



GCSE MARKING SCHEME

ADDITIONAL MATHEMATICS (PILOT)

SUMMER 2010

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2010 examination in GCSE ADDITIONAL MATHEMATICS (PILOT). They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

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	Additional Mathematics Pilot 2010 - Paper 1 (non calculator)	Mark	Comments
8	(a) $2(3)^3 - 2 \times 3 + 1 = 49$ (b)(i) Substitute $x = -4$ showing $= 0$ (ii) $(x+4)(2x^2 + bx + c)$ or intention to divide by $(x+4)$ with $2x^2$ shown $(x+4)(2x^2 - 3x - 2)$ $(x+4)(2x+1)(x-2)$	M1 A1 M1 A1 M1 A2 A1 8	Or division method giving $2x^2 + 6x \dots$ Or division method giving $2x^2 - 3x \dots$ ($-128 + 80 + 56 - 8$) Or use of factor theorem A1 for $-3x$ or -2 . Or use of factor theorem A1 $(x-2)$, A1 $(2x+1)$ CAO. Penalise further working.
9	(a) $(1, a)$ where $a > -3$ $(1, 2)$ (b) Sketch $(1, b)$ where $b > 0$ $(1, 3)$	M1 A1 B1 M1 A1 5	Ignore missing brackets CAO Must intersect x-axis correctly Ignore missing brackets CAO
10	(a) Entire 5, 11, 30 (b) Explanation, e.g. "plots more widely spread"	B2 E1 3	B1 for any two correct, or incorrect but differences correct, 6 and 19 Accept "less steep". Do not accept contradictions in the explanation
11	(a)(i) $4n$ (ii) Sight of $3n$ $3n + 1$ (b)(i) $4xy$ (ii) Strategy, e.g. simplify then extend or look at vertical and horizontal Method leading to correct answer, e.g. notices 1 more row to dimension comparison $(x+1)y + x(y+1)$ ISW $(2xy+x+y)$	B1 B1 B1 B1 M1 A1 7	<i>Accept unsimplified answers throughout</i>
12	(a) Sight or use of $\sin 60 = \sqrt{3}/2$ $\frac{1}{2}x(x+3) \sin 60 = \sqrt{300}$ $x(x+3)\sqrt{3} = 4\sqrt{300}$ $x^2 + 3x - 40 = 0$ (b) $x = 5$ $BA^2 = 8^2 + 5^2 - 2 \times 8 \times 5 \cos 60$ Sight of $\cos 60 = \frac{1}{2}$ $BA = 7$ (cm)	B1 M1 A1 A1 B1 M1 B1 A1 8	<i>Accept in (a), (b) or by diagram</i> Allow missing brackets Or similar progress Convincing Accept $x=5$ shown in (a) Accept $BA^2 = (x+3)^2 + x^2 - 2 \times x \times (x+3) \cos 60$. Allow missing brackets <i>Accept in (a), (b) or by diagram</i>
13	$\frac{10 - 7(x+1)}{10(x+1)} = \frac{3 - 2x}{3x - 2}$ $(3x-2)(3-7x) = 10(x+1)(3-2x)$ $9x-6 - 21x^2+14x = 30x+30 - 20x^2 - 20x$ $x^2 - 13x + 36 = 0$ $(x-9)(x-4) = 0$ $x=9, x = 4$	B1 B1 B1 B1 M1 A1 6	<i>Allow 1 slip with brackets</i> 1^{st} step multiply through by any 2 of $(x+1)$, 10 or $(3x-2)$ <i>For first 3 marks FT until 2nd error</i> Clear fractions, equivalent to $\times 10(x+1)(3x-2)$ Or equivalent Fresh start, FT equivalent difficulty: Collect of terms and equate to zero Or correct substitution into quadratic formula

GCSE Additional Mathematics - Paper 2

	Additional Mathematics Pilot 2010 Paper 2 (calculator allowed)	Mark	Comments
1	$\Pi \times 70$ (= 219.91....) $3 \times \dots / 70\Pi$ Sight or use of 1km = 100000 cm or equivalent Answers in the range 1364 to 1365	M1 M1 B1 A1 4	Distance / their circumference including Π Or implied in calculation CAO
2	(a) $y + \delta y = 6(x + \delta x)^2 + 5$ Subtracting y from above to find δy $\delta y = 12x \delta x + 6(\delta x)^2$ Dividing by δx AND letting $\delta x \rightarrow 0$ $\frac{dy}{dx} = \lim_{\delta x \rightarrow 0} \frac{\delta y}{\delta x} = 12x$ (b) $12x = -36$ $x = -3$ $y = 59$	B1 M1 A1 M1 A1 M1 A1 A1	Idea. Accept missing brackets after “-“ symbol Idea Not a FT from (a) FT $6x^2 + 5$ evaluated for their x. Provided M1 awarded
3	(a) (i) $PQ^2 = (15 - 3)^2 + (11 - 6)^2$ (= $12^2 + 5^2$) $PQ = \sqrt{169}$ (=13) (ii) Grad. PQ (11 - 6) / (15 - 3) = 5/12 Grad. perpendicular -12/5 (b) $y = 2/5 x - 3$ or equivalent	M1 A1 M1 A1 B1 B2 7	Allow 1 slip CAO FT -1/grad PQ. Do not accept fraction of fraction B1 for $m = 2/5$ or $c = -3$
4	(x ...) (x ² ... x ... x ...) (x-1)(x ² +x-6) OR (x+3)(x ² -3x+2) OR (x-2)(x ² +2x-3) Correct expansion, not collected $x^3 - 7x + 6$ therefore LHS \equiv RHS	M1 A1 A1 A1 4	Attempt expand of a pair of brackets Allow missing brackets if intention shown Accept $x^3 - 7x + 6 = x^3 - 7x + 6$ as a conclusion. Needs a conclusion
5	Overall strategy, circle thm. & trig $\sin 40 = \frac{1}{2} BC/3$ OR $BC^2 = 3^2 + 3^2 - 2 \times 3 \times 3 \times \cos 80$ $\frac{1}{2} BC = 3 \times \sin 40$ $BC^2 = 14.874\dots$ $BC = 3.85\dots$ $\angle CAB = 40^\circ$ $\sin ACB/5.6 = \sin CAB/BC$ Answers in the range 67.3 to 69.6	S1 M1 A1 A1 B1 M1 A1 7	Or equivalent Rounded or truncated Maybe indicated on the diagram FT their BC & $\angle CAB$ CAO
6	Attempt dy/dx, one term correct $dy/dx = 3x^2 + 8x$ at $x=1$ gradient = 11 when $x=1$ $y = -2$ Equation $(y - 2) = 11(x - 1)$ $y + 2 = 11(x - 1)$ ISW $(y = 11x - 13)$	M1 A1 A1 B1 m1 A1 6	FT equivalent level of difficulty Or alternative method of setting up the equation FT their value of gradient & point only if M1 awarded. Depends on use of calculus CAO . Any form
7	Attempt to solve simultaneous equations $x^2 + 3x - 18 = 0$ $(x - 3)(x + 6) = 0$ $x = 3, y = -6$ AND $x = -6, y = 12$	M1 A1 M1 A1 4	Equate to zero FT their quadratic. Or correct sub. into formula FT their pair of brackets <i>If no marks awarded then SC1 for either (3,-6) or (-6,12). Both answers all 4 marks</i>
8	Suitable diagram for at least 1 mast $\tan 36 = 88/x$ $x = 88 / \tan 36$ = 121.(1216... metres) $350 - x$ (= 228.878....) height shorter mast = $\tan 14 \times (350 - x)$ = 57.(..... metres)	B1 M1 M1 A1 B1 M2 A1 8	<i>Penalise premature approximation once only PA-1</i> For the strategy that is required. FT their x M1 for $\tan 14 = \text{height}/(350-x)$. M0 for $\tan 14 \times 350$



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