Version 1.0

AQA

**General Certificate of Secondary Education
June 2012**

Applications of Mathematics (Pilot)   93701H

(Specification 9370)

**Unit 1: Applications of Mathematics
      Written Paper (Higher)**

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

M	Method marks are awarded for a correct method which could lead to a correct answer.	
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.	
B	Marks awarded independent of method.	
Q	Marks awarded for quality of written communication. (QWC)	
M Dep	A method mark dependent on a previous method mark being awarded.	
B Dep	A mark that can only be awarded if a previous independent mark has been awarded.	
ft	Follow through marks. Marks awarded following a mistake in an earlier step.	
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.	
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$	

A1 Higher Tier

Q	Answer	Mark	Comments
1(a)	Women plane = 12 **and** coach = 21	B1	
	Men train = 49	B1	
	(300 − (their 49 + 51 + 7 + their 21 + 19 + 12)) ÷ 3 (= 141 ÷ 3) = 47	M1	oe
	Car for men = 94, women = 47	A1	
1(b)	Obs sheet with 3 correct headings	B1	
	Approx 10 entries, ticks or tallies	B1 Dep	

Q	Answer	Mark	Comments
2(a)	96% = 48 or 0.96 × 50 = 48	B1	
	$\frac{3}{4}$ × their 48 (= 36)	M1	
	Their 36 × 3.99 (= 143.64)	M1	
	(Their 48 − their 36) × 2.50 (= 30) or their 48 ÷ 4	M1	The rest of their bulbs × 2.50
	Their (143.64 + 30) − 15	M1	
	158.64	A1	
2(b)	$\frac{78}{120}$ × 100	M1	oe
	65	A1	SC1 For 35

Q	Answer	Mark	Comments
3	3 boxes of 8 and 1 box of 6 = £13.30	B3	B2 For 　Correct combination (3 packs of 8 and 1 of 6) with incorrect total 　or 　Two correct trials with correct totals for 30 cards 　Correct trials are 　5 boxes of 6　£14 　3 boxes of 10　£13.35 　2 boxes of 6 + 1 box of 8 + 1 box of 10 = £13.55 B1 For any correct combination for 30 cards (total cost not required)

Q	Answer	Mark	Comments
4	40	B3	B2 80 or multiples of 8 **and** 10 (at least 3 of each) B1 120 or at least 3 multiples of 10 or at least 3 multiples of 8 or any common multiple or for 10% and 1/8 of any number ≤100 correctly evaluated eg 96 → 9.6 and 12

Q	Answer	Mark	Comments
5(a)(i)	$(15 \times 7) + (45 \times 17) + (75 \times 22) + (105 \times 4)$ or $105 + 765 + 1650 + 420$	M1	Attempt at $\sum fx$ with x values within or on class boundaries
	Their 2940 ÷ 50	M1 Dep	oe
	58.8	A1	oe Ignore further rounding / truncating if 58.8 seen SC2 For 58.3 or 59.3 seen with no working (from midpoints ± 0.5)
5(a)(ii)	No 26 / 50 > 25 / 50 or No and 0.52 or 52% or No and half of 50 = 25 and there are 26	B2	B1 For 26/50 (oe) with no conclusion or incorrect conclusion or (No) 26 is greater than half of 50
5(b)	Trial for any number eg, 10 people $10 \times £5 (= £50)$ **and** $0.8 \times 10 = 8$, $8 \times £4 (= £32)$	M1	oe eg for 10 people 2×5 **and** 8×9
	Gives approximate total for their trial eg, £82 ft Their rounding or truncating of number of people for 80%	M1	10 people = £82 11 people approx £91 12 people approx £100 13 people approx £105 14 people approx £117
	Trial for 15 people $15 \times £5 + 12 \times £4 (= £123)$	M1	
	15	A1	SC3 For 15 with no working seen

Q	Answer	Mark	Comments
Alt 5(b)	$0.8 \times 4x$	M1	$0.8 \times 4 \ (= 3.2)$
	$5x + 0.8 \times 4x = 123$	M1	or $5 + (0.8 \times 4) \ (= 8.2)$ (Average per person, this implies 1st M1)
	$8.2x = 123$	M1	$123 \div 8.2$
	$(x =)$ 15	A1	

Q	Answer	Mark	Comments
6(a)	$575 \div (10 + 8 + 5) \ (= 25)$	M1	
	$5 \times$ their 25	M1 Dep	Allow ft division by 22 or 24 if no working shown
	125	A1	
6(b)	$x + x + 5 + 2 (x + 5) = 65$	B1	oe (x is the amount for Ella)
	$4x + 15 = 65$	M1	Combining their like terms
	$x = \dfrac{65 - 15}{4}$ or $4x = 50$	M1	Simplifying their equation to a $x = b$ or showing complete rearrangement for x
	£12.50	A1	SC3 For £12.50 (SC2 for 12.5) from T & I or numerical methods or no working shown SC2 For 17.50, 35 and 12.50 (no indication of which value relates to each girl) given as answer with no working
	Organised algebraic response	Q1	Strand (iii) - 2nd and 3rd method marks gained and an answer given

Q	Answer	Mark	Comments
7	$3L + S = 175$ **and** $5L + 2S = 300$	M1	
	$(6L + 2S = 350) - (5L + 2S = 350)$	M1	Multiplying and subtracting to eliminate L or S
	$L = 50$	A1	
	$S = 25$	A1 ft	

Q	Answer	Mark	Comments
8(a)	495×0.95 ($= 470.25$) or 505×0.925 ($= 467.125$ or 467.13)	M1	oe Linking correct value and interest rate - choosing the correct path
	$495 -$ their (495×0.95) or 24.75	M1	'their' values must be from use of the correct interest rate
	$505 -$ their (505×0.9250) or 37.88 or 37.875	M1	'their' values must be from use of the correct interest rate
	Their 37.88 − their 24.75	M1	
	13.13 or 13.12	A1	SC2 3.13 or 3.12
Alt 8(a)	0.05 **and** 0.075 seen	M1	
	0.05×495 or 24.75	M1	If neither of these marks are awarded, give M1 for linking a correct value with its interest rate
	0.075×505 or 37.88 or 38.875	M1	
	Their 37.88 − their 24.75	M1	
	13.13	A1	
8(b)	Reference to counting the number of people in the shop and noting the amount of money taken	B1	
	Sample size of at least one week or 7 occasions	B1	
	Reference to drawing scatter diagram (of numbers of people against takings)	B1	
	Drawing a lobf or reference to correlation	B1	oe
	Reference to making a conclusion based on data by an interpretation of the correlation For example "If the diagram shows positive correlation then the hypothesis is correct" "If the graph shows that as the numbers of people increase so do the takings then the hypothesis is correct"	Q1	QWC - Strand (ii) Allow positive gradient

Q	Answer	Mark	Comments
9	0.084×65 (or 5.46)	M1	oe
	0.036×325 (or 11.70)	M1	oe
	(their) 5.46 + (their) 11.70	M1	
	(£) 17.16	A1	Accept £18 or £20 with working shown

Q	Answer	Mark	Comments
10(a)	$\dfrac{3}{500} \times 10\,000$	M1	oe
	60	A1	
10(b)	$20 \div 5 \times 18$ (or 24)	M1	3 bricklayers would build 24 walls in 20 days
	$37 -$ their 24 (or 13) **and** $20 - 15$ (or 5)	M1	13 extra walls need to be built in 5 days
	$18 \div (15 \div 5)$ (or 6)	M1	3 bricklayers build 6 walls in 5 days
	$3 \times 13 \div 6$ (or 6.5)	M1 Dep	6.5 bricklayers build 13 walls in 5 days Dependent on both previous method marks (2nd and 3rd)
	7	A1	
Alt 1 10(b)	$18 \div (15 \div 5) \div 3$ (or 2)	M1	1 bricklayer builds 2 walls in 5 days
	$37 - 18$ (or 19) **and** $20 - 15$ (or 5)	M1	Need to build 19 walls in 5 days
	$19 \div 2$ (or 9.5)	M1 Dep	9.5 bricklayers build 19 walls in 5 days Dependent on both previous method marks
	Their $10 - 3$ or their $9.5 - 3$	M1	
	7	A1	
Alt 2 10(b)	$18 \div 3 \div 15$ $(= 0.4)$	M1	0.4 walls per bricklayer per day
	$37 - 18$ (or 19) **and** $20 - 15$ (or 5)	M1	Need to build 19 walls in 5 days
	$19 \div 0.4 \div 5$ (or 9.5)	M1 Dep	Dependent on both previous method marks
	Their $10 - 3$ or their $9.5 - 3$	M1	
	7	A1	

Q	Answer	Mark	Comments
11(a)	Correct method seen for one item or one correct decimal seen 59.7, 29.1, 11.1	M1	eg, $\frac{1045}{1750} \times 100$
	60, 29 and 11	A2	A1 For 1 correct value
11(b)	One correct frequency density seen 1.2, 4.4, 5.6, 2 or 0.3	M1	May be implied by one correct height
	All heights correct	A1	$\pm \frac{1}{2}$ square
	All widths correct	A1	$\pm \frac{1}{2}$ square
11(c)	Centre A $=$ 16(%)	B1	
	Centre B $\quad 5 \times 2.4 + 20 \times 0.4 \; (= 20)$	M1	
	$\frac{their \; 20}{80} \times 100$	M1	or converting both their A and B values to fractions with the same denominator or to decimals
	25%	A1	
	Centre B have greater proportion over 40 lessons (25% $>$ 16% or 0.25 $>$ 0.16)	Q1	QWC - Strand (ii) Method marks gained and conclusion given ft Their conclusion for their values if methods marks gained

12(a)	$30x + 70y \leq 7 \times 60$ (or 420)	B1	
12(b)	$40x + 20y \leq 300$	B2	oe Ignore subsequent incorrect simplifying B1 For $40x + 20y \geq 300$ (oe) $\quad$ or $40x + 20y = 300$ (oe) $\quad$ or $40x + 20y \leq$ any value
12(c)	Their $2x + y = 15$ drawn on graph	M1	Must be an equation in x and y
	Shading correct for both inequalities	M1	
	At least one integer point at or close to corner point of their feasible region tried using $18x + 27y$	M1	(0, 6) gives profit of £162 (6, 3) gives profit of £189 (7, 1) gives profit of £153
	Make 6 stools and 3 chairs	A1	