

**MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 2 – NOVEMBER 2008 SOLUTION KEY**

Round 6

- A) $360/n = 4.5 \rightarrow n = 80$ and the sum of the interior angles is determined by $180(n - 2)$.
 $180(78) = \underline{14040}$

- B) $x = 49 \rightarrow y = 49$

As vertical angles, $m\angle 3 + m\angle 4 = y$.

Since $m\angle 3 = m\angle 4$, $m\angle 4 = y/2$.

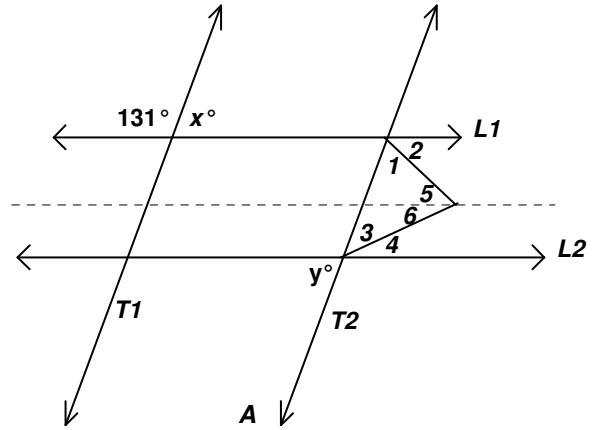
$m\angle 1 + m\angle 2 = 180 - y \rightarrow m\angle 2 = 90 - y/2$

Draw a line through the vertex of the angle whose measure is z° parallel to L_1 .

As alternate interior angles of lls,

$m\angle 2 = m\angle 5$ and $m\angle 4 = m\angle 6$.

Thus, $z = y/2 + (90 - y/2) = 90$ and $y + z = \underline{139}$



- C) By the triangle angle bisector theorem, $\frac{BD}{DC} = \frac{AB}{AC}$.

Since $\triangle DEF \sim \triangle DAC$, $\frac{FE}{AC} = \frac{DF}{DC}$.

Using $BD = DF$, we have $\frac{FE}{AC} = \frac{BD}{DC}$

Using transitivity, we have a third proportion $\frac{FE}{AC} = \frac{AB}{AC}$.

Since the denominators are equal, we have $FE = AB = \underline{7}$.

No computations were necessary!

