

**MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 6 – MARCH 2012
ROUND 3 TRIGONOMETRY: ANYTHING**

ANSWERS

A) (_____ , _____ $^{\circ}$)

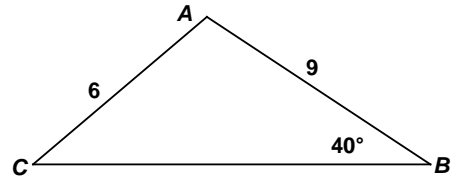
B) (_____ , _____)

C) _____

******* NO CALCULATORS IN THIS ROUND *******

- A) In $\triangle ABC$, $AB = 9$, $AC = 6$ and $m\angle B = 40^{\circ}$, as shown in the diagram at the right.

If $\sin(C) = r \cos \theta^{\circ}$, compute the ordered pair (r, θ°) , where $r > 0$ and θ is an acute angle.



- B) The graph of the function defined by $y = -3\sin\left(4x - \frac{\pi}{2}\right) + 1$ attains a maximum value at the point $P(a, b)$. Compute the ordered pair (a, b) , where a has the smallest possible positive value.

- C) Given: $(-\sqrt{3} + i)^{400} = A + Bi$, where $i = \sqrt{-1}$. Compute $\left(\frac{A}{B}\right)^4$.