

**MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2015
ROUND 1 VOLUME & SURFACES**

ANSWERS

A) _____

B) _____ : _____

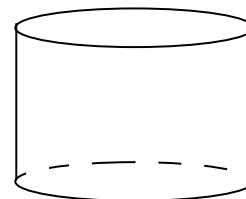
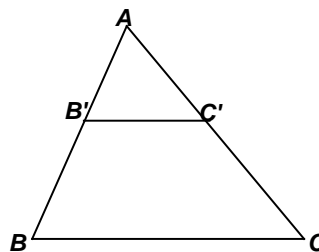
C) _____

- A) A sphere with integer radius r has a volume greater than a cube with a side of length 8.
Determine the smallest possible value of r .
Assume $\pi \approx 3.1416$.

- B) Given: $\overline{B'C'} \parallel \overline{BC}$ and $B'C' = \frac{1}{3}BC$

The radius of the base of a right circular cylinder is $\frac{7}{8}$ of the altitude of $\triangle AB'C'$. The base of $\triangle AB'C'$ is $\frac{5}{4}$ of the radius of the right circular cylinder.

Find the ratio of the area of a base of the cylinder to the area of $\triangle ABC$.



- C) Assume an underground storage tank is a cylinder 72 inches long and 36 inches wide, capped on each end by a hemisphere of radius 18 inches. Assume there are exactly 7.5 gallons of water in a cubic foot. In terms of π , compute the maximum number of gallons of water this tank will hold. Leave your answer in terms of π .