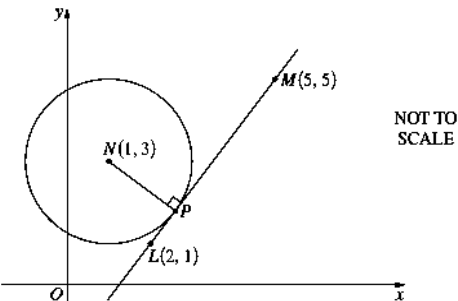*Want more revision exercises?* Get **MathsFit** *- New from projectmaths.*

09	3b	The circle in the diagram has centre N. The line LM is tangent to the circle at P.	
		(i) Find the equation of LM is in the form $ax + by + c = 0$.	**2**
		(ii) Find the distance NP.	**2**
		(iii) Find the equation of the circle.	**1**

$M(5, 5)$ NOT TO SCALE $N(1, 3)$ P $L(2, 1)$

(i)

$$\text{grad } LM = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{5 - 1}{5 - 2}$$

$$= \frac{4}{3}$$

equation: $y - y_1 = m(x - x_1)$

$$y - 1 = \frac{4}{3}(x - 2)$$

$$3y - 3 = 4x - 8$$

$$4x - 3y - 5 = 0$$

(ii) $d = \left| \dfrac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$

$N(1, 3)$ and $4x - 3y - 5 = 0$

$$= \left| \frac{4(1) + (-3)(3) + (-5)}{\sqrt{4^2 + (-3)^2}} \right|$$

$$= \left| \frac{-10}{\sqrt{25}} \right|$$

$$= \frac{10}{5}$$

$$= 2 \qquad \therefore \text{ The distance is 2 units}$$

(iii)   Circle, centre (1, 3) and radius 2:

$$(x - h)^2 + (y - k)^2 = r^2$$

$$(x - 1)^2 + (y - 3)^2 = 4$$

State Mean:
1.74/2
1.33/2
0.56/1

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

(i)   Some careless errors were made in rearranging the equation into the desired form and only a few candidates found the reciprocal of the gradient using $\dfrac{x_2 - x_1}{y_2 - y_1}$. A large number of candidates left the general equation with fractions, which made the working in the following part significantly harder.

(ii) Some candidates did not realise that this question required them to find the perpendicular distance. Common errors in using the formula included: quoting (or not quoting, but using) $\dfrac{|ax_1 + by_1 + c|}{\sqrt{x_1^2 + y_1^2}}$; not using absolute value signs in the perpendicular distance formula; changing the signs within the absolute value signs before adding; careless substitutions especially with $42 + -32$.

A significant number of candidates found the equation of *NP*, used that with the equation of *LM* to find *P*, and then used the distance formula. Many who used this approach received full marks but at the cost of completing more than a page of working. Others who were not successful wasted time using this approach and gave up half-way.

(iii) Most candidates did this part well if they had found a value for *NP* in (ii). A significant number of students could not do this question because they had no answer in part (ii), or forgot to answer it because of this or because they did not number the parts carefully. A significant number did not know the equation of a circle with centre not at the origin. Some diagrams were very small and often the region intended was not clearly shaded.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/