MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2008
ROUND 7 TEAM QUESTIONS

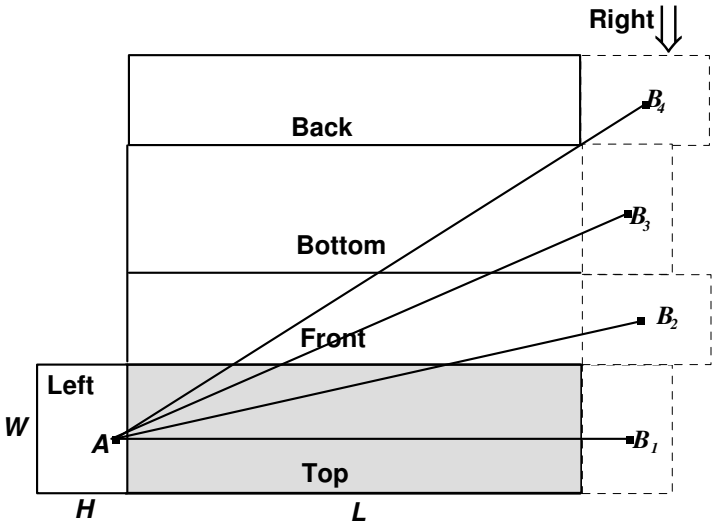
ANSWERS

A) _____units D) _____

B) _____ E) _____

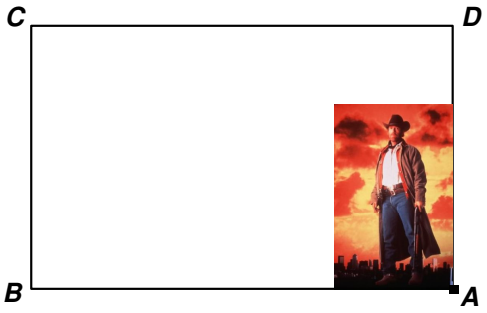
C) _____feet/min F) _____

A) The diagram at the right illustrates possible templates for a rectangular solid (a box) with dimensions $L = 58$, $W = 20$ and $H = 12$. The six faces of the box are marked accordingly. Point A is located on the left face 1 unit from the top and halfway between the front and back. Point B should be located on the right face 1 unit from the bottom and halfway between the front and back. The right face in this template could be attached in any one of four possible positions, as indicated. Position B appropriately on the possible right faces and compute the shortest possible length of $\overline{AB}$.



B) The hypotenuse c in right ΔABC has length 10. $\overline{CN}$ is an altitude and $\overline{CM}$ is a median. Let P and Q denote the areas of ΔACB and ΔCNM respectively and let $h = CN$. If h is an integer, compute all possible <u>rational</u> values of $\frac{P}{Q}$.

C) Walker Texas Ranger (Chuck Norris) travels in a rectangular path, *clockwise* <u>starting at A</u>, completing a distance of 1320 feet in 12 minutes.



<u>*We are also given the following facts*</u>:

$2AB = 3BC$

His velocity v is uniform between any two consecutive vertices and $v_{AB} : v_{BC} : v_{CD} : v_{DA} = 1 : 2 : 4 : 40$

Compute Walker's velocity between D and A in feet per minute.