

**MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 3 - DECEMBER 2013 ANSWERS**

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

- A) $4\sqrt{3}$ B) $\frac{63}{65}$ C) 150

Round 2 Arithmetic/Elementary Number Theory

- A) 61 B) 2019 C) 2013

Round 3 Coordinate Geometry of Lines and Circles

- A) $\left(-\frac{8}{15}, 4\right)$ B) $A\left(-\frac{1}{2}, -\frac{5}{2}\right) B\left(\frac{7}{2}, -\frac{5}{2}\right)$ C) $(x-3)^2 + (y+2)^2 = 20$

Round 4 Alg 2: Log and Exponential Functions

- A) ± 1.25 B) $x = b^{\frac{60}{13}}$ C) $2 + \sqrt{17} - \sqrt{5}$

Round 5 Alg 1: Ratio, Proportion or Variation

- A) 94 B) $\left(-\frac{4}{3}, 4\right)$ C) $\frac{3R}{5}$ (or $\frac{3}{5}R$ or $0.6R$)
(The zero is not required.)

Round 6 Plane Geometry: Polygons (no areas)

- A) 22.5 B) $36 \leq 36 \leq 108$ C) $\frac{23+4\sqrt{3}}{4}$

(or equivalent)
(Accept A) and B) with or without the degree symbol.)

Team Round

- A) 306 D) $\frac{1}{10,000}$
- B) 1 and 6 only E) $\frac{4}{3}, \frac{5}{3}$
- C) $\frac{133}{8}$ (or 16.625) F) 153