1. Show that $gcd(a, b) = gcd(a, b + na)$ for all integers n.

2. What are the possible values of $gcd(a, a + 2)$?

3. What are the possible values of $gcd(a, a + 3)$?

4. What are the possible values of $gcd(a, a + 4)$?

5. Prove that $2 \mid n^2 - n$ for all positive integers n.

6. Prove or disprove: If $a^3 \mid b^2$ then $a \mid b$.

7. Prove or disprove: If $n \mid ab$ and $gcd(n, a) = 1$, then $n \mid b$ (this is one of your homework problems).

8. Prove that if a, b, c, d are integers with $gcd(a, b) = 1$, $gcd(c, d) = 1$, and $\dfrac{a}{b} + \dfrac{c}{d}$ is an integer, then $b = d$.