MASSACHUSETTS MATHEMATICS LEAGUE
JANUARY 2004
ROUND 5: SIMILAR POLYGONS

ANSWERS

A) 62.1

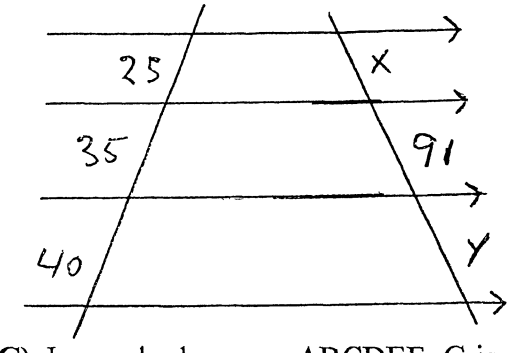
B) $x = 65,\ y = 104$

C) $(\sqrt{3} - 1) : 1$

A) There are two solid cubes made of the same material where the edge of one cube is three times the edge of the other. If the smaller cube weighs 2.3 grams, calculate to the nearest tenth, the weight of the larger cube.

$\frac{w}{2.3} = \frac{27}{1}$ $\quad w = 2.3(27) = 62.1$

B) In the figure shown, lines k, l, m, and n are parallel, with transversal segment lengths given. Calculate the sum of the lengths of segments x and y.

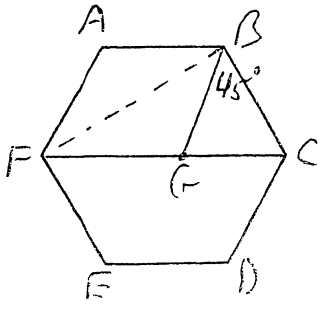


$\frac{91}{35} = \frac{13}{5}$

$x = \frac{25}{1} \cdot \frac{13}{5} = 65$

$y = \frac{40}{1} \cdot \frac{13}{5} = 104$

C) In regular hexagon ABCDEF, G is on $\overline{FC}$ so that $\angle CBG = 45^0$. Calculate in simple radical form, the ratio of $\overline{GC}$ *to* $\overline{CB}$.



$\angle FBC = 90^\circ$, so $\angle FBG = 45^\circ$, and BG is an $\angle$ bisector. Call $BC = 1$, Then $BF = \sqrt{3}$, and $FC = 2$. $FG = GC\sqrt{3}$ so $GC\sqrt{3} + GC = 2$, so $GC = \frac{2}{\sqrt{3}+1} = \sqrt{3} - 1$