



Intermediate Math Circles Contest Preparation II

The following questions come from the Problem Set Generator on the CEMC website. The answers are found at the end of the second page. To find a solution you can go to CEMC Past Math Contests page and find the appropriate contest mentioned in the question.

1. How many positive whole numbers, including 1 and 18, divide exactly into 18?

- (A) 3 (B) 4 (C) 5 (D) 6 (E) 7

(Source: 2006 Pascal (Grade 9), #3)

Primary Topics: **Number Sense**

Secondary Topics: **Divisibility**

2. When three consecutive positive integers are multiplied together, the answer is always

- (A) odd (B) a multiple of 6 (C) a multiple of 12 (D) a multiple of 4
(E) a multiple of 5

(Source: 2009 Cayley (Grade 10), #8)

Primary Topics: **Number Sense**

Secondary Topics: **Divisibility**

3. How many of the four integers 222, 2222, 22 222, and 222 222 are multiples of 3?

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

(Source: 2013 Cayley (Grade 10), #4)

Primary Topics: **Number Sense**

Secondary Topics: **Divisibility**

4. The time on a cell phone is 3:52. How many minutes will pass before the phone next shows a time using each of the digits 2, 3 and 5 exactly once?

- (A) 27 (B) 59 (C) 77 (D) 91 (E) 171

(Source: 2013 Pascal (Grade 9), #10)

Primary Topics: **Number Sense**

Secondary Topics: **Digits**

5. When 100 is divided by 12, the remainder is 4. When 100 is divided by a positive integer x , the remainder is 10. When 1000 is divided by x , the remainder is

- (A) 10 (B) 100 (C) 0 (D) 1 (E) 90

(Source: 2011 Cayley (Grade 10), #18)

Primary Topics: **Number Sense**

Secondary Topics: **Divisibility**



6. The digits 1, 2, 5, 6, and 9 are all used to form five-digit *even* numbers, in which no digit is repeated. The difference between the largest and smallest of these numbers is

- (A) 83916 (B) 79524 (C) 83952 (D) 79236 (E) 83016

(Source: 2005 Pascal (Grade 9), #16)

Primary Topics: **Number Sense**

Secondary Topics: **Digits | Divisibility**

7. In the subtraction shown, K , L , M , and N are digits. What is the value of $K + L + M + N$?

$$\begin{array}{r} 6\ K\ 0\ L \\ -\ M\ 9\ N\ 4 \\ \hline 2\ 0\ 1\ 1 \end{array}$$

- (A) 17 (B) 18 (C) 19
(D) 23 (E) 27

(Source: 2011 Pascal (Grade 9), #17)

Primary Topics: **Number Sense**

Secondary Topics: **Digits | Operations**

8. How many four-digit positive integers x are there with the property that x and $3x$ have only even digits? (One such number is $x = 8002$, since $3x = 24006$ and each of x and $3x$ has only even digits.)

- (A) 82 (B) 84 (C) 86 (D) 88 (E) 90

(Source: 2007 Pascal (Grade 9), #25)

Primary Topics: **Number Sense**

Secondary Topics: **Digits**

9. For each positive integer n , define $S(n)$ to be the smallest positive integer divisible by each of the positive integers $1, 2, 3, \dots, n$. For example, $S(5) = 60$. How many positive integers n with $1 \leq n \leq 100$ have $S(n) = S(n + 4)$?

- (A) 9 (B) 10 (C) 11 (D) 12 (E) 13

(Source: 2014 Cayley (Grade 10), #24)

Primary Topics: **Number Sense | Counting and Probability**

Secondary Topics: **Divisibility | Factoring | Counting**

10. There are n students in the math club at Scoins Secondary School. When Mrs. Fryer tries to put the n students in groups of 4, there is one group with fewer than 4 students, but all of the other groups are complete. When she tries to put the n students in groups of 3, there are 3 more complete groups than there were with groups of 4, and there is again exactly one group that is not complete. When she tries to put the n students in groups of 2, there are 5 more complete groups than there were with groups of 3, and there is again exactly one group that is not complete. The sum of the digits of the integer equal to $n^2 - n$ is

- (A) 11 (B) 12 (C) 20 (D) 13 (E) 10

(Source: 2016 Pascal (Grade 9), #22)

Primary Topics: **Number Sense**

Secondary Topics: **Divisibility**

Answers 1) D 2) B 3) C 4) D 5) A 6) A 7) A 8) A 9) C 10) B