Question	Scheme	Marks	AOs
5 (a)	States $\dfrac{\sin\theta}{12} = \dfrac{\sin 27}{7}$	M1	1.1b
	Finds $\theta =$ awrt $51°$ or awrt $129°$	A1	1.1b
	$=$ awrt $128.9°$	A1	1.1b
		(3)	
(b)	Attempts to find part or all of AD Eg $AD^2 = 7^2 + 12^2 - 2\times 12\times 7\cos 101.9 = (AD = 15.09)$ Eg $(AC)^2 = 7^2 + 12^2 - 2\times 12\times 7\cos\left(180 - \text{"}128.9\text{"} - 27\right)$ Eg $12\cos 27$ or $7\cos\text{"}51\text{"}$	M1	1.1b
	Full method for the total length $= 12 + 7 + 7 + \text{"}15.09\text{"} =$	dM1	3.1a
	$= 42$ m	A1	3.2a
		(3)	
			(6 marks)

Notes

(a)

M1: States $\dfrac{\sin\theta}{12} = \dfrac{\sin 27}{7}$ oe with the sides and angles in the correct positions

Alternatively they may use the cosine rule on $\angle ACB$ and then solve the subsequent quadratic to find AC and then use the cosine rule again

A1: awrt $51°$ or awrt $129°$

A1: Awrt $128.9°$ only (must be seen in part a))

(b)

M1: Attempts a "correct" method of finding either AD or a part of AD eg (AC or CD or forming a perpendicular to split the triangle into two right angled triangles to find AX or XD) which may be seen in (a).
You should condone incorrect labelling of the side.
Look for attempted application of the cosine rule

$$(AD)^2 = 7^2 + 12^2 - 2\times 12\times 7\cos\left(\text{"}128.9\text{"} - 27\right)$$

$$\text{or } (AC)^2 = 7^2 + 12^2 - 2\times 12\times 7\cos\left(180 - \text{"}128.9\text{"} - 27\right)$$

Or an attempted application of the sine rule $\dfrac{(AD)}{\sin\left(\text{"}128.9\text{"} - 27\right)} = \dfrac{7}{\sin 27}$

$$\text{Or } \frac{(AC)}{\sin\left(180 - \text{"}128.9\text{"} - 27\right)} = \frac{7}{\sin 27}$$

Or an attempt using trigonometry on a right-angled triangle to find part of AD

$$12\cos 27 \text{ or } 7\cos\text{"}51\text{"}$$

This method can be implied by sight of awrt 15.1 or awrt 6.3 or awrt 8.8 or awrt 10.7 or awrt 4.4

dM1: A complete method of finding the TOTAL length.
There must have been an attempt to use the correct combination of angles and sides.
Expect to see $7+7+12+\text{"}AD\text{"}$ found using a correct method.
This is scored by either $7+7+12+\text{"}AD\text{"}$ if $\angle ACB = 128.9°$ in a) or
$7+7+12+\text{awrt}\,15.1$ by candidates who may have assumed $\angle ACB = 51.1°$ in a)

A1: Rounds correct 41.09 m (or correct expression) up to 42 m to find steel **bought**

Candidates who assumed $\angle ACB = 51.1°$ (acute) in (a):
Full marks can still be achieved as candidates may have restarted in (b) or not used the acute angle in their calculation which is often unclear. We are condoning any reference to $AC = 15.1$ so ignore any labelling of the lengths they are finding.

Diagram of the correct triangle with lengths and angles:

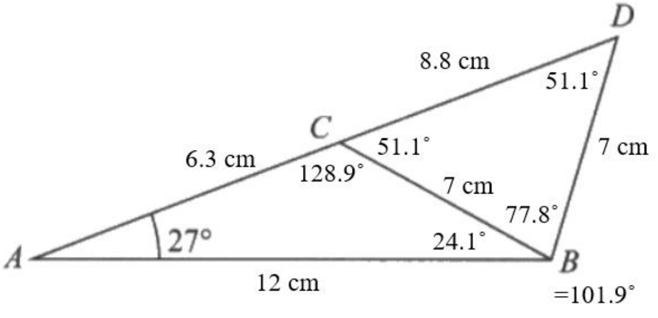

Diagram using the incorrect acute angle: