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Mark Scheme (Results)

November 2012

GCSE Mathematics Linked Pair Pilot
Application of Mathematics (2AM01)
Foundation (Calculator) Paper 1F

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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

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Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		7000	1	B1 for 7000 accept 7 thousand
	(b)		3500	1	B1 for 3500 accept 35 hundred or 3 thousand 500 oe
	(c)		65	1	B1 for 65
2	(a)		4 profit	4	B1 cao
			3.50		B1 cao
			25		B1 cao
			15		B1 cao
	(b)	2.50 + 4 + 1.50 + 20 = 28 28 – 5 = **OR** 5 + 8 + 2 + 25 + 15 = 55 7.50 + 12 + 3.50 + 20 + 35 = 78 78 – 55 =	23	3	M1 ft for attempt to add all profits M1 ft for attempt to subtract losses A1 cao **OR** M1 ft for attempt to sum all the cost and sale prices M1 ft for attempt to subtract cost and sale prices A1 cao
3	(a)	Dog ~~lll~~ lll 8 Cat ~~lll~~ ll 7 Rabbit ll 2 Hamster lll 3	Correct frequencies	2	B2 for all frequencies correct (B1 for 2 tallies or 2 frequencies correct)
	(b)		Correct bars	2	B2 ft for all bar heights correct with or without gaps (B1 ft for 2 bar heights correct)
	(c)		Dog	1	B1 ft

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Question		**Working**	**Answer**	**Mark**	**Notes**
4			correct lines drawn	3	B1 for vertical line of symmetry on Big Ben B1 for no line of symmetry on Houses of Parliament B1 for 4 lines of symmetry on Millennium Arch
5	(a)		3 feet	2	B1 for feet or ft or inches or in B1 (dep) for 3, accept answer in range 2.8 – 3.2, with feet or 36, accept answer in range 35 – 37, with inches
	(b)		2 litres	2	B1 for litres or *l* or millilitres or m*l* B1 (dep) for 2, accept answer in range 1.8 – 2.2, with litres or 2000, accept answer in range 1800 – 2200, with millilitres
6	(a)		18	1	B1 cao
	(b)		–6	1	B1 cao
	(c)	18 – –6 = –6 – 18 Counting on or counting back	24	1	B1 for 24 or –24 or ft from (a) and (b) provided (b) negative
	(d)	(18 + –6) ÷ 2 = or (a) – (c) ÷ 2 or (b) + (c) ÷ 2	6	2	M1 ft for '18' – '24' ÷ 2 or '–6' + '24' ÷ 2 or ('18' + '–6') ÷ 2 A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)		A, C, E	2	B2 for all 3 correct (–1 each error or omission) (B1 for one correct and no incorrect)
	(b)		<table><tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td></tr><tr><td>2</td><td></td><td>8</td><td></td><td>2</td></tr></table>	2	B2 for 2 in A, 8 in C and 2 in E (–1 each answer in B and D) (B1 for one or two correct in A, C and E and no answer given in B or D) **Note** Ignore any reference to order 0 or 1 in B and D
8	(a)		March & April	1	B1 cao
	(b)		Lilac & Potentilla	1	B1 cao
	(c)		March	1	B1 cao
	(d)		Daphne	1	B1 cao
9			Correct arrows drawn	3	B3 for 4 correct arrows B2 for 2 correct arrows B1 for 1 correct answer NB arrows may go to scalene from each triangle and all equilateral triangles are isosceles

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Question		**Working**	**Answer**	**Mark**	**Notes**
*10			Appropriate correct graph drawn	4	C1 for key or suitable labels to identify Dave and Joan C1 for days of the week labelled M1 for diagram or chart (combined or separate) set up for comparison, e.g. dual bar chart, back to back bar charts or stem and leaf diagram, vertical stick graphs, pie charts etc. A1 for fully correct diagram(s) or chart(s) to include time 'axis' correctly scaled and labelled
11	(a)	5 – (0.75 + 0.85) 5 – 1.60	3.40	3	M1 for adding 75 + 85 or 160 or 0.75 + 0.85 or 1.60 M1 for 5 – 1.60 or 500 – 160 or 5 – 0.75 – 0.85 or 500 – 75 – 85 A1 for 3.40 cao (SC B1 for answer of 2.25 if M0 scored)
	*(b)	Single burger meal deal £1.90 Chicken (3) meal deal £1.95 Single burger, fries & milk £2.10 Chicken pieces (3), fries & milk £2.15 Single burger meal deal with large fries £2.10 Chicken (3) meal deal with large fries £2.15	Correct combinations	5	M1 for attempt to find total for drink, fries and either burger or chicken pieces with prices seen C1 for a correct total for drink, fries and either burger or chicken pieces B1 for identifying single burger meal deal and chicken (3) meal deal C2 for all 4 combinations with a total of 2.15 or less (C1 for 2 combinations with a total of 2.15 or less)

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Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$2x + 3x + 4x = 180^o$ $9x = 180$ $x = 180 \div 9$	20	3	M1 for $3x + 4x + 2x$ or $9x$ M1 for $180 \div 9$ or for 60, 80 and 40 A1 for 20 cao
	(b)	$2y + 20 + y + 16 + 90 = 180$ $3y + 36 = 90$ $3y = 54$ $y = 54 \div 3 = 18$ $18 + 16 =$	34	3	M1 for attempt to form an equation in y with sight of $2y + 20$, $y + 16$, 90 and 180 or with sight of $2y + 20$, $y + 16$ and 90 M1 for attempt to isolate y in equation or sight of $y = 18$ A1 for 34 cao
13	(a)	375×9.02	3382.50	2	M1 for 375×9.02 A1 for 3382.5(0) (SC B1 for answer of 3382 or 3383 if M0 scored)
	(b)	$675 \div 9.02 = 74.83$ £75 – 74.83 **OR** $75 \times 9.02 = 676.50$ $676.50 – 675 = 1.50$ $1.50 \div 9.02 = 0.166…$	£0.17 or 17p or 1.50 Kr	3	M1 for $675 \div 9.02$ (= 74.83...) M1(dep) for 75 – '74.83' A1 for £0.17 or 17p **OR** M1 for 75×9.02 (= 676.5) M1(dep) for '676.5' – 675 A1 for 1.5(0) Kr **OR** M1 for 75×9.02 (= 676.5) M1(dep) for '676.5' – 675 = 1.5 and '1.5' $\div$ 9.02 A1 for £0.17 or 17p

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$S - C = 15$ $D = 15/50 = 0.3$ $T = 0.3 \times 100$	P = 15 D = 0.3 T = 30	3	B1 for 15 B1 for 0.3 or $\frac{15}{50}$ oe or ft from '15' B1 for 30 or ft from '0.3'
15		$x + x + 5 + x + x + 5 = 58$ $4x + 10 = 58$ $4x = 48$ $x = 12$ so L = 17 w = 12 Area = 17×12 **OR** $2(x + x + 5) = 58$ $4x + 10 = 58$ $4x = 48$ $x = 12$ so L = 17 width = 12 Area = 17×12 **OR** Trial and Improvement method to find width and length with sight of 12 and/ or 17 Area = 12×17	204	4	M1 for attempt to set up the equation $x + x + 5 + x + x + 5 = 58$ or $4x + 10 = 58$ M1 for attempt to isolate terms in x and number terms or for dividing by coefficient of x M1 for multiplying their length and width A1 for 204 **OR** M1 for attempt to set up the equation $2(x + x + 5) = 58$ M1 for attempt to isolate terms in x and number terms or for dividing by coefficient of x M1 for multiplying their length and width A1 for 204 **OR** Trial and improvement scores 2 marks for sight of 12 and or 17 M1 for 12×17 A1 for 204

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Question		**Working**	**Answer**	**Mark**	**Notes**
*16		**Cwts to lbs** 7.5 × 112 = 840 lbs **Kg to lbs** 400 × 2.2 = 880 lbs **Cwts to Kg** 7.5 × 112 ÷ 2.2 = 381.81 **lbs to Kg** 830 ÷ 2.2 = 377.2727… **Lbs to cwts** 830 ÷ 112 = 7.4107… **Kg to cwts** 400 × 2.2 ÷ 112 = 7.857	Correct comparison	4	**Cwts and Kg to lbs** M1 for 7.5 × 112 or 400 × 2.2 M1 for 7.5 × 112 and 400 × 2.2 A1 for 7½ cwts = 840 (lbs) and 400 kg = 880 (lbs) C1 (dep on at least M1) for conclusion ft from working seen **Cwts and lbs to Kg** M1 for 7.5 × 112 ÷ 2.2 or 830 ÷ 2.2 M1 for 7.5 × 112 ÷ 2.2 and 830 ÷ 2.2 A1 for 7½ cwts = 381.8(18..)(kg) and 830 lbs = 377.2(72..)(kg) C1 (dep on at least M1) for conclusion ft from working seen **Lbs and Kg to cwts** M1 for 830 ÷ 112 or 400 × 2.2 ÷ 112 M1 for 830 ÷ 112 and 400 × 2.2 ÷ 112 A1 for 830 lbs = 7.4(107..)(cwt) and 400 kg = 7.8(571..)(cwt) C1 (dep on at least M1) for conclusion ft from working seen

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Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)		35	1	B1 cao
	(b)(i)	30 ÷ 150	0.2	3	M1 for right angled triangle drawn or diff y ÷ diff x A1 for 0.2 oe, eg $\frac{30}{150}$
	(ii)		20p		B1 for 20p or £0.20 or ft their (b)(i)
	*(c)	<u>75 units</u> Gas&Air = £35 Seagas = £35 Sandygas = £37.50 <u>100 units</u> Gas&Air = £37.50 Seagas = £40 Sandygas = £50 **OR** <u>Gas&Air</u> (75) = £35 (100) = £37.50 <u>Seagas</u> (75) = £35 (100) = £40 <u>Sandygas</u> (75) = £37.50 (100) = £50	Gas&Air with comparisons	4	M1 for attempt to calculate 75 units and 100 units for at least one company A1 for (Seagas =) 35 and 40 OR (Sandygas =) 37.5(0) and 50 OR (Gas&Air =) 35 and 37.5(0) oe A1 for (Seagas =) 35 and 40 AND (Sandygas =) 37.5(0) and 50 AND (Gas&Air =) 35 and 37.5(0) oe C1 (dep on M1) for Gas&Air or ft their calculations **OR** M1 for attempt to calculate 75 units or 100 units for at least two companies A1 for two of (75 units) 35, 35, 37.5(0) or for two of (100 units) 37.5(0), 40, 50 A1 for all of (Seagas =) 35 and 40, (Sandygas =) 37.5(0) and 50, (Gas&Air =) 35 and 37.5(0) oe C1 (dep on M1) for Gas&Air or ft their calculations **OR** M1 for straight line drawn through (0, 0) or (75, 37.5) or for line with gradient 0.5 OR for straight line drawn through (75, 35) or (100, 37.5) or for line with gradient 0.1 A1 for straight line through (75, 37.5) and (100, 50) A1 for straight line through (75, 35) and (100, 37.5) C1 (dep on M1) for Gas&Air or ft 'straight lines' for Sandygas and Gas&Air [NB tolerance ±2mm square]

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Question		Working	Answer	Mark	Notes
18		**Initial information** |	Bags	Pkt	Inst	Tot | | 50	**5**	**0**	**2**	| | 100	**37**	**10**		| | 200		**7**		**40** | | Tot	**70**			**100** | **Calculations** |	Bags	Pkt	Inst	Tot | | 50	5	0	2	**7** | | 100	37	10	**6**	**53** | | 200	**28**	7	**5**	40 | | Tot	70	**17**	**13**	100 |	Table completed correctly	5	**Initial information** B2 for all 8 pieces of information correctly placed (B1 for 3 pieces of information correctly placed) **Calculations** B3 for all 7 items correct (B2 for 4, 5 or 6 items correct) (B1 for 2 or 3 items correct)

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Question		**Working**	**Answer**	**Mark**	**Notes**
*19		Angle *ACB* = 67º *x* = 180 – (67 + 67)	46° with reasons	4	B1 for angle *ACB* = 67º, could be marked on the diagram M1 for 180 – (‘67’ + ‘67’) A1 for *x* = 46° C1 for vertically opposite angles (or vertically opposite angles) **and** base angles of an isosceles triangle are equal **OR** B1 for angle *ACB* = 67º, could be marked on the diagram M1 for 180 – (‘67’ + ‘67’) A1 for *x* = 46° C1 for “angles on a straight line add up to 180º **and** base angles of an isosceles triangle are equal
20	(a)		= 2*A2 + 2*B2 = C2/2	4	B1 for doubling the length and the width either singly or together e.g. 2*(*x* + *y*) or 2**x* and 2**w* or 2*(A2+B2) or 2*A2 or 2*B2 or 2*SUM(A2:B2) B1 for adding the lengths either before or after doubling, e.g. A2 + B2 B1 for attempt to divide their spreadsheet formula by 2 or their cell C by 2, eg C2/2 B1 (dep on two formulas) for correct spreadsheet formula notation (condone missing =)
	(b)		8	1	B1 for 8 or ft their formulas

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Question		**Working**	**Answer**	**Mark**	**Notes**
21	(a)	(79 + 39) × 1.2 118 × 1.2 **OR** 79 × 1.2 + 39 × 1.2 94.80 + 46.80 **OR** $\frac{20}{100}$ × (79 + 39) = 23.60 118 + 23.60 **OR** $\frac{20}{100}$ × 79 = 15.80 $\frac{20}{100}$ × 39 = 7.80 15.80 + 7.80 + 118	141.60	3	M1 for 79 × 1.2 or 39 × 1.2 oe M1 for 79 × 1.2 + 39 × 1.2 oe A1 for 141.6(0) **OR** M1 for $\frac{20}{100}$ × 79 (= 15.8) and $\frac{20}{100}$ × 39 (= 7.8) M1 for $\frac{20}{100}$ × 79 + 79 + $\frac{20}{100}$ × 39 + 39 A1 for 141.6(0) **OR** M1 for $\frac{20}{100}$ × (79 + 39) (= 23.6) oe M1 for $\frac{20}{100}$ × (79 + 39) + 79 + 39 oe A1 for 141.6(0)
	(b)	20 000 × 0.8 = 16 000 16 000 × 0.9 = 14 400 **OR** $\frac{20}{100}$ × 20 000 = 4000 20 000 – 4000 = 16 000 10% × 16 000 = 1600 16 000 – 1600 =	14 400	3	M1 for 20 000 × 0.8 oe or 16 000 seen M1 for '16 000' × 0.9 oe A1 for 14 400 **OR** M1 for 20 000 – 0.2 × 20 000 oe or 16 000 seen M1 for '16 000' – 0.1 × '16 000' oe A1 for 14 400

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