MASSACHUSETTS MATHEMATICS LEAGUE
NOVEMBER 2005
ROUND 5 TRIG: FUNCTIONS OF 30, 45, 60 & 90

******* NO CALCULATORS ON THIS ROUND ******

ANSWERS

A)_____

B)_____°

C)_____

A) **Find the exact value in simplified radical form of:**

$$\sec\left(\frac{4\pi}{3}\right) - 2\sin^2\left(\frac{\pi}{12}\right) + \cot^2\left(\frac{11\pi}{6}\right) - 2\cos^2\left(\frac{\pi}{12}\right) - 2\csc\left(\frac{\pi}{8}\right)\cos\left(\frac{3\pi}{8}\right)$$

B) **Solve for all x, $0° \le x < 360°$:** $\sin(2x) - \sin(-x) = 0$

C) **In the figure below, find the value of DH in simplified radical form if:**

$\sin(\angle FDH) = \cos(\angle A) = \cos(\angle ACB) = 0.5$, $CF = FD$, $AB = 10\sqrt{3}$,
$\cot(\angle CFD) = \cos(\angle CBD) = \cot(\angle H) = 0$, and $\cot(\angle BDH) = -1$