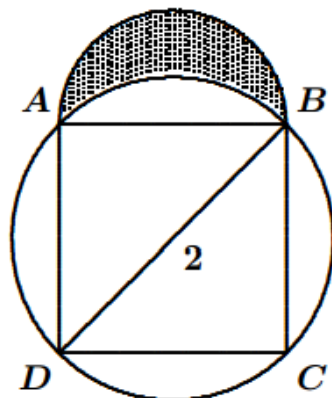


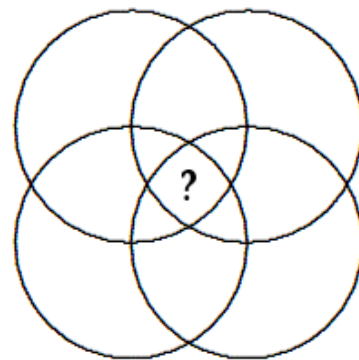
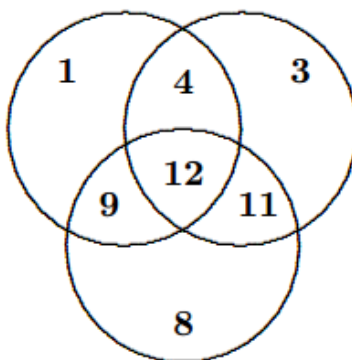
INTRODUCTORY PROBLEMS

The following are genuine math *problems*. When we take up these problems we'll make an important distinction between *problems* and *exercises*. In the meantime, enjoy the challenges!

1. The square $ABCD$ is inscribed in a circle with diameter BD of length 2. If AB is the diameter of the semicircle on top of the square, what is the area of the shaded region?

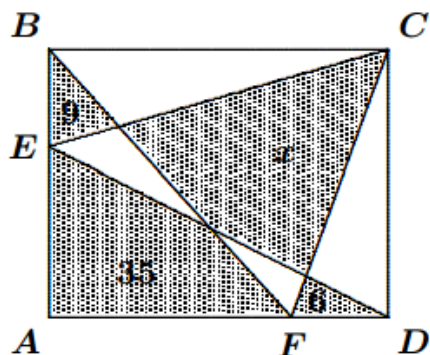


2. Values are assigned to some circles and these values are written in the circles. When two or more circles overlap, the sum of the values of the overlapping circles is written in the common region. In the example on the left below, the three circles have been assigned the values 1, 3, and 8. Where the circles with value 1 overlaps the circles with value 3, we write 4 ($= 1 + 3$). In the region in the middle, we add all three values and write 12.



In the figure on the right above are four circles and thus, thirteen regions. Find the number in the middle if the sum of all thirteen numbers is 294.

3. The line segments DE , CE , BF , and CF divide the rectangle $ABCD$ into several smaller regions. Four of these, two triangles and two quadrilaterals, are shaded in the figure below. The areas of the four shaded regions are 9, 35, 6, and x (see the figure). Determine the value of x .



4. The 20th edition of the Swedish Junior High School Mathematics Contest was held in 2008 and the first qualification round was held in 1988, a span of twenty-one calendar years, 1988-2008. The table at the right has room for only eighteen of them. Which three years must be omitted if the digit sum in every row is to be 20? (Two solutions exist.)