

|   |     |      |   |  |  |   |
|---|-----|------|---|--|--|---|
| 2 | (a) | (i)  | $(x-3)^2 - 9 + (y+2)^2 - 4 + 4 = 0 \Rightarrow (x-3)^2 + (y+2)^2 = 9$<br><br>$C(3, -2)$   | <b>M1</b><br><br><b>A1</b><br><b>[2]</b>   | <b>1.1</b> $(x \pm 3)^2$ and $(y \pm 2)^2$ seen (or implied by correct answer) or one correct coordinate<br><br><b>1.1</b> Accept $x = 3$ and $y = -2$   |   |
| 2 | (a) | (ii) | $r = 3$   | <b>B1</b><br><br><b>[1]</b>  | <b>1.1</b> Allow if stated explicitly in (a)(i) but not written down in (a)(ii) www for $r$  | B0 if $r = \pm 3$ only  |
| 2 | (b) |      | $(x-3)^2 + (kx-3+2)^2 = 9$ or<br>$x^2 + (kx-3)^2 - 6x + 4(kx-3) + 4 = 0$<br><br>$(1+k^2)x^2 + (-6-2k)x + 1 = 0$<br><br>$(-6-2k)^2 - 4(1+k^2)(1)$<br><br>$36 + 24k + 4k^2 - 4 - 4k^2 < 0 \Rightarrow 32 + 24k < 0$<br><br>$k < -\frac{4}{3}$ | <b>M1*</b><br><br><b>A1</b><br><br><b>M1dep*</b><br><br><b>M1dep*</b><br><br><b>A1</b><br><b>[5]</b> | <b>3.1a</b> Substitutes the correct equation of the line into any form of their equation of the circle<br><br><b>1.1</b> oe (all terms on the same side – may not be factorised but should be simplified to 5 terms)<br><br><b>3.1a</b> Correct explicit use of discriminant on their 3TQ to get an expression in $k$ only<br><br><b>2.1</b> Discriminant $< 0$ and simplify to the form $ak + b < 0$ (oe)<br><br><b>2.2a</b> Fully correct (no additional values) | Each M is dependent on the previous Ms<br><br>Condone lack of equal to 0<br><br>Condone equals or incorrect inequality<br><br>$a$ and $b$ non-zero<br><br>Or exact equivalent |