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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Mathematics 4307

Specification B

Module 5 Paper 1 Tier H 43055/1H

Mark Scheme

2009 examination - June series

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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The following abbreviations are used on the mark scheme:

M	Method marks awarded for a correct method.
A	Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied.
B	Marks awarded independent of method.
M dep	A method mark which is dependent on a previous method mark being awarded.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special Case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
eeoo	Each error or omission.

MODULE 5 HIGHER TIER 43055/1H

1(a)	$7x = 63$	M1	$63 \div 7$ 9 embedded M1
	$(x =) 9$	A1	
1(b)	True	B1	
	True	B1	
	True	B1	
1(c)	One integer > 9	B1	

2(a)	$60 \div 2$	M1	$60 \div 120$
	30	A1	0.5
	mph	B1	oe m/min
2(b)	Slower and less steep or took longer	B1	oe L to B is 2 hrs and B to L is 3 to 4 hrs B1 L to B is only 2 hrs B1 L to B is 2 hrs B0 Correct statement with incorrect statement scores B0

3	0.2×600 (= 120)	M1	$0.8C = 24m$ $600 = 0.2C + 24m$ $\frac{C-d}{24}$
	$\frac{600 - \text{their } 120}{24}$ $600 - \text{their } 120 = 24m$	M1 dep	oe $\frac{0.8\times600}{24}$ $\frac{480}{24}$
	20	A1	

4(a)(i)	180	B1	
4(a)(ii)	18	B1 ft	ft their (i) ÷ 10 Do not follow through 280 or 040 or any number greater than 360
4(a)(iii)	06	B1	Do not allow 6
4(b)	210	B1	Allow 208 – 212
	21	B1 ft	SC1 15 Not 21.0

5(a)	Rotation	B1	
	90 clockwise	B1	oe $\frac{1}{4}$ turn clockwise
	About *O*	B1	oe
5(b)	–5 –4	B1	Accept $-\begin{pmatrix}5\\4\end{pmatrix}$

6(a)	123	B1	
	Corresponding	B1 dep	Accept complete alternatives eg Alternate + (vertically) opposite Do not accept F
6(b)	180 – 68	M1	oe (360 – 68 – 68) ÷ 2
	112	A1	

7(a)	$2x^3 + 12x^2 + 3x^2 - 15x$	M1	Allow 1 error
	$2x^3 + 12x^2 + 3x^2 - 15x$	A1	Fully correct
	$2x^3 + 15x^2 - 15x$	A1 ft	Ignore factorising after final answer ft from 4 terms where simplification is possible A0 for fw eg incorrect attempt to collect terms
7(b)	$3mh(h - 5m)$	B2	B1 for partial factorisation with two factors removed $3m(h^2 - 5mh)$ $3h(mh - 5m^2)$ $mh(3h - 15m)$ Ignore fw
7(c)	$(x - 4y)(x + 4y)$	B2	oe B1 for $(x - ay)(x + by)$ where $ab = 16$ B1 for $(x - 4)(x + 4)$ Do not ignore fw

8(a)(i)	A	B1	
8(a)(ii)	$180 - 2 \times 72$ or $(90 - 72) \times 2$ $360 - 3 \times 108$	M1	oe Condone missing brackets
	36	A1	
8(b)	$720 \div 90$	M1	
	8	A1	

9(a)	Valid explanation	B1	eg Allied angles (add up to 180) Inside parallel lines (add up to 180) $y + y + 2x + 2x = 360$ (so $y + 2x = 180$) $2y + 4x = 360$ In a C add up to 180 Interior angles (add up to 180)
9(b)	$3x + y = 230$	B1	
9(c)	Attempt to eliminate a variable (with $2x + y = 180$)	M1	eg $6x + 2y = 460$ and $6x + 3y = 540$ and subtraction Note: Full marks can be awarded for this part on follow through
	$x = 50$	A1 ft	$3x + y = 130 \rightarrow x = -50 \quad y = 280$ $3x = y - 50 \rightarrow x = 26 \quad y = 128$ $3x + y = 410 \rightarrow x = 230 \quad y = -280$
	$y = 80$	A1 ft	

10(a)	cm^2	B1	
10(b)	cm	B1	
10(c)	cm^3	B1	

11(a)	$y = 2x + 8$	B1	Not $2x + 8$
11(b)	Any two pairs of correct coordinates	B2	B1 for each
11(c)	$-\frac{1}{4}$	B1	–0.25
11(d)	$y = -\frac{1}{4}x$ (+c)	B1 ft	Where c is a value Ignore x in part (c) Do not accept $y = 4x$(+c) on ft of 4 or $4x$ in part (c)

12	180 – 36 (or 144) or 90 – 23 (or 67) or 36 – 23 (or 13)	M1	For attempting to find one other angle
	90 – (180 – their 144 – 23) or 180 – 36 – their 67 or 90 – their 13	M1 dep	For a complete method
	77	A1	

13(a)	$9x(x + 2) + 11x$ or $9(x + 2) + 11$ or $9x(x + 2)^2 + 11x(x + 2)$	M1	oe May be unsimplified eg $9x(x + 2) + \frac{11x(x+2)}{x+2}$ $9(x + 2) + \frac{11(x+2)}{x+2}$ If denominators used must be common (consistent) for both terms Ignore the '28' term Accept terms on other side of equation provided that sign has changed
	$9x(x + 2) + 11x = 28$ or $9(x + 2) + 11 = \frac{28}{x}$ or $9x(x + 2)^2 + 11x(x + 2) = 28(x + 2)$	M1 dep	oe If denominators used must be common (consistent) for all three terms Accept terms on other side of equation provided that sign has changed
	$9x^2 + 18x + 11x = 28$ or $9x^2 + 18x + 11x - 28 = 0$ and $9x^2 + 29x - 28 (= 0)$	A1	oe Answer given
Alt 13(a)	Common denominator on one side with at least two terms	M1	eg $9 = \frac{28}{x(x+2)} - \frac{11x}{x(x+2)}$
	Combining numerators over one common denominator in a correct equation	M1 dep	$9 = \frac{28-11x}{x(x+2)}$
	$9x^2 + 18x + 11x = 28$ or $9x^2 + 18x + 11x - 28 = 0$ and $9x^2 + 29x - 28 (= 0)$	A1	oe Answer given
13(b)	Attempt to factorise or Attempt to use formula (allow one error)	M1	$(ax + b)(cx + d)$ where $ac = 9$ and $bd = \pm 28$
	$(9x - 7)(x + 4)$ or formula fully correct	A1	$\frac{-29 \pm \sqrt{29^2 - 4 \times 9 \times -28}}{2 \times 9}$
	$\frac{7}{9}$ and -4	A1	Accept 0.77 … or 0.78

14(a)	2b – 2a	B1	oe b + b – a – a Ignore further work
14(b)	2c – 2b	B1	oe Ignore further work
14(c)	$\frac{1}{2}$(2b – 2a) + $\frac{1}{2}$ (2c – 2b) or b – a + c – b	B1	
14(d)	$\overrightarrow{DG}$ and $\overrightarrow{EF}$ are equal *DG* and *EF* are parallel and equal in length or *DG* and *EF* are equal (vectors) or *GF* and *DE* are equal (vectors)	B1	oe Both *DG* and *EF* are c – a Do not need vector arrows Do not accept properties of parallelogram Not enough to say they are parallel

15(a)	$10\pi = 2\pi r$ or $10\pi = \pi d$	M1	Accept π = 3.14 …
	$10\pi \div 2\pi$	M1 dep	$d = 10$ or $10 \div 2$
	5	A1	
15(b)	$80(\pi) = \frac{1}{3}\pi 5^2 h$	M1	oe $(h =) \frac{3V}{\pi r^2}$ or $\frac{V}{\frac{1}{3}\pi r^2}$ Accept $\frac{1}{3}$ or .33 … Accept π = 3.14 …
	$\frac{3\times 80\pi}{\pi 5^2}$	M1 dep	oe ft their radius in part (a) eg 240 = 25*h* (no fraction and no π) Accept $\frac{3\times 80}{\pi 5^2}$ if first π omitted in first M1
	9.6 or $\frac{48}{5}$ or $\frac{240}{25}$ or $9\frac{15}{25}$ or $9\frac{3}{5}$	A1 ft	oe ft 240 ÷ their radius^2 Ignore fw