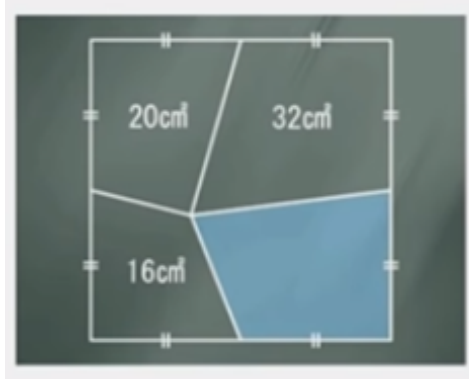


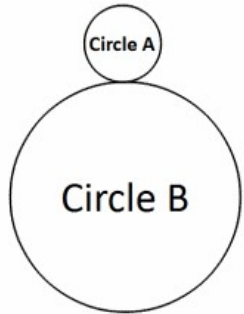
BGSU Mathematics Competition
April 2nd 2022 **B** (below Calculus II)

No cell phones are allowed. Show all your work. Justify your answers.

- (1) Find the shaded area.



- (2) Circle A has radius 1 and circle B has radius 3. Circle A rolls around circle B one trip back to its starting point. How many times will circle A revolve in total?



- (3) A palindrome number is a positive number that remains the same when digits are reversed. For example, the number 12321 is a palindrome number, but 1451 is not a palindrome number.
- How many 5 digit palindrome numbers can be formed?
 - How many 6 digit palindrome numbers can be formed?
 - How many n digit palindrome numbers can be formed?

- (4) Solve for x

$$\sin\left(\frac{5\pi x}{4}\right) = x^2 - 4x + 5.$$

(Hint: Complete the square on the RHS, and use the fact that $\sin(a)$ cannot be larger than 1)

- (5) Find the sum:

$$S = 2 - 7 + 12 - 17 + 22 - 27 + \dots + 2002 - 2007 + 2012 - 2017 + 2022.$$

- (6) You have programmed a robot to walk in a pattern by going 7 feet forward, followed by 8 feet backward and then followed by 4 feet forward. The robot continues this pattern in a straight line. If every foot of movement takes 1 second. How many seconds will it take before the robot reaches 1000 feet?
- (7) Suppose that a cows give b gallons of milk in c days. At this rate, how many gallons of milk will d cows give in e days?

(A) $\frac{bde}{ac}$ (B) $\frac{ac}{bde}$ (C) $\frac{abde}{c}$ (D) $\frac{bcde}{a}$ (E) $\frac{abc}{de}$

- (8) David drives from his home to the airport to catch a flight. He drives 35 miles in the first hour, but realizes that he will be 1 hour late if he continues at this speed. He increases his speed by 15 miles per hour for the rest of the way to the airport and arrives 30 minutes early. How many miles is the airport from his home?

Registration 2022 BGSU Mathematics Competition;**Your NAME:**

E-mail:

(Optional)

Math class you are taking this semester/year:

Name of your instructor(s):

1)

2)

3)

4)

5)

6)

7)

8)

Total: