Q	Marking instructions	AO	Marks	Typical solution
11(a)(i)	Writes down the equation of the circle in any correct form	1.1b	B1	Circle equation is $(x-0)^2 + (y-10)^2 = (\sqrt{20})^2$ $x^2 + y^2 - 20y + 100 = 20$ $x^2 + y^2 - 20y + 80 = 0$ Substitute $y = mx$ $x^2 + m^2x^2 - 20mx + 80 = 0$ $(1 + m^2)x^2 - 20mx + 80 = 0$
	Substitutes mx for y	1.1a	M1	
	Simplifies to the given quadratic AG	2.1	R1	
	Subtotal		**3**	

Q	Marking instructions	AO	Marks	Typical solution
11(a)(ii)	Uses the discriminant of the given equation from (a)(i)	3.1a	M1	Using $b^2 = 4ac$ $400m^2 = 4 \times (1 + m^2) \times 80$ $5m^2 = 4 \times (1 + m^2)$ $m^2 = 4$ $m = \pm 2$
	Obtains a correct equation in m	1.1b	A1	
	Obtains $m = \pm 2$	1.1b	A1	
	Subtotal		**3**	

Q	Marking instructions	AO	Marks	Typical solution
11(b)	Uses one of their m values from **(a)(ii)**	3.1a	M1	Using $m = 2$ in equation from (a) $5x^2 - 40x + 80 = 0$ $x = 4$ giving $y = 8$ Using $m = -2$ in equation from (a) $5x^2 + 40x + 80 = 0$ $x = -4$ giving $y = 8$ So (4, 8) and (–4, 8)
	Obtains one correct x value	1.1b	A1	
	Uses line equation to calculate y value	1.1a	M1	
	Obtains two correct sets of coordinates	1.1b	A1	
	Subtotal		**4**	

	Question Total		**10**	