Bergen County Mathematics League

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Part I *Time Limit:* 12 *minutes* Answers must be exact or have 4 (or more) significant digits, correctly rounded.

2-1. When Jerry played roulette, he spun the wheel 2016° *counterclockwise*. If he then wanted to reset the wheel to its position before spinning, at least how many degrees must he turn the wheel in the *clockwise* direction?

2-2. What is the area of the triangle whose vertices are at (10, 0), (0, 8), and (20, 16)?

Part II *Time Limit:* 12 *minutes*

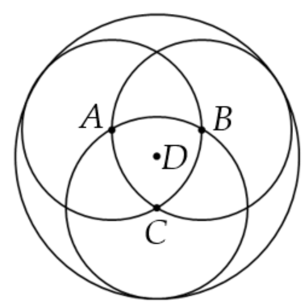
2-3. Jack picked an integer N from 100 to 999 inclusive. He then subtracted the sum of digits of N from N. What is the largest positive integer that must divide the result?

2-4. The first four terms of an increasing arithmetic sequence S are a, b, c, and d respectively. If $a + b + c + d = 20$ and $ad : bc = 2:3$, what is the value of a?

Part III *Time Limit:* 12 *minutes*

2-5. What are all integers a for which the solutions of $x^2 + ax + 12 = 0$ are integers?

2-6. Three congruent circles have centers A, B, and C, as shown, so that each circle passes through the centers of other two. A large circle with center D is externally tangent to each of the other three circles, as shown. If the length of a radius of circle A is 8, what is the length of a radius of circle D?



Answers

2-1. 216 or 216°

2-2. 120

2-3. 9

2-4. 2

2-5. -13, -8, -7, 7, 8, 13

2-6. $8 + \frac{8}{\sqrt{3}}$