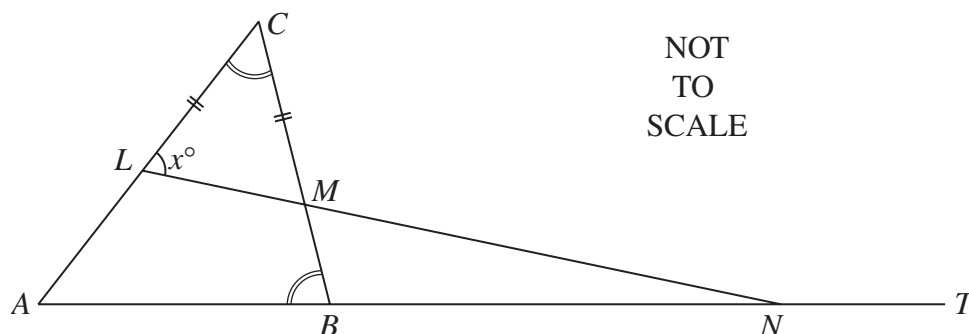


Question 4 (12 marks) Use a SEPARATE writing booklet.

- (a) Find the values of k for which the quadratic equation $3x^2 + 2x + k = 0$ has no real roots. 2

(b)



In the diagram, ABC is an isosceles triangle with $\angle ABC = \angle ACB$. The line LMN is drawn as shown so that $CL = CM$, and $\angle CLM = x^\circ$.

Copy or trace the diagram into your Writing Booklet.

- (i) Show that $\angle ABC = 180 - 2x^\circ$. 2
- (ii) Hence show that $\angle TNL = 3x^\circ$. 2

- (c) (i) Sketch the curve $y = 3 \sin 2x$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$. 2

- (ii) On your diagram for part (i), sketch the line $y = \frac{1}{4}x$, and shade the region represented by 2

$$\int_0^{\frac{\pi}{4}} \left(3 \sin 2x - \frac{1}{4}x \right) dx .$$

- (iii) Find the exact value of the integral in part (ii). 2