Mark Scheme (Results)

June 2011

GCSE Mathematics (5384H)
Paper 14H

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NOTES ON MARKING PRINCIPLES

1   **Types of mark**
         M marks: method marks
         A marks: accuracy marks
         B marks: unconditional accuracy marks (independent of M marks)

2   **Abbreviations**
         cao – correct answer only   ft – follow through
         isw – ignore subsequent working   SC: special case
         oe – or equivalent (and appropriate)   dep – dependent
         indep - independent

3   **No working**
         If no working is shown then correct answers normally score full marks
         If no working is shown then incorrect (even though nearly correct) answers score no marks.

4   **With working**
         If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
         If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
         If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
         If there is no answer on the answer line then check the working for an obvious answer.
         Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
         If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

5   **Follow through marks**
         Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work
It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability
Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.
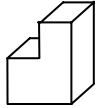
9 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

10 Money notation
Accepted with and without the "p" at the end.

11 Range of answers
Unless otherwise stated, when any answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1).

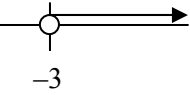| 5384H_14H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1			2	B2 for a clear sketch of a prism with an 'L' shaped cross-section [B1 for a sketch of a cuboid or a sketch of a 2D 'L' with an attempt to make it 3D with additional lines]
2	$\frac{3}{4} \times 120 = 90$ $120 - 90 = 30$ left $30 \div 3$	10	3	M1 for $\frac{3}{4} \times 120$ oe or 90 or $\frac{1}{4} \times 120$ oe or 30 M1(dep) for '30' $- (2 \times$ '30' $\div 3)$ oe or $\frac{1}{3} \times$ '30' oe A1 cao
3	$360 \div (180 - 160)$ $360 \div 20$ OR $180(n-2) = 160n$ $180n - 360 = 160n$ $180n - 160n = 360$ $\qquad 20n = 360$	18	3	M1 for $180 - 160$ or 20 seen M1 (dep) for $360 \div$ "20" A1 cao OR M1 for $180(n-2) = 160n$ oe M1 for fully correct method to isolate terms in n A1 cao
4		Correct enlargement, s.f. ½ centre P	3	B3 for correct enlargement s.f. ½ centre P (B2 for correct enlargement s.f. ½ incorrect centre or correct enlargement s.f. $\neq$ ½ or 1, centre P) (B1 for 2 sides correctly enlarged s.f. ½ or correct enlargement s.f. $\neq$ ½ or 1, incorrect centre)

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Question	**Working**	**Answer**	**Mark**	**Notes**

5	**Monthly:**
	27120 × 2.5 ÷ 100 = 678
	27120 + 678 = 27 798
	 S: 27798 ÷ 12 = 2316.50
	M: 2100 + 200 = 2300
	Monthly:
	27120 ÷ 12 = 2260
	2260 × 2.5 ÷ 100 = 56.50
	S: 2260 + 56.5 = 2316.50
	M: 2100 + 200 = 2300
	Yearly:
	27120 × 2.5 ÷ 100 = 678
	S: 27120 + 678 = 27 798
	M: (2100 + 200) × 12 = 27 600
	
	Yearly:
	27120 × 2.5 ÷ 100 = 678
	S: 27120 + 678 = 27 798
	M: 2300 + 2500 + 2700 + ...
	 + 4500 = 40 800
		Stephen with correct working	4	M2 27120 × 1.025 oe or 27798 seen
				       (M1 27120 × 2.5 ÷ 100 oe or 678 seen)
				M1 '27798' ÷ 12 oe
				A1 Stephen and **2316.5(0)** and **2300**
				OR
				M1 27120 ÷ 12 oe or 2260 seen
				M2 for '2260' × 1.025 or 2316.5(0) seen
				       (M1 '2260' × 2.5 ÷ 100 oe or 56.5(0) seen)
				A1 Stephen and **2316.5(0)** and **2300**
				OR
				M2 27120 × 1.025 oe or 27798 seen
				       (M1 27120 × 2.5 ÷ 100 oe or 678 seen)
				M1 (2100 + 200) × 12 oe or 27600 seen
				A1 Stephen and **27 798** and **27 600**
				OR
				M2 27120 × 1.025 oe or 27798 seen
				       (M1 27120 × 2.5 ÷ 100 oe or 678 seen)
				M1 2300 + 2500 + 2700 + ...+ 4500 or 40 800 seen
				A1 Michelle and **27 798** and **40 800**
				
				NOTE: : If Michelle's 2010 salary is calculated assuming an additional month or 4 weeks in a month then give full credit throughout; with Michelle earning the larger salary

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Question	Working	Answer	Mark	Notes
6	<table><tr><td>x</td><td>$x^3 + 5x$</td></tr><tr><td>3</td><td>42</td></tr><tr><td>3.4</td><td>56.(304)</td></tr><tr><td>3.5</td><td>60.(375)</td></tr><tr><td>3.6</td><td>64.(656)</td></tr><tr><td>3.7</td><td>69.(153)</td></tr><tr><td>3.8</td><td>73.(872)</td></tr><tr><td>3.9</td><td>78.(819)</td></tr><tr><td>4</td><td>84</td></tr><tr><td>3.65</td><td>66.8(77)</td></tr><tr><td>3.66</td><td>67.3(27)</td></tr><tr><td>3.67</td><td>67.7(80)</td></tr><tr><td>3.68</td><td>68.2(36)</td></tr><tr><td>3.69</td><td>68.6(93)</td></tr></table>	3.7	4	B2 for a trial between 3 and 4 exclusive (B1 for a trial between 3 and 4 inclusive) B1 for a different trial of $3.65 \le x < 3.7$ B1 (dep on at least one previous B1) for 3.7 NB For values of x to 1 dp trials should be evaluated to at least 2 s.f., and for values of x to 2 dp truncated or rounded to 1 dp NB No working scores 0 marks
7	$\dfrac{2.4 \times 2.56}{19.2}$ $\dfrac{6.144}{19.2}$ $= 6.144 \div 19.2$	0.32 or $\dfrac{8}{25}$	2	B2 for 0.32 or $\dfrac{8}{25}$ (B1 for 6.144 or $\dfrac{768}{125}$ or $6\dfrac{18}{125}$ seen)
8	$\pi(6)^2 - \pi(5)^2$ $= 113(.0973\ldots) - 78.5(398\ldots)$ $= 34.55751919$	34.5 – 34.6	3	M1 for $\pi(6)^2$ oe or $\pi(5)^2$ oe or 113… or 78.5… M1 for $\pi(6)^2 - \pi(5)^2$ oe A1 for 34.5 – 34.6

Question		Working	Answer	Mark	Notes
9	(a)	$8x - 4 = 3x - 19$ $8x - 3x = -19 + 4$ $5x = -15$	-3	3	B1 for $8x - 4$ or $\dfrac{3x}{4}$ $\dfrac{19}{4}$ seen M1 for a fully correct process which results in the terms in x or the constant terms on one side of an equation from '$ax + b$' = '$cx + d$', $b \neq 0$ A1 cao
	(b)	$y + 4 = 150$ $y = 150 - 4$	146	2	M1 for $y + 4 = 30 \times 5$ oe or $\dfrac{y}{5} = 30 - \dfrac{4}{5}$ oe A1 for 146
10	(a)		 ⟶ -3	2	B2 for an open circle at –3 with either an arrow to the right or a line segment from –3 to at least 5, ±2 mm (B1 for an open circle at –3 with either an arrow to the left or an incorrect line segment OR a closed circle or no circle at –3 with either an arrow to the right or a line segment from –3 to at least 5) ±2 mm
	(b)	$7y \leq 8 - 36$ $7y \leq -28$	$y \leq -4$	2	M1 for a correct process to isolate $7y$ in an inequality or $y = -4$ or $y < -4$ A1 cao
11	(a)	$BC \div 12 = 10 \div 6$ $BC = 10 \times 12 \div 6$	20	2	M1 for $12 \div 6$ or $6 \div 12$ or $10 \div 6$ or $6 \div 10$ oe or a decimal equivalent including 1.6, 1.66..., 1.67 or 1.7 A1 for 19.9 – 20.4
	(b)	$PR \div 18 = 6 \div 10$ $PR = 6 \times 18 \div 10$	10.8	2	M1 for $6 \times 18 \div 10$ oe or $18 \div (1.6, 1.66..., 1.67, 1.7)$ or a complete method ft from '20' or $12 \div$ '20' $\times 18$ A1 for 10.8

Question		Working	Answer	Mark	Notes
12	(a)	$3y = 2x - 12$ $y = \dfrac{2}{3}x - 4$	$\dfrac{2}{3}$	2	M1 for $y = \dfrac{2}{3}x + c$ or $y = \dfrac{2x+3}{3}$ A1 for $\dfrac{2}{3}$ oe or 0.66... or 0.67 SC: B1 for reading a 'correct' gradient from an incorrect rearranged equation if M0 scored
	(b)	Gradient of $2y = 10 - 3x$ is -1.5 $-1.5 \times \dfrac{2}{3} = -1$	Proof	2	B1 for both gradients identified (can f.t. from (a)) B1 indep for product of gradients -1 eg one gradient $= -$ reciprocal of other gradient S.C. B1 for a 'proof' using a correct diagram, if B0 scored
13	(i)		54	2	B1 cao
	(ii)		reason		B1 for angles in the same segment (are equal) oe. or angles subtended at the circumference by the same chord (or arc) (are equal)
14		$(6.21795 \times 10^{10}) \div 510\,072\,000$ $= 121.9(033783\ldots)$	$1.21 \times 10^2 - 1.22 \times 10^2$	3	M1 for SA Jupiter $\div$ SA Earth eg $(6.21795 \times 10^{10}) \div 510\,072\,000$ oe eg $6\,200\,000 \div 51$ OR digits 121... or digits 122 A1 for $121 - 122$ A1 for $1.21 \times 10^2 - 1.22 \times 10^2$

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Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	$x(2x+6) - 3x = 100$ $2x^2 + 6x - 3x = 100$ $2x^2 + 3x - 100 = 0$	Proof	3	M1 for a correct algebraic expression for the area of at least 1 rectangle eg $x(2x+6)$, $3x$, $2x^2 + 6x$ M1 for a correct algebraic expression for the area of the unshaded region eg $x(2x+6) - 3x$ $(= 100)$ or eg $x(2x+6) = 100 + 3x$ A1 for completion from eg $2x^2 + 6x - 3x = 100$
	(b)	$a = 2 \quad b = 3 \quad c = -100$ $x = \dfrac{-3 \pm \sqrt{3^2 - 4(2)(-100)}}{2(2)}$ $= \dfrac{-3 \pm \sqrt{809}}{4}$ $= 6.36073\ldots$ or $-7.86073\ldots$ **OR** $x^2 + \dfrac{3}{2}x - 50 = 0$ $(x + \dfrac{3}{4})^2 - (\dfrac{3}{4})^2 - 50 = 0$ $x + \dfrac{3}{4} = \pm \sqrt{(\dfrac{3}{4})^2 + 50}$ $x = 6.36073\ldots$ or $-7.86073\ldots$	6.36 to 6.365	4	M1 for correct substitution in formula allow sign errors in b and c M1 for reduction to $\dfrac{-3 \pm \sqrt{809}}{4}$ or $\dfrac{-3 + \sqrt{809}}{4}$ $\dfrac{-3+\sqrt{809}}{4}$ A1 for 6.36 to 6.365 or -7.86 to -7.865 A1 for 6.36 to 6.365 OR M1 for $(x + \dfrac{3}{4})^2$ M1 for $-\dfrac{3}{4} \pm \sqrt{\dfrac{9+800}{16}}$ or $-\dfrac{3}{4} + \sqrt{\dfrac{9+800}{16}}$ A1 for 6.36 to 6.365 or $--7.86$ to -7.865 A1 for 6.36 to 6.365 SC: T&I scores 1 mark for 1 correct root or 4 marks for correct length

Question	Working	Answer	Mark	Notes

16	$BC = \sqrt{8^2 - 3^2}$
	
	$= \sqrt{55}$
	
	$= 7.416198\ldots$
	
	$CD = 7.416\ldots \div \sin 50°$
	$= 7.416\ldots \div 0.766\ldots$
	$= 9.6811\ldots.$
		$9.67 - 9.69$	4	M1 for $8^2 - 3^2$ oe
				
				M1 (dep) for $\sqrt{8^2 - 3^2}$ oe or 7.41… or 7.42 seen
				
				OR M1 for $A = \cos^{-1} 3/8$ $(= 67.98°)$
				     M1 (dep) for $3 \times \tan$ '67.98' or 7.41... or 7.42 seen
				
				M1 for '7.4…' $\div$ sin 50
				A1 for $9.67 - 9.69$
				
				SC B3 for -28.2 to -28.3 (using rad)
				          or 10.4 to 10.5 (using grad)

17	LB of 218 = 217.5
	UB of 12.6 = 12.65
	
	$217.5 \div 12.65 = 17.1936\ldots$
		$17.1936\ldots.$	3	B1 for 217.5 or 12.65 or 12.6499... or 12.649 seen
				M1 for LB of 218 $\div$ UB of 12.6
				      where $217.5 \le LB < 218$
				      and $12.6 < UB \le 12.65$
				
				A1 for $17.19 - 17.2$

Ofqual

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