GCSE

Application of Mathematics (Linked Pair Pilot)

93701H
Unit 1: Higher Tier
Mark Scheme

9370
November 2013

Version 1.0 Final Mark Scheme

Mark schemes are prepared by the Lead Assessment Writer 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 associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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.

Further copies of this Mark Scheme are available from aqa.org.uk

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 $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
25.3 …	Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

A1 Higher Tier

Q	Answer	Mark	Comments
1(a)	=B2*C2	B1	Condone missing equals sign here
1(b)	51.3(0)	B1	
1(c)	D2 + D3 + D4 or sum(D2 + D3 + D4) or sum(D2:D4)	B1	
	= sign used	Q1	Correct mathematical notation QWC strand 1
2	'Input £A' box shown	B1	
	'(I =) A × 0.02' box shown	B1	Oe Condone missing I= (oe)
	'Output I' or 'output interest' or 'output answer' or 'write down the interest' completed in box	B1	
	End box included and correct types of boxes used 3 boxes out of 4 correct shape	Q1	Correct mathematical notation QWC strand 1

Q	Answer	Mark	Comments
3(a)	Histogram or frequency polygon attempted	B1	
	Heights correct (4,10,5,1) Or (8,20,10,2) if frequency density used	B1	
	Correct horizontal position	B1	
	Fully labelled diagram with correct scales drawn	Q1	Correct mathematical notation QWC strand (i)
3(b)	2.25 × 4 + 2.75 × 10 + 3.25 × 5 + 3.75 (× 1) or 9 + 27.5 + 16.25 + 3.75 or 56.5	M1	Attempt at Σfx using x values within or on class boundaries
	Their 56.5 ÷ their 20	M1	Their 20 must clearly be their sum of the frequencies
	2.825 or 2 hrs 49.5 minutes	A1	Ignore any attempts to convert to hours and minutes if 2.825 seen Ignore further rounding if 2.825 seen. Allow 2.8 or 2.83 from 56.5 ÷ 20
3(c)	$\frac{14}{20}$ (× 100)	M1	oe
	70(%)	A1	SC1 for incorrect value out of 20 converted to a percentage.
4	2 packs of 15 and 2 packs of 25 = £23	B3	B2 for £23 with no combination stated Or cheapest correct combination with incorrect total or no total eg 2 packs of 15 + 2 packs of 25 cost 23.50 Or two correct combinations shown (but not the cheapest) B1 for any correct combination for 80 bulbs

Q	Answer	Mark	Comments
5	2000 × 0.3 (= 600)	M1	
	2000 – their 600	M1	
	(£) 1400	A1	SC2 for 2600
5 Alt	0.7	M1	
	2000 × 0.7	M1	
	(£) 1400	A1	
6(a)	Criticism of the place chosen	B1	
	Criticism of the time chosen	B1	
6(b)	Complete response, i.e an appropriate question with a response section, no gaps or overlaps.	B2	B1 Partially complete response, eg appropriate question with response section with either gaps or overlaps. B0 for response section with gaps **and** overlaps
7	Two correct sets of four numbers satisfying the criteria given. 1,1,1,5 or 1,1,2,4 or 2,2,3,9 or 2,2,4,8 or 2,2,5,7	B3	B2 A set of 4 numbers with mean twice the mode but not all single digit or not all greater than zero B1 for evidence of mean found for a set of any 4 numbers **or** A set of 4 single digit numbers which has a mode

Q	Answer	Mark	Comments
8(a)	12 × 1200 (14400)	M1	
	Their 14400 – 9440 (= 4960)	M1dep	
	Their 4960 × 0.2	M1	oe
	(£) 992	A1	
Alt 8(a)	9440 ÷ 12 (= 786.6)	M1	
	1200 – their 786.6 (=413.3)	M1dep	
	Their 413.3 x 0.2 x 12	M1	oe
	(£) 992	A1	Allow [991.99, 992.02]
8(b)	784 ÷ 7 × 5	M1	oe
	560	A1	SC1 for 224
9	$x + 2x + 2x - 40 = 500$	B1	
	$5x - 40 = 500$	M1	Collecting like terms Ft their initial equation
	$5x = 540$ or $x = \frac{540}{5}$ or $2x = \frac{540}{5} \times 2$	M1	Rearranging for $5x$ or x or $2x$ Ft their collection of like terms
	216	A1	
	Organised algebraic response with answer given	Q1	Must solve their equation with a max of one error QWC strand (ii) SC3 for 216 from a numerical/T&I approach. SC2 for 108 from a numerical/T&I approach.

Q	Answer	Mark	Comments
10	5 × 12 (= 60)	M1	
	Their 60 ÷ 4	M1	
	15 (days)	A1	
Alt 10	5 ÷ 4 (= 1.25)	M1	Or 4 ÷ 5 (=0.8)
	Their 1.25 × 12	M1	12 ÷ their 0.8
	15 (days)	A1	
11(a)	(0), 15, 39, 56, 60	B1	Correct cf values –may be implied by correct heights on graph
	Plotting at upper class boundaries	B1	Must be an increasing graph
	3 or 4of their cf heights correct	B1 ft	ft first B1. Must be an increasing graph
	All their heights correct and points joined with smooth curve or straight lines starting at (10, 0)	B1ft	Must be an increasing graph and joined consistently to their (10,0)
11(b)	median = '26'	B1	ft their increasing graph
	Their 33 – Their 21	M1	ft their increasing graph
	'12'	A1ft	ft their increasing graph
11(c)	Correct comment using the median eg he is correct as the median/average depreciation is lower for diesel	B1ft	ft their values for diesel
	Correct comment using the IQR eg Diesel cars show less variation in their depreciation	B1ft	ft their values for diesel

Q	Answer	Mark	Comments
12(a)	There are four values for each year	B1	oe
12(b)	$\frac{79+92+85+68}{4}$	M1	oe
	81	A1	SC1 for 273 (from 79 + 92 + 85 + 68 ÷ 4)
12(c)	Correct horizontal plots	B1	$\pm \frac{1}{2}$ small square
	Correct heights, 94.5, 92, 88.5, 85 and their 81	B1	$\pm \frac{1}{2}$ small square ft their moving average value from 12 b
12(d)	Reading of next moving average	B1ft	ft their trend line
	(92 + 85 + 68 + *x*) ÷ 4 = their 76	M1	Oe Their 76 must be between 70 and 80
	59000	A1 ft	
13(a)	826 ÷ 0.4	M1	oe
	2065	A1	

Q	Answer	Mark	Comments
13(b)	$\frac{826+x}{Their\,2065+x} = \frac{41}{100}$	M1	Oe ft their (a)
	100 (826 + x) = 41 (Their 2065 + x)	M1	Oe ft their (a)
	Their 2065 = 59 x or $\frac{2065}{59}$ seen	M1	Simplify their equation to $ax = b$ Their equation must contain 826 and 2065 and have x appearing twice
	(x =) 35	A1	SC1: 20.65 (accept rounded or truncated)
13(b) **Alt 1**	826 + x = 41% **And** 2065 + x =100%	M1	
	1239 = 59%	M1	Subtracting their equations
	2100 =100% Or 1239 ÷ 59 ×100 =100% Or 2100 - 2065	M1	
	35	A1	
13(b) **Alt 2**	T & I approach Any trial correctly evaluated	M1	With their non-zero value added to both 826 and their 2065
	Trials between 30 and 40	M1	
	35	A1	Max 3 marks available for a T&I method

Q	Answer	Mark	Comments
14	12500 or 13499	B1	Condone 13500
	70500 or 71499	B1	Condone 71500
	Their 13499 ÷ their 70500 (× 100)	M1	Their Max ÷ their Min
	19.1(...)	A1	Must be from correct bounds used, 13499 0r 13500 and 70500
15(a)	$10x + 30y \leq 300$	B1	
15(b)	$x + y \leq 16$	B2	B1 for $x + y \geq 16$ or $x + y = 16$
15(c)	Profit per box £10 for oranges and £20 for grapefruit	B1	May be implied by answer
	$x + y = 16$ drawn on graph	B1	
	Shading correct for both inequalities	B1	
	At least one integer point at or close to corner point of their feasible region tried	M1	Allow use of $10x + 20y$ or $20x + 50y$
	9 boxes of oranges and 7 of grapefruit	A1	
	230	A1	