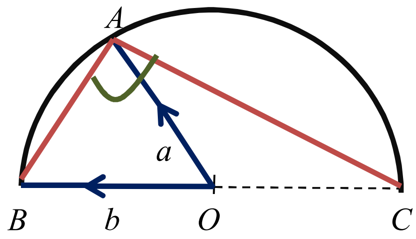

How can we prove that a triangle inscribed within a semi-circle is always a right angled one using a vectors method? Here goes:

Firstly, by assigning the centre of the semi-circle to be the origin, we define the general vectors $\overrightarrow{OA} = a$, $\overrightarrow{OB} = b$; in addition, recognise that $\underline{|a| = |b|}$ since both lengths **represent radii of the same semi-circle.**

Based on the above diagram, we have $\overrightarrow{AB} = b - a, \quad \overrightarrow{AC} = -a - b$

Then $\overrightarrow{AB} \bullet \overrightarrow{AC} = (b-a) \bullet (-a-b) = -a \bullet b - b \bullet b + a \bullet a + a \bullet b$

$$= -b \bullet b + a \bullet a$$

$$= -|b|^2 + |a|^2 = 0 \qquad (\because |a| = |b|)$$

This therefore implies angle $A\hat{O}B = \dfrac{\pi}{2}$ (shown)