Lesson 15.5 - The Cosine Rule

If a problem gives you values for:

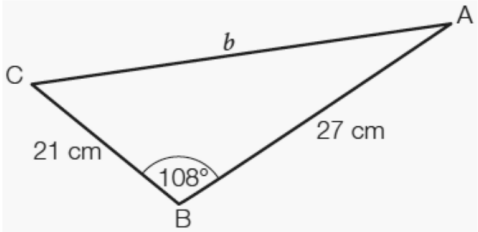
- two sides and the angle between them
  or
- three sides and no angle,

then you **cannot** use the sine rule, because you will have more than one unknown value.

$$a^2 = b^2 + c^2 - 2bc\cos A$$

EXAMPLE #1

Find the length AC.



$b^2 = a^2 + c^2 - 2ac\cos B$

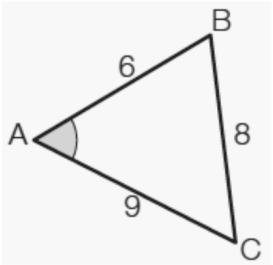
$b^2 = (21)^2 + (27)^2 - 2(21)(27)\cos 108$

$b^2 = 1520.4$

$b = \sqrt{1520.4} = \boxed{39.0 \text{ cm}}$

EXAMPLE #2

Find the size of angle A.



$a^2 = b^2 + c^2 - 2bc\cos A$

$8^2 = 9^2 + 6^2 - 2(9)(6)\cos A$

$64 = 117 - 108\cos A$

$-117 \quad -117$

$\frac{-53}{-108} = \frac{-108\cos A}{-108}$

$.491 = \cos A$

$\cos^{-1}(.491) = A$

$60.6^\circ = A$

When do I use the Sine or Cosine Rule?