Mark Scheme (Results)

November 2010

GCSE

GCSE Mathematics (Modular) 5MB1H
Unit 1 - Higher

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NOTES ON MARKING PRINCIPLES

1   All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2   Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3   All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4   Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5   Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6   Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
     Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
     Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
     The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7   **With working**
     If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
     If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
     If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
     If there is no answer on the answer line then check the working for an obvious answer.
     Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
     If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8   **Follow through marks**
     Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
     Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9   **Ignoring subsequent work**
     It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
     It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
     Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10   **Probability**
     Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
     Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
     If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
     If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11   Linear equations
      Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12   Parts of questions
      Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13   Range of answers
      Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

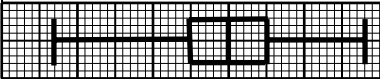| Guidance on the use of codes within this mark scheme |
| --- |
| M1 – method mark
A1 – accuracy mark
B1 – Working mark
C1 – communication mark
QWC – quality of written communication
oe – or equivalent
cao – correct answer only
ft – follow through
sc – special case
dep – dependent (on a previous mark or conclusion)
indep – independent
isw – ignore subsequent working |

5MB1H/01

Question	Working	Answer	Mark	Notes
1 (a)	$1-0.25$	0.75	2	M1 for $1-0.25$ or 0.2 + 0.2 + 0.35 A1 for 0.75 oe
(b)	$(1-0.25-0.35)\div 2$	0.2	2	M1 for $(1-0.25-0.35)\div 2$ A1 for 0.2 oe
2*	714 × 2 =1428 714 × 0.95 = 678.30 678.30 × 2 = 1356.60 1428 + 1356.60 = 2784.60 802 × 2 = 1604 802 × 0.85 = 681.70 681.70 × 2 = 1363.40 1604 + 1363.40 = 2967.40	Comparison	5	B1 for identifying 714 and 802 M1 for $\dfrac{95}{100}\times$ '714' oe or $\dfrac{85}{100}\times$ '802' oe M1 for 2 × "adult" + 2 × "child" oe for at least one holiday A1 for 2784.6(0) and 2967.4(0) or 2785 and 2967 C1 for comparing the costs of their two holidays for 2 adults and 2 children and clearly indicating which is cheaper. Conclusion must clearly follow from working. QWC: Decision and justification should be clear with working clearly presented and attributable. (allow full marks for a candidate who has calculated the cost per day for each holiday (397.8(0) and 211.95(7..)) and compares these costs accordingly.)
3		Types Tally Frequency	3	B3 for correct table with all three aspects Aspect 1:'method of travel' or for at least 3 of bus, car, walk, other etc. Aspect 2: 'tally' or tally marks or 'frequency' or 'number of people' Aspect 3: 'frequency' or frequencies or 'total' or totals or 'number of people' (B2 for two aspects, B1 for one aspect)

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4	Median (before) $=67$ Median (after) $=78$ Mean (before) = 69.6 Mean (after) = 80.8(6...) Range (before) $=84-58=26$ Range (after) $=102-65=37$ IQR (before) $=78-61=17$ IQR (after) $=91-69=22$	Comparison of 1. medians / means 2. range / IQR	6	B2 for median (before) = 67 and median (after) = 78 (B1 for one correct median) OR B2 for mean (before) = 69.6 and mean (after) = 80.9 /80.8(6..) (B1 for one correct mean) B2 for range (before) = 26 and range (after) = 37 OR B2 for IQR (before) = 17 and IQR (after) = 22 (B1 for one correct range/IQR) OR B2 for fully correct diagram/chart to compare, e.g. box plots, cumulative frequency diagrams, etc (B1 for diagram/chart with one error in presentation) C1 for median (after) > median (before) oe or ft their medians OR for mean (after) > mean (before) oe or ft their means OR C1 for range (after) > range (before) oe or ft their ranges OR for IQR (after) > IQR (before) oe or ft their IQRs

5MB1H/01

Question	Working	Answer	Mark	Notes
4				C1 for comments, in context, relating to an average and to the spread of the data (dep on B3). QWC: Decisions should be justified and calculations attributable SC If no marks scored, B1 for a correct comparison (eg Heart rates are faster after walking up the stairs)
5* (a)	13.55 × 1.65 = 22.3575 3.10 ÷ 160 × 1000 = 19.375 OR 13.55 × 1.65 = 22.3575 22.3575 ÷ 1000 × 160 = 3.5772 OR 3.10 ÷ 1.65 = 1.8787… 1.8787…÷ 160 × 1000per kg OR $1355 \div 1000 = 1.355 \, \text{p/g}$ 3.10 ÷ 1.65 = 187.87…p 187.87…÷ 160 = 1.1742…p/g OR 3.10 ÷ 160 = 0.019375 SF/g 13.55 × 1.65 ÷ 1000 =0.0223575SF/g	Switzerland, with correct explanation	4	M1 for a correct method to obtain two comparable weights e.g. cost of 1kg in Switzerland, ÷ 160 × 1000, × 6.25 (cost of 1 kg in England given) or cost of 160g in England, ÷ 1000 × 160 (cost of 160g in Switzerland given) or cost per gram in each country, ÷ 160 and ÷ 1000 or cost of 800g in each country M1 for converting £ to Swiss francs or Swiss francs to £ (other than £1 = 1.65 SFr) A1 for two correct values (using same units) for comparison. C1 for country identified from a clear attempt to use comparable weights and prices. QWC: Decision must be stated, with calculations clearly attributable

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
6		51	4	M1 for a two-way table or Venn diagram with bowling, cinema, skating, boys and girls labelled or list of at least two combinations clearly labelled. M1 for attempt to find the value of an unknown entry in the table oe eg 66 − 28 − 20, 120 − 66, 36 – 20 A1 for 16 or 18 or 54 or 23 or 33 A1 cao (Note: 36 + 15 = 51 scores no marks)
7	$420 \div 7 = 60$ $5 \times 60 = 300$ $2 \times 60 = 120$ $120 \div 3 \times 2 = 80$ $0.32 \times 300 + 1.17 \times 80 + 1.51 \times 40$ 96 + 93.60 + 60.40	250	5	M1 for $420 \div (5+2)$ or 60 seen M1 (dep) for $5 \times$ '60' or $2 \times$ '60' or 300 or 120 seen M1 for $'120' \div 3 \times 2$ oe M1 for $32\,p \times '300' + £1.17 \times '80' + £1.51 \times '40'$ A1 for 250.00 or 250 SC B1 for £539
8 (a)		– 4	2	M1 for 'difference in y' / 'difference in x' or 4 seen A1 for – 4 SC If no marks scored allow B1 for $y = 40 - 4x$, $y = - 4x$, 40 - 4x or - 4x
(b)		Practical interpretation	1	B1 ft for depth decreases by "4" cm each hour oe or enables you to work out that the tank will be empty in 10 hours.

5MB1H/01					
Question		Working	Answer	Mark	Notes
9	(a)		120	1	B1 for 119.5 – 120.5
	(b)	$60 - 52 = 8$ 20% of $60 = 12$	Claim not true since 8 < 20% of 60	3	M1 for using graph at 130, may be implied by a value in the range 52 to 53 seen A1 for 8 (cars breaking speed limit) or 13.(3..)% (accept 7 or 11.(6..)%) A1 for correct conclusion with fully correct working OR M1 for using cf = 48 A1 for (20% of cars exceed) value in the range 126.5 to 127.5 km/h A1 for correct conclusion with fully correct working
	(c)			3	B3 for complete box plot with all three aspects Aspect 1: ends of whiskers at 97 and 138 Aspect 2: ends of box at 115 and 125 Aspect 3: median marked at 120 or ft (a) (B2 for two aspects, B1 for one aspect) (Allow tolerance of $\frac{1}{2}$ square)

5MB1H/01				
Question	Working	Answer	Mark	Notes
10 (a)	$5 \times 16 = 80$ $12.5 \times 18 = 225$ $17.5 \times 10 = 175$ $27.5 \times 6 = 165$ $645 \div 50 = 12.9$ or $5.5 \times 16 = 88$ $13 \times 18 = 234$ $18 \times 10 = 180$ $28 \times 6 = 168$ $670 \div 50 = 13.4$	12.9	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\sum fx \div \sum f$ A1 for 12.9 or 13.4
(b)	$\dfrac{6}{50} \times \dfrac{5}{49} = \dfrac{30}{2450}$	$\dfrac{3}{245}$	2	M1 for $\dfrac{6}{50} \times \dfrac{5}{49}$ A1 for $\dfrac{3}{245}$ oe If M0A0, SC B1 for $\dfrac{9}{625}$ oe
(c)	$0 \leq d < 10$ fd 1.6 $10 \leq d < 15$ fd 3.6 $15 \leq d < 20$ fd 2 $20 \leq d < 35$ fd 0.4	Correct histogram	3	B2 for 4 correct histogram bars ($\pm \frac{1}{2}$ ` square) (B1 for 2 or 3 histogram bars of different widths correct) B1 for frequency density label or key and consistent scaling SC if B0 then M1 for clear attempt to use frequency density or area

5MB1H/01

Question	Working	Answer	Mark	Notes
11 (a)		Correct method to choose a random sample	1	B1 for equal chance of selection, e.g. number each laptop and then use the random number function on a calculator or pick the numbers out of a bag.
(b)	$\dfrac{3}{80} \times 600 = 22.5$	22.5	2	M1 for $\dfrac{3}{80} \times 600$ A1 for 22.5 or 22 or 23 SC B1 for $\dfrac{22.5}{600}$ or $\dfrac{22}{600}$ or $\dfrac{23}{600}$
12 (a)		$\dfrac{3}{10}$ $\dfrac{6}{9}, \dfrac{3}{9}, \dfrac{7}{9}, \dfrac{2}{9}$	2	B1 for $\dfrac{3}{10}$ correct for 1st sock B1 for $\dfrac{6}{9}, \dfrac{3}{9}, \dfrac{7}{9}, \dfrac{2}{9}$ correct for 2nd sock
(b)	$\dfrac{7}{10} \times \dfrac{6}{9} + \dfrac{3}{10} \times \dfrac{2}{9}$	$\dfrac{48}{90}$	3	M1 ft for $\dfrac{7}{10} \times '\dfrac{6}{9}'$ or $'\dfrac{3}{10}' \times '\dfrac{2}{9}'$ M1 for $\dfrac{7}{10} \times '\dfrac{6}{9}' + '\dfrac{3}{10}' \times '\dfrac{2}{9}'$ A1 for $\dfrac{48}{90}$ oe SC B2 for $\dfrac{58}{100}$ oe seen

5MB1H/01				
Question	Working	Answer	Mark	Notes
13	$\dfrac{127}{370} \times 50 = 17.16... = 17.1....$ OR $243 + 370 + 127 = 740$ $\dfrac{370}{740} = 0.5$ so sample size = 100 $\dfrac{127}{740} \times 100 = 17.1....$	17	2	M1 for $\dfrac{127}{370} \times 50$ oe A1 for 17 (accept 18) SC B1 for $\dfrac{17}{127}$ or $\dfrac{18}{127}$ (Note: 50 ÷ 3 = 16.6(...) = 17 scores no marks)