



**General Certificate of Secondary Education  
June 2011**

**Methods in Mathematics (Pilot)                      93651F**  
**(Specification 9365)**

**Unit 1: Methods in Mathematics**  
**Written Paper (Foundation)**

***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.

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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 Foundation Tier

### Section A

Q	Answer	Mark	Comments
1(a)	$\frac{1}{4}$	B1	
1(b)	$1\frac{1}{2}$	B1	
1(c)	$\frac{3}{4}$	B1	0.75
1(d)	Between $1\frac{1}{4}$ and $1\frac{1}{2}$	B1	
1(e)	0.125	B1	
2	$(0.)6(0) \times 2 (= 1.20)$	M1	$60 \times 2 (= 120)$
	$4 - \text{their } 1.2(0) (= 2.8(0))$	M1	$400 - \text{their } 120 (= 2.80)$
	$\text{Their } 2.8(0) \div 4 (= 0.70)$	M1 Dep	$\text{Their } 280 \div 4 (= 70)$
	£0.70 or 70p	Q1	QWC - Strand (i) - Must be in correct money notation
3(a)	2	B1	Accept -2
3(b)	16	B1	
3(c)	64	B1	
4(a)	-4, 1	B1	
4(b)	Marks the point $(-3, 1\frac{1}{2})$	B1	
4(c)	Any point of the form $(a, -a)$ or $(0, 0)$	B1	

Q	Answer	Mark	Comments											
5(a)	Links all three correctly	B2	B1 Links 2 correctly											
	<table border="0" style="width: 100%; text-align: center;"> <thead> <tr> <th style="width: 60%;">Event</th> <th style="width: 40%;">Chance of happening</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">The number of the ball is odd</td> <td style="border: 1px solid black; padding: 5px;">Impossible</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">The number on the ball is 29</td> <td style="border: 1px solid black; padding: 5px;">Unlikely</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">The ball is blue</td> <td style="border: 1px solid black; padding: 5px;">Evens</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">The number on the ball is greater than 10</td> <td style="border: 1px solid black; padding: 5px;">Likely</td> </tr> <tr> <td></td> <td style="border: 1px solid black; padding: 5px;">Certain</td> </tr> </tbody> </table>			Event	Chance of happening	The number of the ball is odd	Impossible	The number on the ball is 29	Unlikely	The ball is blue	Evens	The number on the ball is greater than 10	Likely	
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The number on the ball is greater than 10	Likely													
	Certain													
5(b)	Writes two correct statements eg Event A: The ball ... is pink The ball ... is more than 100  Event B: The ball ... is numbered 1 to 100 The ball ... is yellow or blue	B2	B1 Writes one correct statement											
5(c)	$\frac{1}{100}$	B1	oe											
5(d)	Tries to find the factors of an odd number or multiplication of 2 primes with a correct answer	M1	Number must be non-prime Allow 1 factor missing											
	9, 25 or 49	A1												

Q	Answer	Mark	Comments
6(a)	6	B1	
6(b)	$4y = 15 + 11$ or $4y = 26$	M1	or $26 \div 4$
	6.5	A1	oe
6(c)	$6w + 24 (= 18)$	M1	$w + 4 = 18 \div 6$
	-1	A1	
7(a)(i)	$\frac{1}{9}$	B2	B1 For equivalent unsimplified fraction eg $\frac{4}{36}$ or $\frac{2}{18}$ or correct simplification of their fraction to its lowest form
7(a)(ii)	$\frac{3}{36}$	B1 ft	oe ft From an incorrect denominator in (a)
7(b)	Finds at least five correct scores or correct combinations of numbers	M1	1, 3, 5, 9, 15, 25, 27, 45, 75, 125
	10	A1	
8(a)	Shades B apart from intersection with A	B1	
8(b)	$A' \cap B'$ or $(A \cup B)'$	B1	
8(c)	3 letters in P only, 3 letters in intersection, 4 letters in Q only	B2	2, 4, 3, letters, 1 outside 1, 5, 2, letters, 2 outside 0, 6, 1, letters, 3 outside  B1 6 letters in P or 7 letters in Q Numbers in correct sections All correct, but other letters used

Q	Answer	Mark	Comments
<b>*9</b>	$\frac{1}{3} + \frac{2}{5} (= \frac{11}{15})$ or $\frac{4}{15}$	M1	
	1 – their $\frac{11}{15}$ ( $= \frac{4}{15}$ ) and 44 ÷ their 4 or 44 × 1.5	M1	Sight of 11 Their 11 may then be multiplied.
	66	A1	
	Addition, subtraction from 1 and division of 44 by their numerator or multiplication of 44 by 1.5  Sight of $\frac{11}{15}$ (or $\frac{5}{15}$ and $\frac{6}{15}$ ), $\frac{4}{15}$ and 11, with an answer given, in organised working	Q1	QWC - Strand (iii) - To achieve a correct solution a clear and organised approach must be evident
<b>Alt *9</b>	$0.\dot{3} + 0.4 (= 0.7\dot{3})$ or $0.2\dot{6}$	M1	$33.\dot{3}\% + 40\% (= 73.\dot{3}\%)$ or $26.\dot{6}\%$
	1 – their $0.7\dot{3}$ and 44 ÷ their $0.2\dot{6}$ (× 0.4) or Sight of 165	M1	100 – their $73.\dot{3}$ and 44 ÷ their $26.\dot{6}$ (× 40) or Sight of 1.65
	66	A1	
	Must see addition, subtraction from 1 (or 100) and division of 44 by their decimal (or percentage)  Sight of $0.7\dot{3}$ , $0.2\dot{6}$ and 165 with an integer answer  Sight of $73.\dot{3}$ , $26.\dot{6}$ and 1(.)65 with an integer answer	Q1	QWC - Strand (iii) - To achieve a correct solution a clear and organised approach must be evident

**Section B**

Q	Answer	Mark	Comments
10(a)(i)	180 000	B1	
10(a)(ii)	18 000	B1	
10(a)(iii)	1 800 000	B1	
10(b)	2	B1	

11	20 ÷ 4 (= 5)	M1	oe eg 0.25 × 20 Can be indicated on diagram
	Their 15 ÷ 2 (= 7.5) or their 7 and 8 or 2 pairs of numbers adding to their 15	M1	Attempt to allocate pieces on the diagram
	7	A1	SC2 8 and no working

12	1 and 3 for John	B4	B4 All correct
	2 and 6 for Lily		B3 4 correct
	4 and 7 for Karl		B2 3 correct
	5 and 10 for Ruby, 8 and 9 for Leon		B1 2 correct or (1, 3) for John

13	Links all three correctly	B2	B1 For 1 or 2 correct										
	<table border="0"> <thead> <tr> <th>Word</th> <th>Example</th> </tr> </thead> <tbody> <tr> <td>Equation</td> <td><math>x &gt; 3</math></td> </tr> <tr> <td>Inequality</td> <td><math>7a + 5b</math></td> </tr> <tr> <td>Formula</td> <td><math>P = 4w</math></td> </tr> <tr> <td>Expression</td> <td><math>4x + 2 = 12</math></td> </tr> </tbody> </table>	Word	Example	Equation	$x > 3$	Inequality	$7a + 5b$	Formula	$P = 4w$	Expression	$4x + 2 = 12$		
Word	Example												
Equation	$x > 3$												
Inequality	$7a + 5b$												
Formula	$P = 4w$												
Expression	$4x + 2 = 12$												



Q	Answer	Mark	Comments
14	Writes down at least 3 of the next ten multiples of 9	M1	99, 108, 117, .... Allow 1 error in adding on a 9 The multiples can be implied from (eg) $9 + 9$ , $1 + 0 + 8$ , $1 + 1 + 7$ , etc
	Writes down all the next ten multiples of 9	A1	99, 108, 117, 126, 135, 144, 153, 162, 171, 180 The multiples can be implied from (eg) $9 + 9$ , $1 + 0 + 8$ , $1 + 1 + 7$ , etc
	1	A1ft	ft From M1A0 if 10 multiples are given with one arithmetic error. SC1 99 (does not work)
15(a)	40 – 10 done first	B1	Didn't divide first
15(b)(i)	$\div$ –	B1	
15(b)(ii)	– $\times$	B1	
16(a)	0.14	B1	oe
16(b)	25 or 8	M1	
	200	A1	
16(c)	Common denominator with at least one numerator correct	M1	$\frac{20}{35} + \frac{21}{35}$
	$\frac{41}{35}$	A1	
	$1\frac{6}{35}$	B1 ft	Correct change from improper fraction
17(a)	$3x(2x + 3)$	B2	B1 For $3(2x^2 + 3x)$ or $x(6x + 9)$
17(b)	$4x + 24 (-x) (= 3x + 24)$	M1	$3x + 3a$ or $(3x +) 24 = (3x +) 3a$
	$3(x + 8)$ or $(a =) 8$	A1	
	Expansion, simplification and solution Shows $3x + 24$ and $(a =) 8$	Q1	QWC - Strand (ii) - Logical algebraic steps to a solution Allow one arithmetic error

Q	Answer	Mark	Comments
18(a)(i)	$y = 3$	B1	oe
18(a)(ii)	$x = -1$	B1	oe SC1 $x = 3$ in (a)(i) and $y = -1$ in (a)(ii) or $y = -1$ in (a)(i) and $x = 3$ in (a)(ii)
18(b)(i)	Either point marked at $(-1, -1)$ or $(3, 3)$	M1	Point may be implied by their line going through it
	Correct line drawn crossing $L$ and $M$	A1	
18(b)(ii)	$y = x$	B1 ft	ft Their line if not vertical or horizontal
19	$[-2.8, -2.6]$ and $[0.6, 0.8]$	B2	B1 For either SC1 $[-2.9, -2.8]$ and $[0.8, 0.9]$ or $[-2.4, -2.3]$ and $[0.3, 0.4]$
20(a)	$n + 1$	B1	
20(b)	$n + 1 + n + 2 = 5n$ or $2n + 3 = 5n$	B2	B1 For a correct LHS or RHS expression