General Certificate Secondary of Education
January 2012

Applications of Mathematics (Pilot)   9370

Unit 1 Foundation Tier 93701F

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.

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 Foundation Tier

Q	Answer	Mark	Comments
1(a)	12×20	M1	
	240	A1	
1(b)	$10 \div 2$ or 5 seen	M1	
	Their 5×18	M1 Dep	
Alt 1(b)	90	A1	Ignore fw eg $240 + 90 = 330$
	18×10	M1	
	$180 \div 12$	M1	
	90	A1	
1(c)	16/01 balance 339.14	B1	Can be in working.
	17/01 balance 283.04	B1 ft	ft Their 339.14. 283.04 implies first B1also unless contradicted
	Their $240 + 90$	M1	ft From parts 1(a) and 1(b)
	330 needed and NO	A1 ft	Correct comparison of their 330 with 283.04

Q	Answer	Mark	Comments
2(a)	108	B1	
2(b)	2 × 27 × 0.32 (= 17.28)	M1	Allow working in pence throughout with answer 272 p
	20.00 – their 17.28	M1	
	2.72	A1	Must state p if pence used
*2(c)	5 ÷ 1.15 (= 4.34 …) or 4 bags (= 4.60)	M1	
	Their 4 or their 4.34 (rounded down) × 5 = 20 apples	M1 Dep	
	7	A1	

	Clear method shown	Q1	Strand (iii) - Both M's awarded with no arithmetical errors within the methods
			
			eg, 1.15 × 4 = 4.90 M1
			
			    4 × 5 = 20 M1
			
			    7 A1
			
			But Q0 as error seen

*Alt 2(c)	10 apples = 2.30 20 apples = 4.60	M1	Building up to 20
	20 apples max or 25 is over £5	M1	
	7	A1	
	Method marks gained and attempt at an answer	Q1	Strand (iii)

Q	Answer	Mark	Comments
3(a)	$25 + 50 + 20 + 5$ or 10×10 or $9 \times 10 + 2 \times 5$	M1	oe Attempt at summing of all circles / half circles Allow one error eg, $15 + 50 + 20 + 5$ or $9 \times 10 + 5$ (but not just 9×10) Consistent misinterpretation of value for semi circle can gain M1
	100	A1	
3(b)(i)	$10 + 10 + 5$	M1	
	25	A1	
3(b)(ii)	$100 - 25$	M1	or $50 + 20 + 5$ oe
	75	A1	Do not ignore fw if it leads to an incorrect percentage eg, $75 \div 100 = 0.75$
3(c)	Works out price for at least 1 class for method 2	M1	1 class $= 7.25$ or 2 classes $= 9.50$ etc
	Compares 2 (or more) classes for both methods	M1	eg, 2 classes £6 and £9.50 3 classes £9 and £11.75 4 classes £12 and £14.00 5 classes £15 and £16.25 6 classes £18 and £18.50
	21 and 20.75 seen	A1	
	After 6 or at 7th or 7	A1	SC3 Fully correct method with one arithmetical error and correct conclusion
Alt 1 3(c)	Saves 75 p each week	B1	
	$500 \div 75$	M1	
	$6.6(...)$ or 6.7	A1	
	After 6 or at 7th or 7	A1	
Alt 2 3(c)	$2.25x + 5 = 3x$	M1	
	$0.75x = 5$	M1	
	$6.6(...)$ or 6.7	A1	
	After 6 or at 7th or 7	A1	

Q	Answer	Mark	Comments
4(a)(i)	0.85 seen or $\frac{85}{100}$	B1	
	$0.85 \times 160\,000$	M1 Dep	oe
	$136\,000$	A1	
Alt 4(a)(i)	$\frac{15}{100} \times 160\,000 \; (= 24000)$ or $16000 + 8000$	M1	
	$160\,000 -$ their $24\,000$	M1 Dep	
	$136\,000$	A1	
4(a)(ii)	Their $136\,000 \div 1000$	M1	
	Their 136×5.33	M1	
	724.88	A1 ft	ft Their (a)(i) If (a)(i) is blank award SC1 for $160 \times 5.33 = 852.80$
4(b)(i)	$153\,000$	B1	
4(b)(ii)	$11\,000$	B1	
4(b)(iii)	(After) April 2009	B1	Accept July 2009 or between April and July 2009
4(b)(iv)	$182\,(000) - 153\,(000)$	M1	29 seen is evidence of subtraction
	$29\,000$	A1	

Q	Answer	Mark	Comments
5(a)	$\frac{55}{180} \times 360$ or 55×2	M1	oe Correct method shown for one angle Implied by one correct angle seen or drawn
	110, 140, 30 and 80	A1	4 correct angles
	All 4 sectors drawn to correct size 110, 140, 30, 80	A1	$\pm 2°$
	4 sectors drawn and labelled in correct order of size	B1	
5(b)	$\frac{240}{360} \times 180$ or $240 \div 2$ or 120	M1	oe
	Their $120 - 55$	M1 Dep	
	65	A1	
Alt 5(b)	$240 - 110 (= 130)$	M1	
	$\frac{130}{360} \times 180$ or $130 \div 2$	M1	
	65	A1	

Q	Answer	Mark	Comments
6(a)	$\frac{9}{15}$	M1	
	$\frac{3}{5}$	A1	
6(b)	Ordering all values 3.20, 3.90, 4.50, 4.60, 4.60, 4.80, 5.10, 5.20, 5.30, 5.50, 6.00, 6.30, 6.80, 7.50, 10.80 Or ordering 8 values from either end	M1	Allow 2 errors
	5.20	A1	5.2 is M1A0
6(c)	Ticks increases	B1 ft	ft Their median in 6(b) with correct box ticked
	By 5 p / to 5.25 or its now between 5.20 and 5.30 or one more is added to the higher half of the numbers/its more than the median	B1 ft	ft Their median in 6(b)

Q	Answer	Mark	Comments
7	Multiples of 340 or 120 seen	M1	At least one
	Finds any combination of adult and child which would give a total between £1100 and £1300	M1	1A,7C (= £1180) 1A, 8C (= £1300) 2A, 5C (= £1280) 2A,4C (= £1160) 3A,1C (= £1140)
	3 adults and 2 children	A1	

Q	Answer	Mark	Comments
8(a)	$x + 7$	B1	Allow any letter used throughout
8(b)	$2x$	B1	
8(c)	$x + x + 7 + 2x = 29$	M1	ft From their (a) and (b)
	$4x + 7 = 29$	M1	ft From their (a) and (b) if linear
	$4x = 22$	M1	
	5.5	A1 ft	SC3 For complete answer from use of only 2 people including Ruth ($x + 7$) Must be clear use of algebra eg, $x + 7 + 2x = 29$ $3x + 7 = 29$ $3x = 22$ $x = 7.3(...)$ SC2 For 7.3(...) or 11 with no working or no algebraic method
Alt1 8(c)	$29 - 7$ or 22	M1	
	4 seen	M1	
	Their $22 \div 4$	M1	
	5.5	A1	
Alt 2 8(c)	A pair of numbers fitting x and $x + 7$ or x and $2x$	M1	eg, 6 and 13 or 6 and 12
	A set of numbers fitting x, $x + 7$ and $2x$	M1	eg, 7,14,14
	Correct trial giving total in the range 27 to 31	M1	eg, $5 + 10 + 12 = 27$
	5.5	A1	

Q	Answer	Mark	Comments
*9	$\frac{2}{10}$ or 60 prizes in total seen or 300 ÷ 5	M1	oe
	Their (£) 60 + (£) 90	M1 Dep	Accept 150 if 60 seen SC Use of 59 + 90 or 61 + 90 (eg from attempt at list) → M0M1
	Their 150 ÷ 300 or their 15 000 ÷ 300	M1	
	£ 0.50 or 50 p	Q1	Correct answer with correct units

Q	Answer	Mark	Comments
*10	$7 \times \frac{3}{4}$	M1	oe Can use grams or kg throughout
	$5\frac{1}{4}$ or 21 portions	A1	oe
	$2 + 1\frac{1}{2} + \frac{3}{4} + \frac{1}{2}$	M1	oe or $5\frac{1}{4} - (2 + 1\frac{1}{2} + \frac{3}{4} + \frac{1}{2})$
	$4\frac{3}{4}$ or 19 portions	A1	oe or $\frac{1}{2}$
	No With $4\frac{3}{4}$ and $5\frac{1}{4}$ or 19 and 21 seen	Q1 ft	or No she is $\frac{1}{2}$ kg short ft Their $5\frac{1}{4}$ and their $4\frac{3}{4}$ with method marks gained and conclusion given
Alt 1 10	Plums → 1 day	M1	
	Cherries → 2 days	M1	
	Apples → 2 days with $\frac{1}{2}$ kg or 2 (portions) left	M1	
	Rest of apples and grapes → 1 day with $\frac{1}{4}$ kg left	A1	
	No there is only enough for 1 child on 7th day	Q1	Method marks gained and conclusion given

Q	Answer	Mark	Comments
Alt 2 **10**	$7 \times \dfrac{1}{4}$ or 7×250	M1	
	1.75 or 1750	A1	oe
	$(2 + 1\dfrac{1}{2} + \dfrac{3}{4} + \dfrac{1}{2}) \div 3$	M1	oe
	1.58 (...)	A1	oe
	No with 1.58... and 1.75 seen	Q1	Ft their 1.58 and 1.75 if method marks gained and conclusion given
Alt 3 **10**	$2 + 1\dfrac{1}{2} + \dfrac{3}{4} + \dfrac{1}{2}$	M1	oe
	$4\dfrac{3}{4}$	A1	oe
	$4\dfrac{3}{4} \div 3 \div 7$	M1	oe
	[0.22, 0.23]	A1	
	No 0.226 < 1/4 or No with 0.226 and 0.25(0) seen	Q1	Accept ft Their 0.226 if method marks gained and conclusion given
Alt 4 **10**	$2 + 1\dfrac{1}{2} + \dfrac{3}{4} + \dfrac{1}{2}$	M1	oe
	4.75	A1	oe
	4.75 ÷ 0.75	M1	
	6.3...	A1	
	No 6.3 < 7(days) or No it only lasts for 6(.3) days	Q1	ft Their 6.3 if method marks gained and conclusion given
Alt 5 **10**	$3 \times \dfrac{1}{4}$ or 3 ✖ 0.25 (= 0.75)	M1	
	$2 + 1\dfrac{1}{2} + \dfrac{3}{4} + \dfrac{1}{2} (= 4\dfrac{3}{4})$	M1	
	Their $4\dfrac{3}{4} \div 7$	M1	
	0.678 (...) or 678	A1	
	No with 0.678 (....) and 0.75 seen	Q1	ft Their 0.678 and 0.75 if method marks gained and conclusion given

Q	Answer	Mark	Comments
11(a)	$\dfrac{3}{20}, \dfrac{6}{20}, \dfrac{3}{20}, \dfrac{3}{20}, \dfrac{2}{20}, \dfrac{3}{20}$ or 0.15, 0.3, 0.15, 0.15, 0.1, 0.15	B2	B1 For 4 or 5 correct
11(b)	Yes relative frequency of 2 is greater than 1/6 or 1 in 6 or 0.16 ... or Yes relative frequency should be about 3/20 or Yes, 6 twos should be about 3 or 4 of each number or No, 20 times it not a large enough sample	B1	Must say Yes or No

Q	Answer	Mark	Comments
12(a)	One correct mid-point used leading to one correct fx	B1	
	$(7 \times 7.5) + (23 \times 12.5) + (16 \times 17.5) + (4 \times 22.5)$ or $52.5 + 287.5 + 280 + 90$ or 710	M1	Attempt at $\sum fx$ with x's used on or between the boundaries Totals of 585, 685, 735, or 835 can imply M1 (Consistent use of lower/upper class boundaries or midpoint $\pm \dfrac{1}{2}$)
	Their 710 ÷ 50	M1 Dep	Accept incorrect $\sum f$ if clear evidence shown of adding the values
	14.2	A1	Ignore rounding to 14 if 14.2 seen If no working shown award SC2 For 16.7 or 11.7 (Consistent use of upper class or lower class boundaries)
12(b)	Mean is less for the town or on average it is quicker through the town	B1 ft	oe ft From their mean in 12(a) with correct conclusion
	Quickest time is through the town	B1	or B2 For comparing ranges 8 and a value from 10 to 20, so town more variable / alt more consistent or B1 For 8 and a value from 10 to 20 with no comparison or B1 For correct comparison with no range values given eg, town is more variable
	Slowest time is through the town	B1	

Q	Answer	Mark	Comments
12(c)	**Either** 'Through town' with reason Quicker on average or Can do quicker times thorough town (oe) **Or** 'Alternative route' with reason Never takes more than 19 minutes on alternative route (but sometimes does through town) or its more consistent	B1 ft 13	ft Their mean if average used for justification of choice