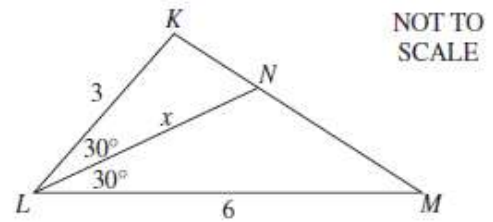




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- 2018 14** In  $\triangle KLM$ ,  $KL$  has length 3,  $LM$  has length 6 and  $\angle KLM$  is  $60^\circ$ . The point  $N$  is chosen on side  $KM$  so that  $LN$  bisects  $\angle KLM$ . The length  $LN$  is  $x$ .
- (i) Find the exact value of the area of  $\triangle KLM$ .
- (ii) Hence, or otherwise, find the exact value of  $x$ .



**1**  
**2**

(i) Using Area =  $\frac{1}{2}absin C$

$$= \frac{1}{2} \times 3 \times 6 \times \sin 60^\circ$$

$$= \frac{1}{2} \times 3 \times 6 \times \frac{\sqrt{3}}{2}$$

$$= \frac{9\sqrt{3}}{2} \quad \therefore \text{the area is } \frac{9\sqrt{3}}{2} \text{ u}^2.$$

(ii) Area of  $\triangle KLN$  + Area of  $\triangle NLM$  = Area of  $\triangle KLM$

$$\frac{1}{2} \times 3 \times x \times \sin 30^\circ + \frac{1}{2} \times x \times 6 \times \sin 30^\circ = \frac{9\sqrt{3}}{2}$$

$$\frac{1}{2} \times 3 \times x \times \frac{1}{2} + \frac{1}{2} \times x \times 6 \times \frac{1}{2} = \frac{9\sqrt{3}}{2}$$

$$\therefore \frac{3x}{4} + \frac{3x}{2} = \frac{9\sqrt{3}}{2}$$

$$3x + 6x = 18\sqrt{3}$$

$$9x = 18\sqrt{3}$$

$$x = 2\sqrt{3}$$

State Mean:  
**0.73**  
**0.74**

\* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by NESA.

## NESA: Marking Feedback

### Skills addressed:

- showing the appropriate substitution into the area of a triangle formula, that is,  $\frac{1}{2} \times 3 \times 6 \times \sin 60^\circ$
- substituting the exact value of  $\sin 60^\circ$  into the formula before simplification
- presenting a simplified exact value as their final answer (ai)
- understanding that 'hence' implies linking parts (ai) and (aii)
- carefully examining a question, considering if there is more than one approach, and selecting the most appropriate and simplest method
- recognising that their result in (ai) is equal to the sum of the areas of the two smaller triangles



**Areas for students to improve include:**

- assuming information not stated in the question without proof, for example,  $\angle L = 90^\circ$
- expressing an answer in exact form