MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2011 ANSWERS

Round 1 Trig: Right Triangles, Laws of Sine and Cosine

A) $\dfrac{17}{13}$

B) 108

C) $\dfrac{3}{2}$

[3, 6, 9, 12, 15, 18, 21 and 24]

Round 2 Arithmetic/Elementary Number Theory

A) 49

B) 20,871

C) 1101111

Round 3 Coordinate Geometry of Lines and Circles

A) 13

B) $2\sqrt{7}$

C) $X(9, 0)$ $Y\left(0, -\dfrac{27}{4}\right)$

Round 4 Alg 2: Log and Exponential Functions

A) $\left(-1, \dfrac{1}{4}\right)$

   or equivalent

B) 2.5, $\dfrac{1}{2}\sqrt{17}$

C) $\dfrac{30k+1}{10k}$

Round 5 Alg 1: Ratio, Proportion or Variation

A) $(-6, -12)$

B) 2.5 gal

C) 2012

Round 6 Plane Geometry: Polygons (no areas)

A) 87

B) 120

C) 160

Team Round

A) (4, 3, 1)

D) $1+\sqrt{2}$

B) 1 : 15

E) 611

C) (17, 14), (17, 6), (9, 14), (9, 6)

F) 170