



Math Olympiad and Problem Solving Programs
E230 - Advanced Math Competitions
Problem Set 7.1 - AMC 8 Number Theory Solutions

Name:

Date:

1. B. $\lfloor \frac{46}{3} \rfloor + \lfloor \frac{46}{5} \rfloor - \lfloor \frac{46}{15} \rfloor = \boxed{21}$.
2. C. There are more factors of 5s than 2s. Thus, $8 \times 8 \times 8 = 2^9$ and there are 9 zeros.
3. E. Calculate the remainder of each number we have $2 \cdot 1 \cdot 2 \cdot 1 = \boxed{4}$.
4. B. $\frac{4}{37} = 0.\overline{108}$. 100 divided by 3 leaves a remainder of 1. Thus, the digit is the first digit in the pattern, which is 1.
5. A. 47 is an odd number. Thus, one of the primes must be 2. There will be only one way to do it.
6. D. The digit zero can only occur in tens and units digits. Thus, we have $2 \times 9^2 = \boxed{162}$ numbers.
7. A. 9 is not a prime, but $9 - 2 = 7$ is a prime.
8. A. $6545 = 5 \times 7 \times 11 \times 17 = 77 \times 85$. Thus, $77 + 85 = \boxed{162}$.
9. D. The remainder pattern is 4, 1, 4, 1, ... Since 2000 is even, the remainder is 1.
10. A. $9999 \dots 99 \times 4444 \dots 44 = (10^{95} - 1) \times 4444 \dots 44 = 4 \times 435 \times 56$ where there are 93 4s and 93 5s. Thus, the number is $4 \times 93 + 3 + 5 \times 93 + 6 = \boxed{846}$.