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General Certificate Secondary of Education
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Methods in Mathematics (Pilot) 9365

Unit 1 Higher Tier 93651H

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 meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting 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 the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting 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.

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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.
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 $\frac{1}{2}$

M1 Higher Tier

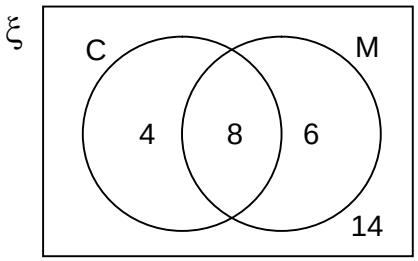
Q	Answer	Mark	Comments
1(a)	5	B1	
1(b)	$10x + 5 = 21$	M1	$8x = 16 - 2x$ allow one error
	$10x = 16$	A1	
	1.6	A1ft	oe If M1 awarded
2	(1 000 000) ÷ 60 or (1 000 000) ÷ 24 or (1 000 000) ÷ 365	M1	Division by at least one of these numbers Condone division by 366
	(1 000 000) ÷ 60 ÷ 24 ÷ 365 (= 1.9 …)	M1	1 year 9 months implies M1M1 Using 366 gives 1.897…
	12 × their 0.9 … (= 10.8 …)	M1	12 × their 0.897 … (= 10.768 ...)
	[1 year 10 months, 1 year 11 months]	A1	
Alt 1 **2**	60 × 24 × 365(or 366) (= 525 600)	M1	
	Their 525 600 × 2 (= 1 051 200) or 1 000 000 – their 525 600 (= 474 400)	M1	1 year 9 months implies M1M1 51200 implies M1M1
	$\frac{\text{Their } 51\,200}{525\,600} \times 12$ (= 1.1689 …) or $\frac{\text{Their } 474\,400}{525\,600} \times 12$ (= 10.83 …)	M1	
	[1 year 10 months, 1 year 11 months]	A1	
Alt 2 **2**	(1 000 000) ÷ 60 or (1 000 000) ÷ 24	M1	Division by at least one of these numbers
	(1 000 000) ÷ 60 ÷ 24 (= 694.4 …)	M1	1 year 328 or 329 days implies M2
	$\frac{\text{Their } 694.4 - 365}{365} \times 12$ (= 10.8 …)	M1	
	[1 year 10 months, 1 year 11 months]	A1	

Q	Answer	Mark	Comments
Alt 3 2	(1 000 000) ÷ 60 or (1 000 000) ÷ 24	M1	Division by at least one of these numbers
	(1 000 000) ÷ 60 ÷ 24 ÷ 30 (= 23.148 …)	M1	(1 000 000) ÷ 60 ÷ 24 ÷ 31 (= 22.40 …) Condone division by 28 (gives 24.8) or 29 (gives 23.9)
	Their 23.148 – 12 (= 11.148)	M1	Their 22.40 … – 12 (= 10.40 …)
	[1 year 10 months, 1 year 11 months]	A1	
Alt 4 2	(1 000 000) ÷ 60 or (1 000 000) ÷ 24	M1	Division by at least one of these numbers
	(1 000 000) ÷ 60 ÷ 24 ÷ 7 (= 99.2 …)	M1	1 year 47 weeks implies M2
	$\frac{\text{Their } 99.206 - 52}{52} \times 12$ (= 10.89 …)	M1	
	[1 year 10 months, 1 year 11 months]	A1	
3	$(x + 4) \times 4$	B1	Any letter $4x + 16$ Condone $x + 4 \times 4$
	$(4 \times x) + 4$	B1	$4x + 4$ $x \times 4 + 4$
	$4x + 16 - (4x + 4) = 12$	Q1	oe $4x + 16 - 4x - 4 = 12$ Strand (ii) - All steps shown with correct use of brackets if required Accept reverse subtraction giving answer –12 SC1 B0, but gives correct two numbers for any input
4(a)	–6, 10	B2	B1 For one correct value
4(b)	Their points plotted correctly	B1 ft	Allow one error or omission
	Smooth curve through their points	B1 ft	Within 1 small square of each point
4(c)	[1.4, 1.6]	B1 ft	ft From their curve ± 0.1

Q	Answer	Mark	Comments
5	$20x + 15y = 170$ $9x - 15y = 33$	M1	$12x + 9y = 102$ $12x - 20y = 44$ oe for all equations Accept one arithmetic error
	$29x = 203$	M1Dep	$29y = 58$ Correct addition or subtraction if M1 awarded
	$(x =)\ 7$	A1	$(y =)\ 2$
	$(y =)\ 2$	A1	$(x =)\ 7$
Alt 5	$x = \frac{34 - 3y}{4}$	M1	$y = \frac{3x - 11}{5}$ Accept one sign error
	$3\ \frac{(34 - 3y)}{4} - 5y = 11$	M1 Dep	$4x + 3\frac{(3x - 11)}{5} = 34$
	$(x =)\ 7$	A1	$(y =)\ 2$
	$(y =)\ 2$	A1	$(x =)\ 7$
6(a)	$2x^2 + 8x - 9x - 36$	M1	Allow one error, but must have four terms (three if terms in x are combined), including term in x^2
	$2x^2 - x - 36$	A1	
6(b)	$(x + 2)(x - 2)$	B1	$(x - 2)\ (x + 2)$
7(a)	$\frac{1}{4}, \frac{5}{8}, \frac{3}{8}$	B1	
7(b)	$\frac{3}{4} \times$ their $\frac{3}{8} = \left(\frac{9}{32}\right)$	M1	$\frac{3}{4} \times$ their $\frac{5}{8} = \left(\frac{15}{32}\right)$
	Their $\frac{9}{32}$ + their $\frac{1}{4}$	M1 Dep	oe $1 -$ their $\frac{15}{32}$
	$\frac{17}{32}$	A1	oe 0.53125

Q	Answer	Mark	Comments
8	$A \propto L^2$ or $A = kL^2$	M1	$4 = k \times 4^2$
	$k = 0.25$	A1	oe
	Their 0.25×25^2	M1	
	156.25	A1 ft	
9	$y = 5.5x + 2$ or $y = 2 - 0.2x$	B1	oe
	Gradient of M is 5.5 or Gradient of N is -0.2	B1	
	Gradient perpendicular to N is 5	B1 ft	oe ft Their gradient of N
	-0.2 and 5 and 5.5	Q1	Strand (ii) -All three gradients given
10	$p \times 2p$ (= 0.045)	M1	$2p^2$ (= 0.045), $p^2 = 0.0225$
	$p = \sqrt{\frac{0.045}{2}}$	M1 Dep	
	$p = 0.15$	A1	
	(1 – their 0.15) × (1 – their 0.3)	M1	0.85×0.7
	0.595	A1 ft	oe $\frac{119}{200}$ ft From a given value of p
11(a)	$\frac{15}{40}$ (+) $\frac{16}{40}$	M1	Equates denominators with at least one numerator correct 0.375 (+) 0.4
	$\frac{31}{40}$	A1	0.775
11(b)	$\frac{20}{42}$	M1	oe $\frac{840}{1764}$
	$\frac{10}{21}$	A1	

Q	Answer	Mark	Comments
12(a)	$4a - 20$	B1	
12(b)	$2(3d + 7)$	B1	
13(a)	$66 \div 6$	M1	$66 \div 600 \times 100$
	11	A1	
13(b)	376	B1	
13(c)	$600 \div 12$ (= 50)	M1	
	50 : 550	A1	SC1 550 : 50
14	$(x =)\ 4$	B1	$2x = 8$
	$3 \times$ their $4 + 5y = 2$	M1	oe
	$(y =)\ -2$	A1 ft	Correct value of y for their value of x
	0	B1 ft	Correct substitution and evaluation using their x and y
15	Lists one pair of possible numbers in Farook's bag eg, 1, 4 2, 8 3, 12	M1	$6 + \frac{x}{5} = \frac{4x}{5}$ or $x + 6 = 4x$ oe
	Identifies 2, 8 as correct pair	M1	$x = 10$ (original number in Farook's bag) $x = 2$ (original red balls)
	16	A1	SC1 11 SC1 14
16	$4x \geq 10$ or $6x < 30$	M1	
	$x \geq 2.5$ or $x < 5$	M1	$5 > x \geq 2.5$ gets M2
	3, 4	A1	SC1 3 only or 4 only or 3 and 4 and one other number as answer, with or without working

Q	Answer	Mark	Comments
17(a)	29	B1	
17(b)(i)	$\frac{10}{\text{their } 29}$	B1 ft	
17(b)(ii)	$\frac{16}{\text{their } 29}$	B1 ft	
17(c)		B1	8 in intersection and sum of the four numbers is 32
		B1	Sum of C is 12
		B1	Sum of M is 14
18(a)	9.3×10^7	B1	
18(b)	$0.5\ (\times 10^5)$ or $(0.5) \times 10^5$	M1	$\frac{4 \times 10^5}{8}$ or $\frac{40\,000\,000}{800}$ or 50 000
	5×10^4	A1	SC1 5×10^n
18(c)	3	B1	Accept -3 and condone -4
19(a)	Correct curve through (0, 0)	B1	
19(b)	Correct curve in both quadrants	B1	
19(c)	Correct curve	B1	
19(d)	Correct curve	B1	Correct intersections with x-axis
20	$\frac{6 + \sqrt{16}\ \sqrt{2}}{\sqrt{2}}$	M1	$\frac{6}{\sqrt{2}} + \sqrt{16}$
	$(6\sqrt{2} + 2\sqrt{16})/2$	M1	$\frac{6\sqrt{2}}{2} + 4$
	$4 + 3\sqrt{2}$	A1	SC1 $8 + 6\sqrt{2}$

Q	Answer	Mark	Comments
21	Identifies 16:45 train as last or identifies any train before 15:00	M1	
	8	A1	