2009



3 (a) (iii)

STEPS

- **1**. Find the slope of the line from the centre to the point of contact.
- **2**. Find the slope of the tangent (it is perpendicular to the radius).
- **3**. Find the equation of *T*.

$$\begin{array}{c}
 (0, 0) \quad (4, -3) \\
\downarrow \downarrow \downarrow \downarrow \downarrow \\
x_1 \quad y_1 \quad x_2 \quad y_2
\end{array}$$

$$\begin{array}{c}
 m = \frac{y_2 - y_1}{x_2 - x_1} \\
(0, 0) \quad m = -\frac{3}{4}
\end{array}$$

$$\begin{array}{c}
 T \\
m = \frac{4}{3} \\
(4, -3)
\end{array}$$

Slope of line joining (0, 0) and (4, -3): $m = \frac{0 - (-3)}{0 - 4} = \frac{3}{-4} = -\frac{3}{4}$

Slope of *T* (perpendicular slope): $m = \frac{4}{3}$

Equation of *T*: Point (4, -3),
$$m = \frac{4}{3}$$

- $y (-3) = \frac{4}{3}(x 4)$ $y y_1 = m(x x_1)$
- $y+3 = \frac{4}{3}(x-4)$
- 3(y+3) = 4(x-4)
- 3y+9 = 4x-16
- 0 = 4x 3y 25

3 (a) (iv)



3 (a) (v)



3 (b) (i) Radius: $|cr| = \sqrt{(9-1)^2 + (0-(-6))^2}$ $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ c(1, -6) r(9, 0) \downarrow \downarrow $\downarrow \downarrow$ $=\sqrt{8^2+6^2}$ $x_1 \quad y_1$ $x_2 y_2$ $=\sqrt{64+36}$ $=\sqrt{100}=10$ 3 (b) (ii) Equation of *K*: Centre (1, -6), r = 10Circle *C* with centre (h, k), radius *r*. $(x-1)^{2} + (y-(-6))^{2} = 10^{2}$ $(x-h)^{2} + (y-k)^{2} = r^{2}$ $(x-1)^{2} + (y+6)^{2} = 100$ 3 (b) (iii) -6 Pass the point *r* through *c* by a central symmetry. $r(9, 0) \rightarrow c(1, -6) \rightarrow t(-7, -12)$ -8 →t(-7, -12) -8 -6 The other points, *s* and *u*, are found by inspection. s(9, -12) r(9, 0)c(1, -6) u(9, -12) t(-7, -12)