

SchoolNova, Math 5c
Homework 2
More Numbers, Factorials, Divisibility Tests
September 24, 2017

1 Assignment

1. Use divisibility tests to determine if 12345 divisible by 3? by 5? by 9? by 11?
2. What is the remainder when $1 + 41 + 441 + 4441$ is divided by 4?
3. *Twin primes* are primes of the form $(p, p + 2)$ which differ by 2. Some examples are (a) (5, 7) (b) (11, 13). List 3 more pairs of twin primes.
4. Let us define primes of the form $(p, p + 2, p + 4)$. An example is (3, 5, 7). Are there any other primes of this form? Explain.
5. Consider the product of all numbers from 1 to 25: $1 \times 2 \times \dots \times 24 \times 25$. How many 3s are there in the prime factorization of this number?
6. Said Anne to Betty: “If you give me one marble, we will each have the same number of marbles.”
Said Betty to Anne: “If you give me one marble, I will have twice as many marbles as you will have.”
How many marbles did Anne have (before the exchange)?
- 7.* List the integers $100!$, 100^{100} , 2^{100} and $(50!)^2$ in order of increasing size. Explain your answer.
- 8.* Jane claims that if you take any two-digit number, write a zero after it, and then write the original number so that you get a five-digit number, then the result will always be a multiple of 7. For example, if your original number is 17, then the five-digit number is 17017. Is she right? Can you explain why?