(7) Subs $y=2x$ into $x^2+y^2-14x-8y+45=0$

$$x^2+(2x)^2-14x-8(2x)+45=0$$

$$5x^2-14x-16x+45=0$$

$$5x^2-30x+45=0$$

$$x^2-6x+9=0$$

$$(x-3)^2=0$$

$$x=3$$

$$\therefore y=2\times 3=6$$

$(3,6)$

Question			Generic scheme	Illustrative scheme	Max mark
7.			**Method 1**	**Method 1**	**4**
			•[1] substitute for y	•[1] $x^2+(2x)^2-14x-8(2x)+45=0$	
			•[2] write in standard quadratic form	•[2] $5x^2-30x+45=0$	
			•[3] determine x-coordinate	•[3] 3	
			•[4] determine y-coordinate	•[4] 6	
			Method 2	**Method 2**	
			•[1] substitute for x	•[1] $\left(\frac{y}{2}\right)^2+y^2-14\left(\frac{y}{2}\right)-8y+45=0$	
			•[2] write in standard quadratic form	•[2] $\frac{5}{4}y^2-15y+45=0$	
			•[3] determine y-coordinate	•[3] 6	
			•[4] determine x-coordinate	•[4] 3	
			Method 3	**Method 3**	
			•[1] use centre and perpendicular gradient to determine equation of radius through point of contact	•[1] $x+2y=15$	
			•[2] substitute for y	•[2] $x+2(2x)=15$	
			•[3] determine x-coordinate	•[3] 3	
			•[4] determine y-coordinate	•[4] 6	

Notes:

1. In Methods 1 and 2, treat an absence of brackets at the •[1] stage as bad form only if corrected on the next line of working.
2. In Methods 1 and 2, •[1] is only available if the '=0' appears by the •[2] stage.
3. In Methods 1 and 2, if a candidate arrives at an equation which is not a quadratic •[3] and •[4] are unavailable.
4. Where the quadratic obtained at •[2] in Methods 1 and 2, does not have repeated roots •[3] and •[4] are not available.
5. In Method 3 accept $y-4=-\frac{1}{2}(x-7)$, $-\frac{1}{2}=\frac{4-y}{7-x}$ or equivalent for •[1].
6. In Method 3 •[2], •[3] and •[4] are unavailable to candidates who find the equation of any other line.
7. For (3,6) without working, award 0/4.
8. For answer of (3,6) verified in both equations, or (3,6) generated by the linear equation and verified in the equation of the circle, award 4/4.

Question	Generic scheme	Illustrative scheme	Max mark
7. (continued)			
Commonly Observed Responses:			
Candidate A - substitution into the equation of the circle ⋮ $x=3$ •3 ✓ $(3)^2+y^2-14(3)-8y+45=0$ $y^2-8y+12=0$ $(y-2)(y-6)=0$ $y=6$ •4 ✓ no need to explicitly consider $y=2$ **However,** (3,6) and (3,2) •4 ✗			