Math Problems
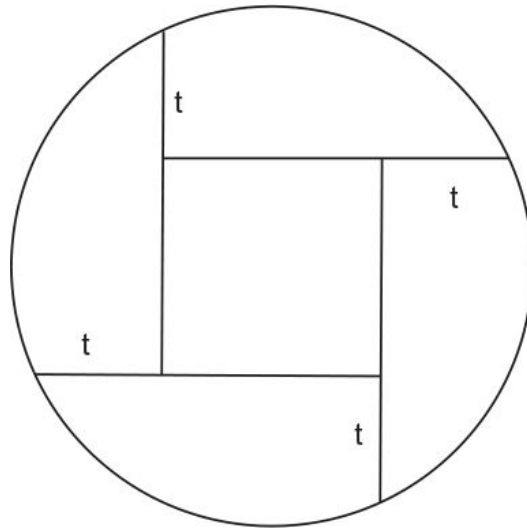
Four lines of length t divide a circle of radius r into five regions with equal, one of which is a square as depicted in the figure below. Compute the length t in terms of the radius r of the circle.

As shown in the figure below, an equilateral triangle with side length t, a square with side length s and a circle touch each other in a right triangle ABC with the length of BC = a. Compute the ratio t/a.
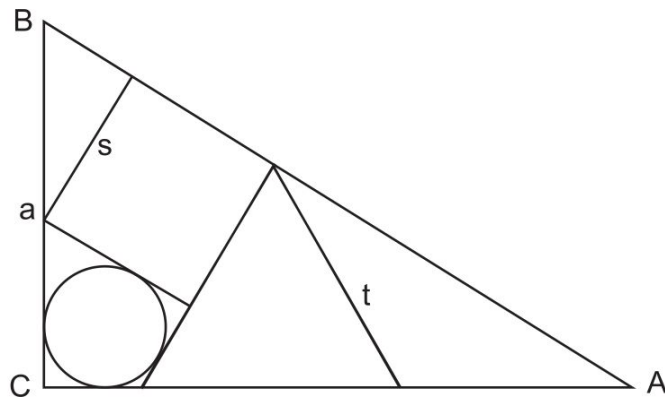
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Place balloons (white circles) and iron balls (black circles) in the cells according to the following rules:
1. Each region delineated by bolded lines must have exactly one balloon and one iron ball.
2. Balloons are light and float, so they must be placed in the top row or have a black cell or balloon in the cell directly above them.
3. Iron balls are heavy and sink, so they must be placed in the bottom row, or have a black cell or iron ball in the cell directly below them.