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General Certificate of Secondary Education
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Applications of Mathematics (Pilot) 9370

Unit 1 Higher Tier 93701H

Final

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 students' 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 students' 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.

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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.
M dep	A method mark dependent on a previous method mark being awarded.
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.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
Q	Marks awarded for quality of written communication.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded 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)	14	B1	
1(b)	3 (+) 1 (+) 5 (+) 2 (+) 8 (+) 1	M1	Allow one error or omission Accept clear indication on the diagram.
	20	A1	
2(a)	0.8 × 80	M1	Or 80 - $\left(\frac{20}{100}\times 80\right)$ or 80 -16
	64	A1	SC1 for 96
2(b)	$\frac{2}{12}$ (× 100)	M1	
	16(.6 ...)	A1	Allow 17 if $\frac{2}{12}$ or $\frac{1}{6}$ seen.
	'Less' box ticked	Q1 ft	Method mark gained and correct decision from their answer QWC Strand (ii)
2(b)	**Alternative**		
	12 – (0.2 × 12) or 12 × 0.8	M1	
	9.6(0)	A1	
	'Less' box ticked	Q1 ft	Method mark gained and correct decision from their answer QWC Strand (ii)
2(b)	**Alternative 2**		
	0.2 × 12 = (£)2.4(0)	M1	
	(£)2.4(0) **and** (£)2 seen	A1	
	'Less' box ticked	Q1 ft	Method mark gained and correct decision from their answer QWC Strand (ii)
2(b)	**Alternative 3**		
	(£)10 ÷ 0.8	M1	
	(£)12.5(0)	A1	
	'Less' box ticked	Q1 ft	Method mark gained and correct decision from their answer QWC Strand (ii)

Q	Answer	Mark	Comments
3	A – 3 (observation) B – 1 (questionnaire) C – 2 (controlled experiment)	B2	B1 for one correct
4(a)	216 ÷ 4 = 54 or 4 × 54 = 216 or 216 ÷ 54 = 4	B1	
4(b)	$x - 5$ or $x + 8$	B1	
	$x + x - 5 + x + 8 = 54$	M1	oe eg all multiplied by 4 condone one error or omission.
	$3x = 51$ or $x + 1 = 18$	M1	Simplifying their linear equation
	$x = 17$	A1	
	£68	B1ft	ft their 17 × 4 where their 17 is a number of hours.
4(b)	**Alternative 1 (hours)**		
	Two numbers (hours) with a difference of 5 or 8 seen	B1	
	A set of 3 numbers fitting x, $x - 5$ and $x + 8$	M1	$x \neq 54$
	Their 3 numbers tested against 54	M1dep	Total must be seen dep on previous M1
	17	A1	
	£68	B1ft	ft their 17 × 4 where their 17 is a number of hours.

Q	Answer	Mark	Comments
4(b)	**Alternative 2 (money)**		
	Two amounts with a difference of 20 or 32 seen	B1	
	A set of 3 amounts fitting x, $x - 20$ and $x + 32$	M1	
	Their 3 amounts tested against 216	M1dep	Totals must be seen dep on previous M1
	An improved set of three numbers fitting the criteria (closer to total of 216)	M1	Totals must be seen
	£68	A1	
4(b)	**Alternative 3 (combined hours and money)**		
	Two numbers (hours) with a difference of 5 or 8 seen	B1	
	A set of 3 numbers fitting x, $x - 5$ and $x + 8$	M1	$x \neq 54$
	Their hours each multiplied by 4 and total tested against 216	M1dep	Totals must be seen dep on previous M1
	An improved set of three numbers fitting the criteria (closer to total of 216)	M1	Totals must be seen
	£68	A1	

Q	Answer	Mark	Comments
5(a)	All 3 points correctly plotted	B1	$\pm \frac{1}{2}$ sq Ignore extras
5(b)	Negative correlation or As the time spent learning words increased, the number of incorrect words decreased.	B1	oe
5(c)	Line of best fit drawn	M1	Between (3,5) to (3,6) to between (7,1) and (7, 3) And at least from 3 to 7 horizontally
	4	A1	ft a correct lobf. Accept integer answers only SC1 for 3 or 4 if no lobf or incorrect lobf
5(d)	No line of best fit may change or No Line of best fit cannot continue in the same way (becomes negative) Not possible to be sure mistake is not made in test/pressure of test/human error/different individuals Cannot say as 12 is beyond the range of the data	B1	oe

Q	Answer	Mark	Comments
6	784 ÷ 5600 (= 0.14)	M1	
	Their 0.14 × 1.15	M1	Increasing by 15%
	Their 0.161 × 4900	M1	
	[788,790]	A1	
	Clearly communicated answer and a conclusion	Q1	Working shown with all method marks gained and a total shown QWC strand (iii)
6	**Alternative 1**		
	$\frac{4900}{5600}$ or 1/8 or 12.5% seen or 7/8 or 87.5% seen	M1	Or 5600 ÷ 784 (=7.14...)
	Their 7/8 × 784 (= 686)	M1	4900 ÷ their 7.14.... (=686) For left hand scheme their 7/8 must be from an attempt to proportion 4900 and 5600
	Their 686 × 1.15	M1	
	[788,790]	A1	
	Clearly communicated answer and a conclusion	Q1	Working shown with all method marks gained and a total shown QWC strand (iii)
6	**Alternative 2**		
	784 × 1.15 (= 901.6)	M1	
	$\frac{4900}{5600}$ or 1/8 or 12.5% seen or 7/8 or 87.5% seen	M1	their 901.6 ÷ 8 (= 112.7)
	901.6 × their 7/8	M1	901.6 – their 112.7 For left hand scheme their 7/8 must be from an attempt to proportion 4900 and 5600
	[788,790]	A1	
	Clearly communicated answer and a conclusion	Q1	Working shown with all method marks gained and a total shown QWC strand (iii)

Q	Answer	Mark	Comments
7	$160 \times \frac{3}{4}$ or $160 \times \frac{2}{5}$	M1	
	$160 \times \frac{3}{4} = 120$	M1	
	$160 \times \frac{2}{5} = 64$	M1	(120 – 56) ÷ 2 (=32)
	Their 120 – their 64 (= 56) Or 120 – 56 = 64	A1	32 × 5 (=160)
7	**Alternative 1**		
	$\frac{3}{4} - \frac{2}{5}$ $(= \frac{7}{20})$	M1	or 0.75 – 0.4
	$\frac{7}{20} = 56$	M1	0.35 = 56
	56 ÷ 7 (= 8)	M1	
	8 × 20	A1	
7	**Alternative 2**		
	$\frac{75}{100} - \frac{40}{100}$	M1	
	$\frac{35}{100}$ or 35% = 56	M1	
	56 ÷ 160 (=0.35)	M1	
	35%	A1	
7	**Alternative 3**		
	$\frac{3}{4}x - 56 = \frac{2x}{5}$	M1	
	$15x - 1120 = 8x$	M1	
	$7x = 1120$	M1	
	1120 ÷ 7 (= 160)	A1	

Q	Answer	Mark	Comments
8	Midpoints used 31, 33, 35, 37	B1	At least 3 seen
	(31 × 3) + (33 × 9) + (35 × 6) + (37 × 2) Or 93 + 297 + 210 + 74	M1	Attempt at $\sum fx$ with x values on or between class boundaries.
	Their 674 ÷ 20	M1	
	33.7	A1	Allow 34 from correct working seen.
9(a)	Malta	B1	
9(b)	16770000 or 16800000 or 1.68×10^7 seen	M1	
	Netherlands	A1	
10(a)	0.25 × 20	M1	
	5	A1	
10(b)	0.32	B1	
	There have been more trials	B1	oe SC1 for tending towards 0.3 as trials increase
10(c)	Their 0.32 × 1000	M1	
	320	A1ft	ft their 10b if their 10b is between 0 and 1 Answer must be an integer.
11	3.5 × 36000 (= 126000)	M1	Answer of 138600 implies this M1 (126000+10%)
	Their 126000 = 90%	M1	Implied by division by 90
	Their 126000 ÷ 90 (×100) or 1400	M1	
	140000	A1	

Q	Answer	Mark	Comments
12	$3a + 1.5b = 9(.00)$ or $2a + 4b = 13.2(0)$	B1	
	$6a + 3b = 18$ **and** $6a + 12b = 39.6$	M1	oe equating coefficients Allow one error in **totals**
	$9b = 21.6$	M1	Subtracting
	Apples = 1.80	A1	
	Blackberries = 2.40	A1	1.8 and 2.4 is A1 A0
13(a)	43095	B1	
13(b)	32245 × 0.2	M1	
	(their 43095 – 32245) × 0.4	M1	10850 × 0.4
	6449 and 4340	A1ft	ft their 13a
	52300 – (their 6449 + their 4340)	M1	
	41511	A1ft	ft their 13a SC3 for 32306 with no working.
13(b)	**Alternative**		
	32245 × 0.8	M1	
	(their 43095 -32245) × 0.6	M1	
	25796 and 6510	A1	ft their 13a
	Their 25796 + their 6510 +9205	M1	
	41511	A1	ft their 13a SC3 for 32306 with no working.
14	15 : 6 : 4	B1	oe equating ratios
	$\frac{100}{their(15 + 6 + 4)}$ or 4	M1	
	24 (women)	A1	

Q	Answer	Mark	Comments
15(a)	0.8 or 0.3 seen	M1	Can be implied by correct height of first or last bar
	Bars correct height and width 0.8, 3.8, 3.4, 0.3	A2	A1 for 3 correct or all 4 fd's seen
15(b)	Batch A = 29	B1	
	5 × 3.6 or 40×0.7 or 18 or 28	M1	oe eg counting squares
	46	A1	
	17	A1 ft	ft their 46 – their 29 if M1 gained
16(a)	$800x + 300y \leq 20000$ (÷ 100)	B1	Or $0.8x + 0.3 \leq 20$
16(b)	$8x + 12y \leq 600$ (÷ 4)	B1	Condone < used
16(c)	$8x + 12y \leq 600$ drawn on graph	B1	Condone < used
	Shading correct for both inequalities or region identified.	M1	ft their diagonal line, shading < side.
	At least one integer point at or close to corner point tried.	M1	(± one square from corner) (0, 50) gives profit of £200 (8, 44) gives profit of £232 (25, 0) gives profit of £175
	Make 8 bowls and 44 jugs	A1	
17(a)	0.25 × 20 (=5) Or It represents 25% (or ¼) of the meetings/distribution	B1	oe Comment referring to 25% or 1/4
17(b)	15 × 3	M1	
	5 + 45 (= 50)	A1	
17(c)	5 × 1.6 or 10 × 2.4 or 5 × 3.2	M1	0.25 × 1.6 or 0.5 × 2.4 or 0.25 × 3.2
	8 + 24 + 16	M1	0.4 + 1.2 + 0.8 at least 2 correct
	48 **and** B	A1	2.4 **and** 2.5 **and** B