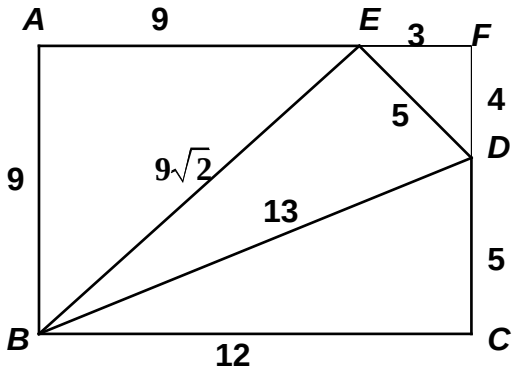
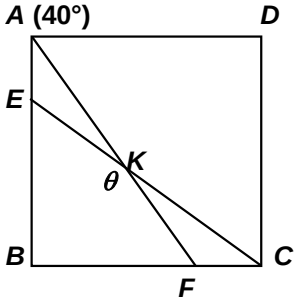
MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2012 SOLUTION KEY

Round 6



A) "Completing" the rectangle, we recognize two common right triangles, 3-4-5 and 5-12-13.
The required value is $\left(13+9\sqrt{2}\right)-9=\underline{\mathbf{4+9\sqrt{2}}}$.

B) The sum of the degree-measures of the 5 angles in any pentagon = (5 – 2)180 = 540.
Thus, in *P*, we have $2x^2+(13x+100)+120+170=540$.
$\Leftrightarrow 2x^2+13x-150=0$
$\Leftrightarrow (2x+25)(x-6)=0 \Leftrightarrow x=-\frac{25}{2},\ 6$
$x=-\frac{25}{2}$ is rejected, because (13*x* + 100) becomes negative.
$x=6 \Rightarrow$ 36, 36, 178, 120, 170 $\Rightarrow$ largest sum = **348**.



C) Let $m\angle EKF=\theta°$. $m\angle AFB=50°$
AE = *CF* $\Rightarrow$ *BE* = *BF*.
Since $\Delta BEC \cong \Delta BFA$ (SAS), $m\angle BCE=40°, m\angle BEC=50°$
Thus, θ = 360 – 90 – 2(50) = **170**.