

1. (5 points) Fill in the five missing numbers so that the list below is of the first 30 prime numbers written in increasing order.

____, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, ____, 59
61, 67, 71, 73, 79, 83, ____, ____, 101, 103, 107, 109, ____

2. (6 points) To determine whether or not $10^{12} + 1$ is prime, the *Prime Number Test* indicates that one only needs to check if it is divisible by primes up to which amount below?

(a) 100 (b) 1000 (c) 10,000 (d) 100,000 (e) 1,000,000 (f) 10,000,000

3. (6 points) Which one of the following numbers is prime?

(a) 153 (b) 155 (c) 157 (d) 159 (e) 161

4. (7 points) What is the value of $LCM(12, 20)$?

5. (6 points) Suppose that p is a prime number between 100 and 200 and that q is a prime number between 300 and 500. What is the value of $GCF(10 \times p^2, 12 \times q)$?

- (a) 0 (b) 1 (c) 2 (d) $p^2 \times q$ (e) $2 \times p^2 \times q$ (f) $120 \times p^2 \times q$

6. (6 points) Two positive integers a and b satisfy $GCF(a, b) = 1$ and $a \times b = 3000$. Compute the value of $LCM(a, b)$.

For the next two problems, when using the black and red chips model for arithmetic, we will use \bullet for each black chip (+) and \circ for each red chip (-).

7. (6 points) What integer is represented by the following sets of chips?

$\circ \circ \circ \circ \circ \bullet \bullet$

8. (5 points) Carefully explain or carefully sketch how one could use the black and red chips model to show that $1 - 4 = -3$.

9. (7 points) Write the fraction $\frac{3^6 \times 5^5}{3^8 \times 5^4}$ in lowest terms.
10. (7 points) Write one rational number which is between the numbers $\frac{2}{3}$ and $\frac{3}{4}$.
11. (7 points) Draw fraction bars which demonstrate that $\frac{2}{3} = \frac{4}{6}$.
12. (6 points) Use the fact that there are 100 centimeters in a meter. If a square has an area of 50 square meters (m^2), then what is its area in square centimeters (cm^2) ?
- (a) 0.005 (b) 0.5 (c) 50 (d) 500 (e) 50,000 (f) 500,000 5,000,000

13. (6 points) Which one of the following numbers can be written as a terminating decimal?

(a) $\frac{12}{1440}$

(b) $\frac{23}{1440}$

(c) $\frac{34}{1440}$

(d) $\frac{45}{1440}$

14. (7 points) Use any method to rewrite the number $0.\overline{04} = 0.04040404\dots$ as a simplified fraction.

15. (7 points) Determine the sum of the infinite geometric series below.

$$5 + \frac{5}{2} + \frac{5}{4} + \frac{5}{8} + \dots$$

16. (6 points) What is the approximate value of the quantity $0.32987352654 \times 454.719727786$?

(a) 15

(b) 90

(c) 150

(d) 210

(e) 225

(f) 1350