UW Math Circle
January 30, 2014

1. Use the Euclidean Algorithm to find $\gcd(13, 41)$. If you had one egg timer that measures 13 minutes, and one egg timer that measures 41 minutes, how could you use them together to measure 1 minute? How about 3 minutes?

2. Show that if a and b are digits $(0 - 9)$ and $a + b$ is divisible by 7, then so is the three-digit number aba.

3. There is a bank whose only currency comes in units of 3 math fun bucks and 5 math fun bucks. For which numbers n is it possible to get n math fun bucks from the bank?

4. If a and b are odd integers and $n \geq 1$, show that $a^3 - b^3$ is divisible by 2^n if and only if $a - b$ is divisible by 2^n.

5. Is it possible to form two numbers using the digits 3, 4, 6, 7 (for example, 33434767 and 7636) so that one of the numbers is 57 times the other?