

Huddle 2008

1. Evaluate $1 - 2 + 3 - 4 + 5 - \dots + 2007 - 2008$.

Solution: $(1 - 2) + (3 - 4) + (5 - 6) + \dots + (2007 - 2008)$ is the sum of (-1) exactly 1004 times, so the sum is -1004 .

2. Let N be the number of digits in 2^{2008} , in the usual decimal notation. How many digits has N ?

Solution: $2^{2008} < 2^{3 \cdot 670} = 8^{670} < 10^{670}$ and $2^{2008} > 2^{10 \cdot 200} = 1024^{200} > 10^{3 \cdot 200} = 10^{600}$. Since $10^{600} < 2^{2008} < 10^{670}$, $601 \leq N \leq 670$, so N has 3 digits.

3. Ann and Bob are going to play a game. Ann chooses a number from 1 to 10. Bob then adds a number from 1 to 10 to Ann's number, and announces the sum. The players then alternate adding a number from 1 to 10 to the previously announced number. The player who says "100" wins. In order to win, what number should Ann choose for her first move?

Solution: Ann should choose "1." From then on, if Bob adds x , Ann's next choice should be to add $11 - x$, so the sequence of numbers she announces will be 1, 12, 23, 34, 45, 56, 67, 78, 89, 100. If Ann doesn't choose 1, Bob can choose 12 and the rest of the same sequence.

4. Find the area inside the hexagon. Write the answer in the form $a + b\sqrt{2}$, for integers a, b .

Solution: The required area is $1 + \sqrt{2}$.

