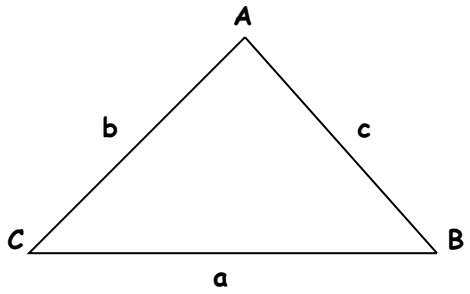
5.4 INVESTIGATING THE COSINE LAW

For a triangle labeled as shown, the COSINE LAW can be written as:

$\mathbf{a^2 = b^2 + c^2 - [2bc(cosA)]}$ or
$\mathbf{b^2 = a^2 + c^2 - [2ac(cosB)]}$ or
$\mathbf{c^2 = a^2 + b^2 - [2ab(cosC)]}$



- **To use the cosine law to solve a triangle, you must know either:**

  Two sides and the contained angle. (This will determine the 3rd side of the Δ)
  Three sides. (This will determine a missing angle measure)

  - Once you have put the given information into the cosine law formula, you isolate for the missing side or angle measure.

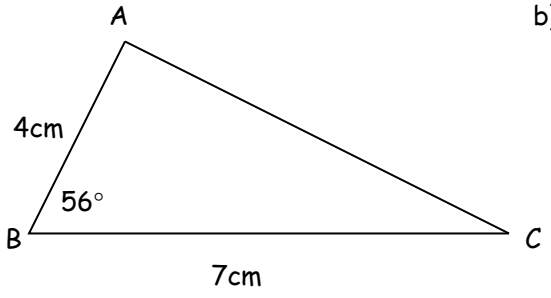
  - Recall : When finding a missing angle measure, you must use the $\cos^{-1}$ function on your calculator.

- To **solve** a triangle means to find <u>all</u> missing side lengths and angle measures.

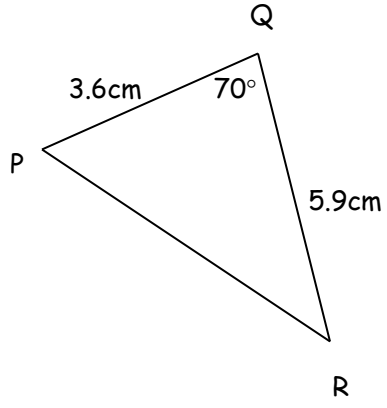
Examples :

1. Find the missing side length, to one decimal place.

a)



b)

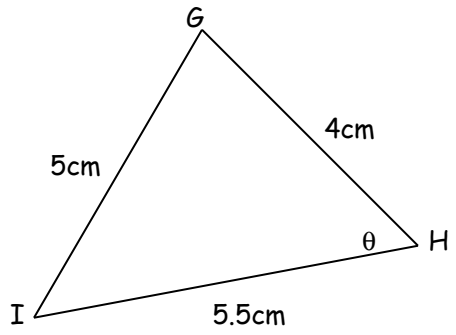


The cosine law can be rearranged to find an angle measure:

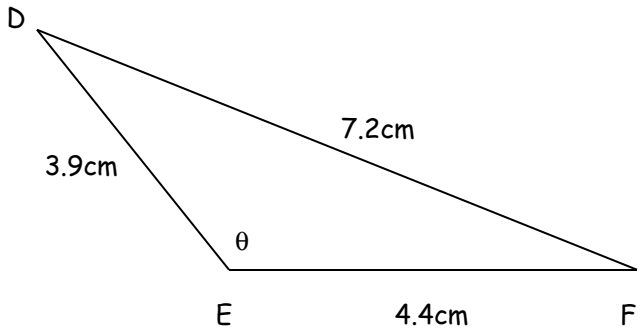
$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

2. Find the measure of the indicated angle, to the nearest degree.

a)



b)



3. The pendulum of a clock is 30cm long and swings through an angle of 18°. What is the horizontal separation of the pendulum's swing from one side to the other?