

6. The center of a circle of radius 4 is located at the center of a square table with side 16. A coin with radius $1/8$ is randomly thrown onto the table. What is the probability that the coin comes to rest on the boundary of the circle?

7. Find the value of

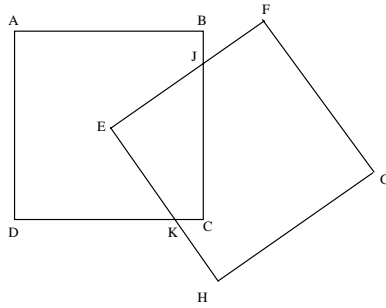
$$\frac{3}{(1 \cdot 2)^2} + \frac{5}{(2 \cdot 3)^2} + \frac{7}{(3 \cdot 4)^2} + \frac{9}{(4 \cdot 5)^2} + \cdots + \frac{2001}{(1000 \cdot 1001)^2}$$

8. Two candles of equal length start burning at the same time. One of the candles will burn in 4 hours, and the other in 5 hours. How long *in hours* will they have to burn before one candle is 3 times the length of the other?

9. Three integers form a geometric progression. Their sum is 21 and the sum of their reciprocals is $\frac{7}{12}$. Find the largest integer.

10. There are eight men in a room. Each one shakes hands with each of the others once. How many handshakes are there?

11. Two squares (shown below), each with side 12, are placed so that a corner of one lies at the center of the other. Find the area of quadrilateral **EJCK** if **BJ** = 4.



12. In a 10-team baseball league, each team plays each of the others 18 times. The season ends, not in a tie, with each team the same number of games ahead of the following team. What is the greatest number of games that the last team could have won?

13. Find the unique pair of real numbers (x, y) such that $(4x^2 + 6x + 4)(4y^2 - 12y + 25) = 28$.

14. A man and his grandson have the same birthday. For six consecutive birthdays the man is an integral number of times as old as his grandson. How old is the man at the sixth of these birthdays?

15. In the product $9 \cdot \text{HATBOX} = 4 \cdot \text{BOXHAT}$, find the six-digit number BOXHAT .

16. If n is an even integer, express in terms of n the number of solutions in positive integers of $2x+y+z = n$.

17. A sequence is defined by $x_1 = 2$ and $x_{n+1} = \frac{x_n}{1+x_n}$ for all $n \geq 1$. Find $x_{10,000}$.

18. If $a = \frac{x}{x^2+y^2}$ and $b = \frac{y}{x^2+y^2}$, find $x+y$ in terms of a and b . Express your answer as a common fraction.