



**General Certificate of Secondary Education  
November 2010**

**Mathematics 4306**

**Specification A**

**Paper 2 Foundation**

**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 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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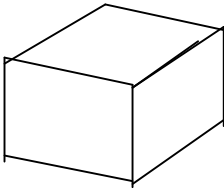
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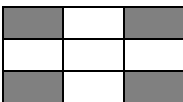
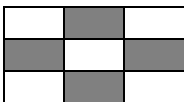
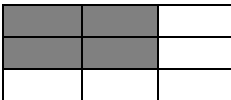
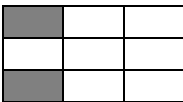
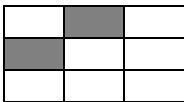
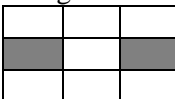
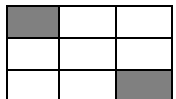
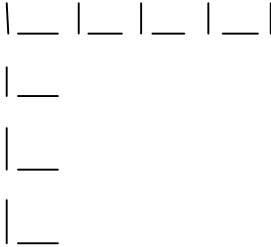
## Glossary for Mark Schemes

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.

<b>M</b>	Method marks are awarded for a correct method which could lead to a correct answer.
<b>A</b>	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>B</b>	Marks awarded independent of method.
<b>M dep</b>	A method mark dependent on a previous method mark being awarded.
<b>B dep</b>	A mark that can only be awarded if a previous independent mark has been awarded.
<b>ft</b>	Follow through marks. Marks awarded following a mistake in an earlier step.
<b>SC</b>	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
<b>oe</b>	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

Q	Answer	Mark	Comment
<b>1 (a)</b>	$56 \div 100 \times 250$	M1	140
	£1.40 or £140p or £1.40p	A1	£140 is M1A0, £1.4 is M1A0
<b>1 (b)</b>	3	B1	
<b>2 (a)</b>	75040	B1	Allow 75,040 but B0 for 75.040
<b>2 (b)</b>	nine thousand (and) eight	B1	Nine, thousand eight Allow poor spelling
<b>3 (a)</b>	25	B1	
<b>3 (b)</b>	$\frac{2}{10}$	B1	
<b>3 (c)</b>	$\frac{10}{20}$	B1	
<b>4 (a)</b>	1997	B1	Ignore any , or .
<b>4 (b)</b>	1954	B1	Ignore any , or .
<b>4 (c)</b>	$1989 - 40 + 60$	M1	1949
	2009	A1	Ignore any , or .
<b>5 (a) (i)</b>	15 – half of 6 or $24 \div 2$	M1	$30 - 6 \div 2$ is M0 unless recovers to correct answer
	12	A1	
<b>5 (a) (ii)</b>	15	B1	
<b>5 (b)</b>	4	B2	B1 for 26 or 56 seen Allow embedded answers unless contradicted on answer line when B1
<b>6 (a)</b>	(5, 3) or ( $x = 5$ , $y = 3$ ) Answer may be on diagram	B1	B0 for (x5, y3), B0 for (5x, 3y)
<b>6 (b)</b>	4 answer may be on diagram	B1	0.4 is B0
<b>6 (c)</b>	Answer to $(6b)^2$	B1ft	16
<b>6 (d)</b>	(3, 5) or ( $x = 3$ , $y = 5$ ) Answer may be on diagram	B1	B0 for (x3, y5), B0 for (3x, 5y)

Q	Answer	Mark	Comment
7	<p>Even ————— • Certain</p> <p>Number 3 ————— •</p> <p>less than 9 ————— • even</p> <p>number 10 ————— • impossible</p>	B3	<p>B2 3 correct</p> <p>B1 1 or 2 correct</p>
8	RH, BH, GH, RT, BT, GT, and/or reversed or small letters	B2	–1 each error or omission
9 (a)		B1	<p>Ignore any hidden edges if shown.</p> <p>Allow rectangle or parallelogram for base, but at least two faces must look like a square or a rhombus.</p> <p>Allow approximately parallel edges</p> <p>Edges can be freehand</p> <p>B0 for net of a cube</p>
9 (b)	tetrahedron	B1	
10 (a)	35	B1	
10 (b)	$6 \times (9 - 7) + 3$	B1	
10 (c)	$(3 + 2) \times (5 + 6)$	B1	
11 (a)	none or 0	B1	zero oe
11 (b)	parallelogram	B1	Allow any spelling but not just 'parallel'
11 (c)	Any correct obtuse angle Need not be labelled provided it is unique	B1	May be interior or exterior angle
11 (d)	6.3 to 6.5 cm	B1	63 to 65 mm may be on diagram
11 (e)	$52^\circ$ to $54^\circ$	B1	May be on diagram

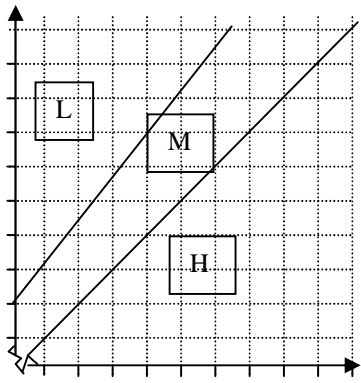
Q	Answer	Mark	Comment
12 (a)	 or 	B1	Allow rotations of 
12 (b)	 or  or rotations of each of these	B1	B1 for any correct pair with no extras.  Or can use centre square + any other  B0 eg and their rotations  or 
12 (c)	isosceles triangle has no rotational symmetry It has rot. symmetry of order 1	B1	This describes an equilateral triangle . Because the sides are not all the same. The angles are not all the same. (only)two sides are the same. (only)two angles are the same.  B0 for 1 line of symmetry B0 for all sides are different B0 for it has no lines of symmetry  B0 for correct plus incorrect eg it has 2 equal sides and rotational symmetry of order 2
13 (a)	- 9	B1	B0 for 9
	26	B1	B0 for -26
13 (b)	- 14	B1	
14 (a)		B1	
14 (b)	15	B1	
	Their 15 + 4	B1ft	19

Q	Answer	Mark	Comment
<b>14 (c)</b>	Add 4, + 4, plus 4, number of sticks + 4. miss out the next odd number and then go to the next odd number	B1	$4n - 1$ oe allow use of other letter Allow $n4 - 1$ B0 for $n = + 4$ , $n + 4$ , number + 4 $n = 4n - 1$ etc B0 for correct and incorrect eg + 4 and $n + 4$
<b>14 (d)</b>	31 or 35 seen $4n - 1 = 32$ has no integer solution. pattern 8 has 31 sticks. one stick left over 3 sticks short	B1	oe no even numbers, no even terms only odd numbers 32 is an even number  B0 because adding 4 each time B0 started at 3 sticks
<b>15</b>	Bags $10 \times 2.85$	M1	
	28.50	A1	Allow 28.5
	Single load $17 + 10$	M1	27
	Single load or £27 or 'delivery' on answer line oe	A1cao	A1 is cao so there must be no errors in the working
<b>15 ALT</b>	$25 \div 2.85$ and $250 \div 27$ oe	M1	$2.85 \div 25$ and $27 \div 250$ oe
	8.77(kg/£) or 8.8	A1	0.114(£/kg)
	9.26 or 9.3	A1	0.108
	Single load or £27 or 'delivery' on answer line oe	A1cao	
<b>16 (a)</b>	$9a$	B1	B0 for $7a + 2a$ Penalise further work eg $9a = a^9$ is B0
<b>16 (b)</b>	$7a - 8f + 6a + 5f$	B2	B1 for $-8f$ or $++-$ or $-+-$
<b>17 (a)</b>	49, 64, 81	B2	B1 for any 2 of these or any other square numbers
<b>17 (b)</b>	$49 + 25 + 9 + 1$	M2	M1 for any 3 of these but must be no even square numbers
	84	A1	SC1 for eg $84 \times 4$ , $84 \times 6$ , $84^3$ etc after seeing 84
<b>18</b>	Stating sides are 12 10 8cm	B1	Can be implied if diagram is correct
	May be on drawing in question		
	Two sides drawn to 3 mm accuracy	M1	
	All 3 sides correct and a triangle	A1	
<b>19 (a)</b>	7	B1	
<b>19 (b)</b>	8	B1	
<b>19 (c)</b>	6	B1	

Q	Answer	Mark	Comment
<b>19 (d)</b>	Attempt at $\sum xf$ $12 + 5 + 12 + 56 + 48 + 45 + 50$ (= 228)	M1	$4 \times 3 + 5 \times 1 + \dots + 10 \times 5$ Allow one arithmetic error or omission of a product
	Their $228 \div 30$	M1Dep	$12 + 5 + \dots + 50 \div 30$ is M1M0 unless recovers
	7.6	A1	Allow 7 or 8 after 7.6 or $228 \div 30$ seen
<b>19 (d) ALT</b>	$4 + 4 + 4 + 5 + 6 + 6 + \dots + 10 + 10$	M1	Allow one missed value
	Their $228 \div 30$	M1Dep	
	7.6	A1	Allow 7 or 8 after 7.6 or $228 \div 30$ seen
<b>20 (a)</b>	(0).612244898	B1	(0).6122449
<b>20 (b)</b>	(0).6	B1ft	Round their answer to 1sf
<b>21</b>	Use mark scheme on LHS or RHS whichever is most beneficial to candidates		
	A pair of numbers that satisfy condition one eg Sal    0   1   2   3   4   6 Bill    2   3   4   5   6   8	M1	$b - 1 = s + 1$ or $b + 1 = 2(s - 1)$
	A pair of numbers that satisfy condition two eg Sal        2   3   4   6 Bill        1   3   5   9	M1	Both equations
	Sal = 5, Bill = 7	A1	Correct answer gets 3 marks Can score M0M1A0 Sc2 for Sal 7 Bill 5
<b>22 (a)</b>	$5.6 \times 3.7$	M1	
	20.7(2)	A1	20.75 is M1A0
<b>22 (b)</b>	18.6	B1	18.60
<b>23</b>	Sight of 1.18	B1	
	$1.18 \times 145$	M1	
	171.10	A1	171.1 is A0



Q	Answer	Mark	Comment
<b>23 ALT</b>	$\frac{18}{100} \times 145$ (26.1)	M1	Allow build up method for 18%. Must get to 18% but allow arithmetic errors for M1
	145 + their 26.1	M1dep	$\frac{118}{100} \times 145$ M2
	171.10	A1	171.1 is A0
<b>24 (a)</b>	'Either' ticked and prime can be odd or even stated or shown Needs both parts for one mark	B1	Allow misreads of formula as $pr$ or $(pr)^2$ or miscalculations as long as $p = 2$ and $p = \text{odd prime}$ mentioned eg $2 \times 3^2 = 36$ and $3 \times 3^2 = 81$
<b>24 (b)</b>	Any valid expression, eg $xy + z$ Must use all 3 letters	B1	Allow numbers if all variables used, ie $x + y + z + 1$ , $2(x + y + z)$ B0 for $x \pm y \pm z$
<b>25</b>	$800 + 1200 + 1400 + 700$ (= 4100)	M1	Allow 1 arithmetic error
	$2 \times \text{their } 4100$ (= 8200)	M1	
	$\frac{130}{360} \times \text{their } 8200$	M1Dep	Dependent on first M1 then doubling or halving their 4100 eg $130 \div 360 \times 2050$ is M1 Accept 36% of their 8200 oe $130 \div 180 \times 4100$ is M3
	2950 to 2965	A1	SC1 2800 or $2 \times 1400$
<b>26</b>	$16 \times 4$ (= 64)	B1	
	$\pi \times 8^2 \div 2$	M1	$\pi \times 16^2 \div 2$ (400.92 to 402.18), $\pi \times 6^2 \div 2$ (56.52 to 56.56)
	100.48 to 100.57	A1	$32\pi$
	164.48 to 164.57 164 or 165 with working	A1ft	$64 + 32\pi$ gets all 4 marks ft if an area of a rectangle calculated with a length of 16 and any other width eg 152.52 to 152.56 comes from using 6 as radius and height and so scores 2/4
<b>27</b>	$250 \div 8 \times 5$ or $250 \div 8 \times 3$	M1	
	156.25 and 93.75	A1	or reversed
<b>28 (a)</b>	High	B1	

Q	Answer	Mark	Comment
28 (b)	30	B1	
28 (c)		B1  B1	Line from (18, 18) to (36, 36) Allow one square accuracy  Areas marked with line passing between (16,19) and (19,16) and (38,34) and (34,38)
29	$2x < 8$ or $2x < 6$	M1	$2x \leq 8$
	$x < 4$ or $4 > x$	A1	$x < 4$ in working but just 4 on answer line gets M1A0
30 (a)	Correct plots at mid class point to 1 square accuracy and joined up Ignore any extra lines going back to horizontal axis at start or end	B2	B1 7 correct plots but not joined up B1 5 or 6 correct plot at midpoints to 1 square accuracy and joined up B1 7 correct plots at upper or lower class boundaries and joined up B0 for bar chart only, but mark frequency polygon if seen as well
30 (b)	Any correct statement using both sets of data. This is not a fit mark eg  Higher average spend at shop A Lower average spend at shop B Higher mean at A Higher median at A More money spent at A Same number of people spend £80 to £100 Same number of people spend £20 to £40 12 people spend £50 at A but 18 spend £50 at B	B1	More spread out at shop A Less spread out at shop B oe Mode at A higher (than mode at B) Same range More people in B spend £40 to £60 More spend £70 at B 20 shoppers spend £90  B0 they both go up and down B0 more spend £70 in one shop than the other B0 A highest was £110 but B was £70