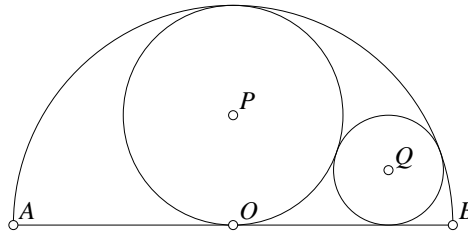


Russian-Style Circle Problems

- Let $S = \{11, 13, 14, 15, 17, 27, 28, 29, 36, 51\}$. Five distinct integers are chosen from S whose product is 2137590. Compute their sum.
- A palindromic number is an integer whose decimal expansion reads the same backwards as forwards. For example, 6, 232 and 4579754 are palindromes. Let S be the set of 15-digit positive integers from which an integer is chosen at random. Find the probability that that integer is a palindrome.
- If $A = (a, a^2)$, $B = (b, b^2)$, $C = (c, c^2)$ and $D = (d, d^2)$ are four points on the parabola $y = x^2$ then:
 - Compute the area of the triangle ABC .
 - Show that if a, b, c and d are integers, then the area of the quadrilateral $ABCD$ cannot be equal to 8.
- Compute $\sqrt{(11111111111)(1000000000005) + 1}$.
- Let AB be the diameter of a semicircle centered at O . P is the center of a circle tangent to the semicircle and to AB . Q is the center of a circle tangent to the circle centered at P , the semicircle, and AB as in the figure below. If the length of AO is 1, what is the radius of the circle centered at Q ?



- If A, B, C, \dots, Z are 26 variables, and:

$$\begin{aligned}
 A + B &= 1 \\
 B + C &= 2 \\
 C + D &= 3 \\
 &\dots \\
 X + Y &= 24 \\
 Y + Z &= 25
 \end{aligned}$$

compute the value of $A + Z$.