - (1 + 0.004)^{-25}} = 500$$

B2 (incorrect evaluation or no evaluation of above)

$$\frac{0.4 \times 125000}{1 - (1 + 0.4)^{-300}} = 50000$$

B2 (correct evaluation using 0.4 twice instead of 0.004)

$$\frac{0.004 \times 125000}{1 - (1 + 0.4)^{-300}} = 500$$

B2 (correct evaluation using 0.4 once instead of 0.004)

B1 for incorrect evaluation or no evaluation

$$\frac{0.4 \times 125000}{1 - (1 + 0.4)^{-25}} = 50011$$

B1 (correct evaluation with consistent 0.4 and 25)

$$\frac{0.004 \times 125000}{1 - (1 + 0.4)^{-25}}$$

B1 numerator correct

14	<p>The 3rd M1 is for working out the total number of students or the extra 20% of students based on their value for the number who failed first time.</p> <p>The 4th M1 is then for working out 60% of their total number of students or 1.5x their number who failed first time</p>
15	Other multipliers may be used.
	T & I methods leading to 14.99 and 9.50 score M1M1A1A1 with a possible B1ft but no Q mark
	T & I methods with incorrect answers score M0M0A0A0 with a possible B1ft only.
16	<p>Check histogram for working.</p> <p>Counting squares methods may be used.</p> <p>Example</p> <p>1sq cm = 10 students M1</p> <p>10 × 10.8 M1dep</p> <p>108</p> <p>Other scaling factors can be used eg 2.5 small squares = 1 student M1</p> <p style="text-align: center;">$270 \div 2.5$ M1 dep</p> <p style="text-align: center;">108 A1</p>
17	<p>Note that 168 is correct answer only – There is no ft from other incorrect work. Their 21 is ft and can be found by dividing their 168 by 8 or finding the missing amount to make the sample size 50</p>
18(a)	Division by 3 does not need to be seen
18(c)	<p>Shading can be shaded in or shaded out. Or they can outline the feasible region or shade just their feasible region</p> <p>For the M1 must be integer values tried in/on their region. If a vertex has integer values then it must be the vertex that is tried. For a non-integer vertex they can try the nearest integer point(s) within the region For example for the correct graph it is sensible to check (5,11) and (6,11) but not sensible to check (5,10)</p> <p>Note that (5,12) does not fit the criteria as it gives a total of 85 balls of wool.</p> <p>If there is no clear region identified then the only way to gain M1 is if they give 110 as their answer (M1A1)</p> <p>The final M1 A1 can be awarded for a correct answer of 110 even if the graph is incomplete/ incorrect or not attempted.</p>
	ft their part (b) for this question. If a different inequality is given in b) and they draw the line, shade correctly and find their maximum profit then award full marks.