



**General Certificate of Secondary Education**

**Mathematics 4307**

*Specification B*

**Module 5 Paper 2 Tier H 43055/2H**

**Final**

**Mark Scheme**

*2010 examination - June series*

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**The following abbreviations are used on the mark scheme:**

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

**MODULE 5 HIGHER TIER**

**43055/2H**

1(a)	16	B1	
1(b)	$9.30 + 1(h) (= 10.30)$	M1	Point (10.30, 24) identified
	$24 \div 12 (= 2)$	M1	Draws line of negative gradient representing speed of 12 km/h
	12.30	A1	oe SC2 11.30

2	All 9 correct $\begin{matrix} \checkmark & \times & \checkmark \\ \checkmark & \checkmark & \times \\ \checkmark & \times & \checkmark \\ \times & \times & \times \end{matrix}$	B3	6, 7 or 8 correct B2 3, 4 or 5 correct B1
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3	No and 6(.183) ( $x = 2.7$ ) and 7(.952) ( $x = 2.8$ )	B2	B1 for at least one correct evaluation using $2.7 \leq x \leq 2.8$
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4	One correct area product seen	M1	eg $12 \times 3 (= 36)$ or $10 \times 8 (= 80)$
	All rectangle calculations correct and addition or subtraction shown $12 \times 3 + 8 \times 2 (= 36 + 16)$ $11 \times 2 + 10 \times 3 (= 22 + 30)$ $10 \times 3 + 3 \times 2 + 8 \times 2$ $(= 30 + 6 + 16)$ $12 \times 11 - 10 \times 8 (= 132 - 80)$	M1	$12 \times 3 + 11 \times 2 - 3 \times 2$ $(= 36 + 22 - 6)$
	52	A1	

5(a)	Line from (0, 10) to (2, 10)	B1	Allow if intention is clear
5(b)	Line from (0, 8) to (2, 0)	B1	Allow if intention is clear

6(a)	37	B1	
	Alternate (angles)	B1	Do not allow alternate segment
6(b)	$180 - 79$	M1	
	101	A1	

7(a)(i)	180°	B1	
	(Centre) $P$	B1	
7(a)(ii)	Correct line drawn	B1	Allow if intention is clear
7(b)	Correct shape with vertices (4, 6) (4, 7) (3, 7) (3, 8) (6, 8) (6, 7) (5, 7) (5, 6)	B2	B1 if $D$ is translated by $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

8	2 arcs, equal radii, centre $B$ , cutting $AB$ and $BC$	M1	1 arc, centre $B$ , cutting $AB$ and $BC$
	2 arcs, equal radii, centres at intersections of arc(s) with $AB$ and $BC$ and bisector drawn	A1	

9(a)	$3(2a + 3)$	B1	$1(6a + 9)$ is B0
9(b)	$8p + 4 + 6 - 3p$	M1	4 terms with 3 correct including signs
	$5p + 10$	A1	
9(c)(i)	-2	B1	
9(c)(ii)	4	B1	
9(d)	$m^2 + 2m + 2m + 4 (-m^2 - 4)$	M1	oe
	$4m$	A1	

10(a)	$12y \div 4 (= 3y)$	M1	oe
	$9y^2$ or $(3y)^2$ or $3y \times 3y$	A1	Penalise further work by subtracting 1 mark
10(b)	$2g + \frac{79}{100}h$ or $2g + 0.79h$ or $\frac{200g + 79h}{100}$	B2	B1 for one term correct or B1 for $200g + 79h$
10(c)	$6a^4b^3$	B2	B1 for 2 out of 3 parts correct Must be 3 components SC1 $a^4b^3$
10(d)	$(6x)^2 = 2w + y$	M1	Condone invisible brackets
	their $(6x)^2 - y (= 2w)$	M1 dep	oe
	$\frac{36x^2 - y}{2} = w$	A1	oe eg $\frac{(6x)^2 - y}{2} = w$ or $w = 18x^2 - \frac{1}{2}y$ Must have $= w$ or $w =$

11	$7.8 \div 1.2 (= 6.5)$	M1	$1.2 \div 7.8 (= 0.15(\dots))$
	$16.9 \div$ their 6.5	M1 dep	their $0.15(\dots) \times 16.9$
	2.6	A1	
	<b>Alternative method</b>		
	$16.9 \div 7.8$ (= 2.16(...) or 2.17 or 2.2)	M1	$7.8 \div 16.9 (= 0.46(\dots))$
	their $2.16(\dots) \times 1.2$	M1 dep	$1.2 \div$ their $0.46(\dots)$
	2.6	A1	

12(a)	Evidence of attempt to find gradient	M1	eg triangles on graph or $2 : 1$ or $\frac{4}{2}$
	(gradient of) $-2$	A1	
	$y = -2x - 1$	A1	oe eg $y + 2x = -1$ or $y + 2x + 1 = 0$ Must be an equation SC2 $-2x - 1$ SC2 $y = -mx - 1$ ( $m > 0$ ) SC1 $y = mx - 1$ ( $m > 0$ )
12(b)	$\frac{1}{2}$	B1 ft	oe Correct or ft Must be a numerical answer, not an equation ft their gradient in (a) Condone $\frac{1}{8}$

13(a)	$4^2 + 7.5^2 (= 16 + 56.25 = 72.25)$	M1	
	$\sqrt{\text{their } 72.25}$	M1 dep	
	8.5	A1	oe
13(b)	$\pi \times 4 \times$ their 8.5	M1	106.76 to 106.828 inclusive
	106.8 or 110 or 107 or $34\pi$	A1 ft	ft their 8.5 to 1 dp or 2 sf or 3 sf

14(a)	$\frac{1}{2} (2x + 4)(x + 2 + 2x - 3)$	M1	$\frac{1}{2} (2x + 4)(3x - 1)$ or $(x + 2)(3x - 1)$ or $\left(\frac{3x}{2} - \frac{1}{2}\right)(2x + 4)$ Condone missing brackets
	Expands their brackets obtaining 4 terms with at least 3 correct (one term must be in $x^2$ )	M1	If correct $\frac{1}{2} (6x^2 - 2x + 12x - 4)$ or $3x^2 - x + 6x - 2$
	$3x^2 - x + 6x - 2 = 20$ or $\frac{1}{2} (6x^2 - 2x + 12x - 4) = 20$	A1	All 4 terms of the expansion correct and made into a correct equation Do not accept the printed equation without seeing where it came from
14(b)	$(3x \pm a)(x \pm b)$ with $ab = 22$	M1	$-5 \pm \sqrt{5^2 - 4 \times 3 \times -22}$ $2 \times 3$
	$(3x + 11)(x - 2)$	A1	Allow one numerical or sign error for M1 Fully correct for A1
	$x = 2$	A1	
	26	B1 ft	ft $10x + 6$ evaluated correctly for their positive value of $x$ SC1 $10x + 6$ seen if M1 not awarded

15(a)	4a	B1	$\frac{2}{3} (6a)$ is B0
15(b)	$-3a + b + \dots$ or $-3a + b - \dots$	M1	$(\overrightarrow{AN} =) \frac{1}{2}$ their 4a Must be processed to $ka$ where $k$ is a number
	$-3a + b + \frac{1}{2}$ their 4a	M1 dep	$\frac{1}{2}$ their 4a must be processed to $ka$ where $k$ is a number
	$-a + b$	A1 ft	ft their 4a SC1 Answer only $5a + b$

16(a)	$\frac{17}{6}$ or 2.83(...)	B1	oe $17 \div 6$ is B0
16(b)	$(x =) 70.6$ or 71	B1	$(A =) 19.4$ or 19
	$(BDC =) 180 - 45 -$ their 70.6 (= 64.4)	M1	$(BDA =) 180 - 45 -$ their 19.4 (= 115.6)
	$\frac{BD}{\sin \text{ their } 70.6} = \frac{6}{\sin \text{ their } 64.4}$	M1 dep	$\frac{BD}{\sin \text{ their } 19.4} = \frac{17}{\sin \text{ their } 115.6}$
	$BD = \frac{6 \times \sin \text{ their } 70.6}{\sin \text{ their } 64.4}$	M1 dep	$BD = \frac{17 \times \sin \text{ their } 19.4}{\sin \text{ their } 115.6}$
	6.15 to 6.32 inclusive	A1	