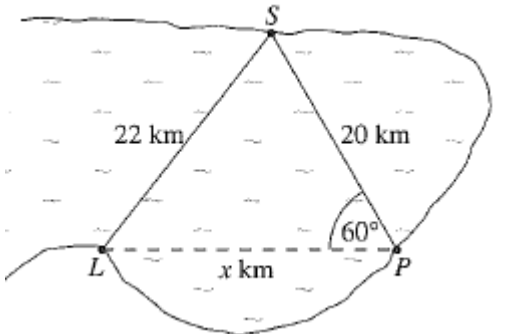


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11	8a	<p>In the diagram, the shop at S is 20 kilometres across the bay from the post office at P. The distance from the shop to the lighthouse at L is 22 kilometres and $\angle SPL$ is 60°. Let the distance PL be x kilometres.</p> <p>(i) Use the cosine rule to show that $x^2 - 20x - 84 = 0$.</p> <p>(ii) Hence, find the distance from the post office to the lighthouse. Give your answer correct to the nearest kilometre.</p>		1 2
<p>(i) $22^2 = x^2 + 20^2 - 2 \times x \times 20 \times \cos 60^\circ$ $484 = x^2 + 400 - 20x$ $x^2 - 20x - 84 = 0$</p>		<p>(ii) $x = \frac{20 \pm \sqrt{400 - 4 \times 1 \times (-84)}}{2 \times 1}$ $= \frac{20 \pm \sqrt{736}}{2}$ $= 23.56465 \dots, -3.56465 \dots$ \therefore the distance is 24 km</p>		

State Mean:
0.66/1
1.27/2

* 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) Generally this part was done very well. Common errors included difficulty in rearranging the cosine rule to obtain the result, using the cosine rule starting with x^2 on the left but still using the 60° angle, using an incorrect version of the cosine rule (including using sine not cosine in the formula) or using the incorrect value of $\cos 60^\circ$.
- (ii) This part was done reasonably well. Common errors included the incorrect application of the quadratic formula (including quoting an incorrect formula), difficulty in completing the algebra and arithmetic involved in solving a quadratic equation (including inability to correctly simplify the expression inside the radical and not dividing by the denominator correctly) or attempting to factorise the given quadratic equation and determining two incorrect factors.
- A number of candidates did not attempt to solve the quadratic equation in part (i), rather they approached the solution either by using the sine rule to get the value of angle LSP then using the cosine rule or the sine rule again to get the value of x , or by drawing a perpendicular from S to LP and finding the values of sections of LP using a combination of trigonometry and Pythagoras' theorem.

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