AQA Qualifications

AQA Level 2 Certificate
FURTHER MATHEMATICS
Level 2 (8360)

Mark Scheme
Worksheet 3
Algebraic Proof

Version 2.0

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The GCSE Mathematics Department
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Glossary for Mark Schemes

These examinations are marked in such a way as to award positive achievement wherever possible. Thus, for these 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.
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 $\frac{1}{2}$

3 Algebraic Proof

Question	Answer	Mark	Comments
1	$4p - 12 - 4p + 2$ -10	M1 A1	4 terms with 3 correct
2	$8y + 24 + 6 - 3y$ or $5y + 30$ $5y + 30$ and $5(y + 6)$	M2 A1	M1 4 terms with 3 correct oe eg, $5y + 30$ and states both terms divisible by 5
3	$8a^3 + 4a^2 - 4a^2$ or $8a^3$ $8a^3$ and $(2a)^3$	M2 A1	M1 3 terms with 2 correct oe eg, $8a^3$ and states that 8 is a cube number
4	$a(x + 3)$ or $b(x + 3)$ $\frac{a(x+3)}{b(x+3)}$ and cancelling seen $\frac{a}{b}$ and explains that as numerator is smaller than denominator value will be < 1	M1 A1 A1	 oe
5(a)	$a = 3$ $b = 2$	B1 B1 ft	 ft 11 – their a^2
5(b)	$(x + 3)^2 \geq 0$ Adding 2 means always positive	M1 A1	oe Allow their a Must have $a = 3$ and $b = 2$

Question	Answer	Mark	Comments
6	$(x + 1)^2$	B1	
	$(x + 1)^2 + 5$	B1 ft	ft Their $(x + 1)^2$
	$(x + 1)^2 \geq 0$	M1	oe Allow their 1
	Adding 5 means always positive	A1	Must have $(x + 1)^2 + 5$
7	$4x^2 + 6x + 6x + 9 + 8x + 16$ or $4x^2 + 20x + 25$	M2	M1 Allow one error in expansions
	$4x^2 + 20x + 25$ and $(2x + 5)^2$	A1	oe eg, $4x^2 + 20x + 25$ and $(2x + 5)(2x + 5)$
	Explains that only solution is $(x =) -2.5$	A1	oe eg, explains that because the brackets are the same there is exactly one solution
8(a)	$\frac{1}{2}(n - 1)(n - 1 + 1)$	M1	
	$\frac{1}{2}n(n - 1)$	A1	oe eg, $\frac{1}{2}n^2 - \frac{1}{2}n$
8(b)	$\frac{1}{2}n(n + 1) + \frac{1}{2}n(n - 1)$	M1	$\frac{1}{2}n(n + 1)$ + their (a)
	$\frac{1}{2}n^2 + \frac{1}{2}n + \frac{1}{2}n^2 - \frac{1}{2}n$	M1	Expands brackets ft Their (a)
	n^2	A1	
Alt 8(b)	$\frac{1}{2}n(n + 1) + \frac{1}{2}(n + 1)(n + 1 + 1)$	M1	oe
	$\frac{1}{2}n^2 + \frac{1}{2}n + \frac{1}{2}n^2 + n + \frac{1}{2}n + 1$	M1	Expands brackets oe eg, $n^2 + 2n + 1$ ft Their $\frac{1}{2}(n + 1)(n + 1 + 1)$
	$(n + 1)^2$	A1	

Question	Answer	Mark	Comments
9	$\frac{(x+2)(x-2)}{5(x-2)}$	M2	M1 For either numerator or denominator factorised correctly
	At least one correct cancellation in the product	M1	
	$2x^2$	A1	oe eg, $\frac{10x^2}{5}$
	Explains that $2 > 0$ and $x^2 \geq 0$ so $2x^2$ always positive	A1	oe eg, Explains that $10 > 0$ and $5 > 0$ and $x^2 \geq 0$ so $\frac{10x^2}{5}$ always positive
10	$(3n)^2 - 3n + \{(n+1)^2 - (n+1)\}$	M1	oe $9n^2 - 3n$ or $n^2 + n + n + 1 - n - 1$
	$9n^2 - 3n + n^2 + n + n + 1 - n - 1$	A1	oe eg, $10n^2 - 2n$
	$10n^2 - 2n$ and $2n(5n - 1)$	A1	oe eg $10n^2 - 2n$ and $k = 2$