Mark Scheme (Results)

Summer 2013

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Foundation (Calculator) Paper 2F

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

PAPER: 5AM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		700 or 7 hundred(s) or seven hundred(s)	1	B1 for 700 or 7 hundreds oe (do not accept 100)
	(b)		4.357	1	B1 for 4.357 (accept 4 km 357 m)
	(c)		$\frac{6}{10}$ or 6 tenths or 60 cm	1	B1 for $\frac{6}{10}$ or 6 tenths or 60 cm (do not accept 'tenths' or 0.6)
	(d)		174	1	B1 cao
2			2100 – 2500	4	M1 for attempting to count the squares or for sight of a number in the range 21 to 25 seen implying the area of the region. M1 (dep) for multiplying any number of squares by 100 A1 for an answer in the range 2100 to 2500. B1 (indep) for m^2
3			53	3	M1 for an attempt to find either the total number of cameras (= 150) or the total number of laptops (= 97) M1 (dep) for finding the difference between their numbers of cameras and laptops A1 cao OR M1 for an attempt to find the difference in the number of cameras and the number of laptops in either January (= 28) or February (= 9) or March (= 16) M1 (dep) for adding their 3 differences A1 cao

PAPER: 5AM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		67	2	M1 for 3 × 19 + 10 A1 cao
	(b)		7	3	M1 for 143 – 10 or 133 seen M1 for "143 – 10" ÷ 19 or 133 ÷ 19 A1 cao
5			10 am	4	B1 for inclusion of 30 (minute rest) in a calculation M1 for identifying 40, 50, 1hr 15 (75) and 1hr 5 (65) M1 for adding at least 4 correct times or 'subtracting' at least 4 correct times from 3 pm A1 for 10 am or 10 00
6	(a)		unlikely	1	B1 cao
	(b)		certain	1	B1 cao
	(c)		1, 1, 1, 2, 2, 3	2	B1 for three 1s B1 for more 2s than 3s
7		2.35 × 4 = 9.40 2 + 8 × 1.10 = 10.80 OR 2 + 8 × 1.10 = 10.80 10.80 ÷ 4 = 2.70	Bus	4	M1 for 2.35 × 4 (= 9.40) M1 for 2 + 8 × 1.10 (=10.80) A1 for 9.4(0) cao and 10.8(0) cao A1 (dep on at least M1) for correct decision based on their calculations OR M1 for 2 + 8 × 1.10 (= 10.80) M1 (dep) for "10.80" ÷ 4 A1 for 2.7(0) cao A1 (dep on at least M1) for correct decision based on their calculations

Question		Working	Answer	Mark	Notes
8	(a)(i)		6	3	M1 for a fully correct method to find either the total number of days or the total profit
	(ii)		475		A1 for 6 A1 for 475
	(b)		2 cupboards and 1 chair	3	M1 for a combination of items that takes 7 days to make M1 (dep) for a correct method to work out the total profit for their items A1 for 2 cupboards and 1 chair OR M1 for a correct method to work out the profit per day for either 1 table or 1 cupboard M1 (dep) for using a combination with 2 cupboards A1 for 2 cupboards and 1 chair [SC: B2 for an answer of 675 if M0 scored]
		$175 \div 2 = 87.5$ $300 \div 3 = 100$			
9	(i)		$\frac{9}{10}$ oe	3	B1 for $\frac{9}{10}$ oe or 0.9 or 90%
	(ii)		$\frac{1}{10}$ oe		B1 for $\frac{1}{10}$ oe or 0.1 or 10%
	(ii)		0		B1 for 0 or 0% or zero (accept $\frac{0}{10}$)
10			(L, I), (L, F), (L, C), (P, I),(P, F), (P, C), (B, I), (B, F),(B, C)	2	B2 for all 9 pairs with no incorrect pairs – ignore repeats or additional reversed pairs. (B1 for at least 4 pairs - ignore any incorrect pairs, repeats or additional reversed pairs)

PAPER: 5AM2F_01					
Question		Working	Answer	Mark	Notes
11	(a)		$m = s + 8$	2	B2 for $m = s + 8$ (B1 for $m - s = 8$ or m = expression in s or for $s + 8$ or for $s = m - 8$)
	(b)	$2 \times 10 + 16$	36	2	M1 for $2 \times 10 + 16$ A1 cao
12	(a)		21.5 to 22	1	B1 for an answer in the range 21.5 to 22
	(b)		4 to 4.4	1	B1 for an answer in the range 4 – 4.4
	(c)		Yes	4	M1 for the adding the 4 weights in pounds (= 650) M1 for selecting a factor of 320 or "650" and attempting to read this from the graph M1 for a fully correct method leading to total weights in pounds and kg which could be compared. A1 (dep on M3) for "yes" and either a converted maximum weight of 700 – 710 pounds or a converted total weight of 286 – 302 (kg) OR M1 for selecting a factor of 165 or 180 or 135 or 170 and attempting to read this from the graph M1 for a fully correct method leading to a converted weight into kg of at least one person Accept converted weights in the ranges: Tom = 73 to 77 (kg), Zak = 79 to 83 (kg), Tina = 59 to 63 (kg) and Asif = 75 to 79 (kg) M1 (indep) for adding their 4 converted weights. A1 (dep on M3) for "yes" and a converted total weight in the range 286 – 302 (kg) provided all 4 converted weights are within the accepted ranges above.

Question		Working	Answer	Mark	Notes
*13		$3.80 \times (23 + 21)$ $= 87.4 + 79.8 \qquad = 167.20$ $5.99 \times (28 + 27)$ $= 167.72 + 161.73 \quad = 329.45$ $7.14 \times (19 + 32)$ $= 135.66 + 228.48 \quad = \underline{364.14}$ $\qquad\qquad\qquad\qquad 860.79$ $5.99 \times (23 + 21 + 28 + 27 + 19 + 32) = 898.50$	No, Parcel Express is cheaper	5	M1 for a correct method to find cost of Parcel Express for either month or for the two months for one of the weight ranges M1 for method to find cost of Parcels R Go for either one month or for two months A1 for 860.79 A1 for 898.5(0) C1 (dep on M2) for a correct conclusion from their comparable calculations; units must be included [SC: B2 for a correct conclusion and £860.79 and £898.5(0) without working if M0 scored. B1 only if units omitted]
14	(a)		Triangle constructed	2	M1 for intersecting arcs drawn of radii 5.3cm and 6.5cm A1 for a fully correct triangle [SC: B1 for correct triangle with no arcs] Ignore any rectangles
	(b)		Yes with 3 cm by 2 cm rectangle inside triangle	2	M1 for a rectangle drawn inside their triangle with one side either 2cm or 3cm in length OR a line drawn parallel to one side of their triangle 3 cm or 2 cm from the side A1 for a 3 cm by 2 cm rectangle drawn inside triangle or ft from an incorrect triangle in (a) [Note: a rectangle drawn of dimensions 3+cm by 2+cm is acceptable]

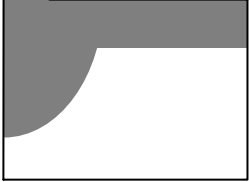| PAPER: 5AM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		Cuboid with dimensions	3	B1 for sketch of cuboid M1 for showing the dimensions of the cuboid A1 for cuboid with correct dimensions that allow 8 cans to fit inside it.
	(b)		Net drawn	2	B2 for a correct sketch of a net of an open or closed box/cuboid (ignore flaps) [B1 for at least 4 rectangles drawn and connected at complete sides]
16	(a)		2pm	1	B1 for 2 (pm) Accept 2 o'clock (in the afternoon) or 14 00 but not 2 am or 02 00
	(b)		Graph completed	2	B1 for line from (2 pm, 2.5) to (3pm, 2.5) B1 for line from (t, 2.5) to (t + 45mins, 0)
	(c)		5	1	B1 for 5 or ft from 'graph' in part (b)

Question	Working	Answer	Mark	Notes
*17		She cannot buy enough sand to fill the sandpit	5	M1 for a correct method to find the volume of the sandpit (= 192000) M1 (dep) for "192000" ÷ 10000 (= 19.2) M1 (dep on previous M1) for their number of bags × 2.99 A1 for (£)59.8(0) (20 bags) or (£)57.40(8) or (£)57.41 (19.2 bags) C1 (dep on at least M2) for comparing cost of sand needed (with units) with £50 SC: B1 for correct value(s) with units and correct statement if M0 scored OR M1 for a correct method to find the volume of the sandpit (= 192000) M1 for 50 ÷ 2.99 (= 16.722...) M1 (dep on previous M1) for "16" × 10000 A1 for 160000 (cm^3) C1 (dep on at least M2) for comparing volume of sand needed (with units) with volume that can be bought for £50 SC: B1 for correct value(s) with units and correct statement if M0 scored

Question	Working	Answer	Mark	Notes
*18		Not enough butter Enough sugar and flour	5	M1 for a correct method to find the total number of cookies required (= 50) M1 (dep) for "50" ÷ 20 (= 2.5) M1 (dep on M2) for "2.5" used as a factor A1 for two of: 562.5, 300, 687.5 or two of: 2.22.., 2.5, 3.636... or two of: 200, 120, 400 C1 (dep on at least M2) for 562.5g and 300g and 687.5g or for 2.22.. and 2.5 and 3.636.. or for 200g and 120g and 400g AND a correct decision for all three ingredients OR M1 for a correct method to find the total number of cookies required (= 50) M1 for a correct method to find the number of cookies one ingredient could produce M1 for a correct method to find the number of cookies that ALL ingredients could produce A1 for two of: 44. ..., 50, 72. ... C1 (dep on at least M2) for 44. ... cookies and 50 cookies and 72. .... cookies AND a correct decision for all three ingredients
19		$\frac{4100}{30000}$ or Chloe The larger the sample the better the estimate	2	B1 for identifying the trial that gives the best estimate, e.g. $\frac{4100}{30000}$ or Chloe B1 for the larger the sample the better the estimate oe

Question		Working	Answer	Mark	Notes
20	(a)		Diagram	2	M1 for pentagon with at least two sides correct A1 cao
	(b)		42.98	6	M1 for a correct method to find the area of either a side (= 12) or an end (= 10) M1 for a correct method to find both the area of a side (= 12) **and** the area of an end (= 10) A1 for 44 or 12 and 12 and 10 and 10 M1 for an area ÷ 8 or for a correct method to work out how many m² can be painted from each tin. M1 (dep on previous M1) for a correct method to find a cost of paint required for their number of litres to cover their total area of 4 faces A1 cao
21	(a)	$21 \times 90 = 1890$ $\sqrt{1890} =$	43	2	M1 for $\sqrt{21 \times 90}$ or 1890 seen A1 for answer in the range 43 – 43.5
	(b)	$50 = \sqrt{21 \times d}$ $2500 = 21d$ $d = 2500 \div 21$	119	3	M1 for $50 = \sqrt{21 \times d}$ or 50^2 or 2500 M1 for $21d = 50^2$ oe A1 for answer in the range 119 – 119.05

PAPER: 5AM2F_01					
Question		Working	Answer	Mark	Notes
22		B1 for arc of radius 3 cm (± 0.2)	Correct region	4	B4 fully correct [B3 for fully correct shading of the area where people **can** leave boats] OR B1 for arc of radius 3 cm (± 0.2 cm) centre *A* B1 for a straight line parallel to ED and 1 cm (± 0.2 cm) from it B1 shading inside their arc or for shading above their line, provided that their line is drawn parallel to ED B1 fully correct Ignore any drawing outside the harbour
23	(a)		0.1 on 1st branch 0.15 on 2nd branch	2	B1 for 0.1 on first branch B1 for 0.15 on 2nd branch
	(b)		0.765	2	M1 for 0.9×0.85 A1 for 0.765 oe