1 Adding and Multiplying (mod n)

1. Alicia needs to find $3456+823 \pmod{10}$. Instead of adding $3456+827$, she adds $6+3$. Why does this work?

2. Benjamin wants to calculate $32+67 \pmod{6}$. Instead of adding $32+67$, he adds $2+1$. Why does this work?

3. Carrie wants to calculate $8035+9372 \pmod{2}$. What two smaller numbers could she add instead?

4. Diego needs to find $37 \times 55 \pmod{9}$. What two smaller numbers could he multiply instead?

5. How can you find $35 \times 35 \pmod{36}$ in the laziest way possible?

6. Compute these sums. Hint: you don't need to do a lot of arithmetic.
   (a) $423+577 \pmod{10}$
   (b) $56+89 \pmod{10}$
   (c) $892+9823 \pmod{5}$
   (d) $944+741 \pmod{9}$

7. Compute these products. Hint: be lazy.
   (a) $4893 \times 49024 \pmod{10}$
   (b) $3982734 \times 2398739 \pmod{10}$
   (c) $78 \times 23 \pmod{5}$
   (d) $3874 \times 3284 \pmod{9}$

8. Fill out the addition and multiplication table for arithmetic mod 8.

$+_8$	0	1	2	3	4	5	6	7
0								
1								
2								
3								
4								
5								
6								
7								

$\cdot_8$	0	1	2	3	4	5	6	7
0								
1								
2								
3								
4								
5								
6								
7								

Do you notice any patterns in either of these two tables?