Coordinate Geometry 1 MS

Q1.

8	**(i)** Mid-point of $AC = (2, 3)$ Gradient of $AC = {}^{1}/_{3}$ Gradient of $BD = -3$ Equation $y - 3 = -3(x - 2)$	B1 M1 A1 [3]	Co Use of $m_1 m_2 = -1$ Co
	(ii) If $x = 0$, $y = 9$, B (0, 9) Vector move D (4, –3)	B1√ M1 A1 [3]	√ on his equation. Valid method. co.
	(iii) $AC = \sqrt{40}$ $BD = \sqrt{160}$ Area = 40 (or by matrix method M2 A1)	 M1 M1 A1 [3]	 Correct use on either AC or BD, Full and correct method. co

Q2.

8	**(i)** $3x^2 + x - 2 = 0$ $(x + 1)(3x - 2) \rightarrow x = -1$ or ⅔ (–1, 1), (⅔, 6)	M1A1 M1 A1	[4]	Eliminates x or y. Sets quadratic to 0. Attempt to solve *their* equation co
	(ii) $AB^2 = (5/3)^2 + 5^2$ $AB = 5.27(0\ldots)$ mid-point = (–1/6, 7/2)	M1 A1 B1√	[3]	√ their coordinates from **(i)** Or $(5\sqrt{10})/3$ oe ft from *their* **(i)**

Q3.

7	**(i)** (2, 5) to (10, 9) gradient = ½ Equation of L_2 $y = \frac{1}{2}x$. Gradient of perpendicular = – 2 Eqn of Perp $y - 5 = -2(x - 2)$ Sim Eqns $\rightarrow$ $C(3.6, 1.8)$	B1 B1√ M1 M1 A1 [5]	co √ on gradient of L_1 Use of $m_1 m_2 = -1$ Correct form of line eqn co
	(ii) $d^2 = 1.6^2 + 3.2^2$ $\rightarrow$ $d = 3.58$	M1 A1 [2]	Correct method for AC co (accept with √5 in answer)

Coordinate Geometry 1 MS

Q4.

3 $\frac{x}{a}+\frac{y}{b}=1$ $P(a, 0)$ and $Q(0, b)$ Distance $\rightarrow \sqrt{(a^2+b^2)}=\sqrt{45}$ Gradients $\rightarrow \frac{-a}{b}=\frac{-1}{2}$ Solution of sim eqns $\rightarrow a=6, b=3$	 M1 A1 M1 A1 A1 [5]	 M1 even if sign(s) incorrect. Correct values a and b (both)

Q5.

9 **(i)** Gradient of $AC = ½$ Gradient of $BD = -2$ Eqn of BD is $y-6=-2(x-3)$ Eqn of AC is $y+1=\frac{1}{2}(x+1)$ Sim eqns $\rightarrow M(5, 2)$ Vector move – or midpoint back $\rightarrow D(7, -2)$	B1 M1 M1 M1 A1 M1 A1√ [7]	co Use of $m_1m_2=-1$ with AC Correct formula for straight line Solution. co Correct method. √ on M.
(ii) Ratio of $AM : MC = \sqrt{45} : \sqrt{20}$ or Vector step $\rightarrow$ 3 : 2	M1 A1 [2]	Correct distance formula. Looks at the two x or y steps. Must be numerical, 1.5 ok, not as roots

Q6.

12(a)	Centre = (2, –1)	**B1**	
	$r^2=[2-(-3)]^2+[-1-(-5)]^2$ or $[2-7]^2+[-1-3]^2$ OE	**M1**	OR $\frac{1}{2}\left[(-3-7)^2+(-5-3)^2\right]$ OE
	$(x-2)^2+(y+1)^2=41$	**A1**	Must not involve surd form **SCB3** $(x+3)(x-7)+(y+5)(y-3)=0$
		3	
12(b)	Centre = *their* (2, –1) + $\begin{pmatrix}8\\4\end{pmatrix}$ = (10, 3)	**B1FT**	SOI FT on *their* (2, –1)
	$(x-10)^2+(y-3)^2=$ *their* 41	**B1FT**	FT on *their* 41 even if in surd form **SCB2** $(x-5)(x-15)+(y+1)(y-7)=0$
		2	

Coordinate Geometry 1 MS

12(c)	Gradient m of line joining centres = $\frac{4}{8}$ OE	**B1**	
	Attempt to find mid-point of line.	**M1**	Expect (6, 1)
	Equation of RS is $y-1=-2(x-6)$	**M1**	Through *their* (6, 1) with gradient $\frac{-1}{m}$
	$y=-2x+13$	**A1**	AG
	Alternative method for question 12(c)		
	$(x-2)^2+(y+1)^2-41=(x-10)^2+(y-3)^2-41$ OE	**M1**	
	$x^2-4x+4+y^2+2y+1=x^2-20x+100+y^2-6y+9$ OE	**A1**	Condone 1 error **or** errors caused by 1 error in the first line
	$16x+8y=104$	**A1**	
	$y=-2x+13$	**A1**	AG
		4	
12(d)	$(x-10)^2+(-2x+13-3)^2=41$	**M1**	Or eliminate y between C_1 and C_2
	$x^2-20x+100+4x^2-40x+100=41 \rightarrow 5x^2-60x+159=0$	**A1**	AG
		2	

Q7.

11(a)	Express as $(x-4)^2+(y+2)^2=16+4+5$	**M1**
	Centre $C(4, -2)$	**A1**
	Radius = $\sqrt{25}$ = 5	**A1**
		3
11(b)	$P(1,2)$ to $C(4,-2)$ has gradient $-\frac{4}{3}$ (**FT** on coordinates of C)	**B1FT**
	Tangent at P has gradient = $\frac{3}{4}$	**M1**
	Equation is $y-2=\frac{3}{4}(x-1)$ or $4y = 3x + 5$	**A1**
		3
11(c)	Q has the same coordinate as P $y = 2$	**B1**
	Q is as far to the right of C as P $x = 3 + 3 + 1 = 7$ Q (7, 2)	**B1**
		2

11(d)	Gradient of tangent at $Q = -\frac{3}{4}$ by symmetry (**FT** from part (**b**))	**B1FT**
	Eqn of tangent at Q is $y-2=-\frac{3}{4}(x-7)$ or $4y + 3x = 29$	**M1**
	$T\left(4, \frac{17}{4}\right)$	**A1**
		3

Coordinate Geometry 1 MS

Q8.

10(a)	Mid-point is (–1, 7)	**B1**
	Gradient, *m*, of *AB* is 8/12 OE	**B1**
	$y-7=-\frac{12}{8}(x+1)$	**M1**
	$3x+2y=11$ **AG**	**A1**
		4
10(b)	Solve simultaneously $12x-5y=70$ and *their* $3x+2y=11$	**M1**
	$x=5,\ y=-2$	**A1**
	Attempt to find distance between *their* (5, –2) and either (–7,3) or (5, 11)	**M1**
	$(r)=\sqrt{12^2+5^2}$ or $\sqrt{13^2+0}=13$	**A1**
	Equation of circle is $(x-5)^2+(y+2)^2=169$	**A1**
		5

Q9.

9(a)	$m_{AB}=\frac{4-2}{-1-3}=-\frac{1}{2}$	**B1**	
	Equation of tangent is $y-2=2(x-3)$	**B1 FT**	(3, 2) with *their* gradient $-\frac{1}{m_{AB}}$
		2	
9(b)	$AB^2=4^2+2^2=20$ or $r^2=20$ or $r=\sqrt{20}$ or $AB=\sqrt{20}$	**B1**	
	Equation of circle centre *B* is $(x-3)^2+(y-2)^2=20$	**M1 A1**	FT *their* 20 for M1
		3	
9(c)	$(x-3)^2+(2x-6)^2=$ *their* 20	**M1**	Substitute *their* $y-2=2x-6$ into *their* circle, centre *B*
	$5x^2-30x+25=0$ or $5(x-3)^2=20$	**A1**	
	$[(5)(x-5)(x-1)$ or $x-3=\pm 2]$ $x=5,\ 1$	**A1**	
		3	