

1. [Algebra, 3 Points]

For how many real values of x is $\sqrt{500 - \sqrt{2x}}$ an integer?

- A) 23 B) 22 C) 21 D) 20 E) 12

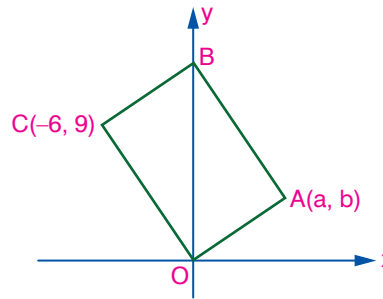
2. [Geometry, 3 Points]

In the given figure, OABC is a rectangle.

$C(-6, 9)$, and $A(a, b)$ are given.

OB is a diagonal on the y -axis.

What is sum of the coordinates of the point A?



- A) 8 B) 9 C) 10 D) 11 E) 12

3. [Combinatorics, 3 Points]

Two dice are rolled.

What is the probability that the product of the top two numbers is greater than their sum?



- A) $\frac{1}{2}$ B) $\frac{5}{9}$ C) $\frac{11}{18}$ D) $\frac{23}{36}$ E) $\frac{2}{3}$

4. [Number Theory, 3 Points]

When three-digit number **ABA** is divided by two-digit number **A1**, the quotient is 13 and the remainder is 19.

What is $A + B$?

- A) 8 B) 9 C) 10 D) 11 E) 12

5. [Algebra, 5 Points]

For the integers n and N ,

$$1 < n < 1000$$

$$\log_3(\log_2 n) = N$$

What is the sum of the possible values of n ?

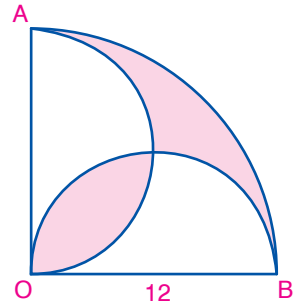
- A) 522 B) 512 C) 324 D) 266 E) 10

6. [Geometry, 5 Points]

In the given figure, O is the center of the quarter circle, \overline{AO} and \overline{OB} are the diameters of semicircles.

$OB = 12$ cm.

What is total area of the shaded regions?



- A) $(36\pi - 60)$ cm²
- B) $(36\pi - 80)$ cm²
- C) $(24\pi + 36)$ cm²
- D) $(36\pi - 72)$ cm²
- E) 32π cm²

7. [Number Theory, 5 Points]

How many sets of two or more consecutive positive integers have a sum of 153?

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

8. [Combinatorics, 5 Points]

Nine-digit numbers are formed using the digits 1, 2, 3, 4, 5, 6, 7, 8 and 9 without repetition. How many numbers can be written if 3 appears to the left and 1 appears to the right of 2?

- A) 2160
- B) 6480
- C) 32,450
- D) 42,560
- E) 60,480

9. [Number Theory, 7 Points]

In the sequence 2021, 2022, 2023, 2024, ... each term after the fourth is found by subtracting the previous term from the sum of the three terms that precede that term.

For example, the fifth term is $2021 + 2022 + 2023 - 2024 = 4042$.

What is the 14th term in this sequence?

- A) 68,610
- B) 34,315
- C) 18,173
- D) -10140
- E) -22,144

10. [Algebra, 7 Points]

The sum and the product of the solutions of a quadratic equation are 3 and 4, respectively. Which of the following is one of the solutions of the equation? ($i^2 = -1$)

- A) $\frac{3 + 4i}{2}$
- B) $\frac{3 + 5i}{2}$
- C) $\frac{3 + 2i}{2}$
- D) $\frac{3 + \sqrt{7}i}{2}$
- E) $\frac{3 + \sqrt{5}i}{2}$