

15.

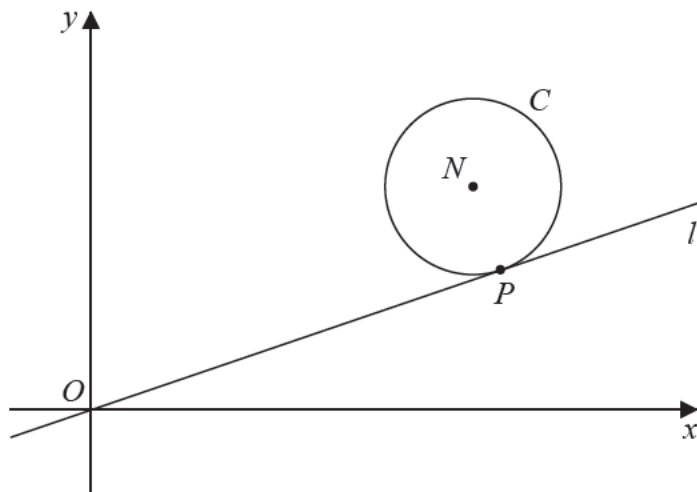
**Figure 4**

Figure 4 shows a sketch of a circle  $C$  with centre  $N(7, 4)$

The line  $l$  with equation  $y = \frac{1}{3}x$  is a tangent to  $C$  at the point  $P$ .

Find

(a) the equation of line  $PN$  in the form  $y = mx + c$ , where  $m$  and  $c$  are constants, (2)

(b) an equation for  $C$ . (4)

The line with equation  $y = \frac{1}{3}x + k$ , where  $k$  is a non-zero constant, is also a tangent to  $C$ .

(c) Find the value of  $k$ . (3)