

Section A. Each correct answer is worth 1 point.

1. Simplify: $20 \times 17 - 2^0 - 1^7$
2. In a month of 31 days, how many different days of the week occur 5 times during that month?
3. What is the smallest 3-digit prime number that contains only odd digits?
4. What is the percentage of multiples of 4 that end in 4?
5. Find the y-intercept of the line $x - 20 = 4(y + 17)$.
6. If 2017 is divided by the integer n , the quotient is 20 and the remainder is 17. What is the value of n ?
7. Evaluate and express your answer in simplest form (without !): $\frac{4! 7! 10!}{9! 8! 3!}$

Section B. Each correct answer is worth 2 points.

8. The equation $x^2 = 1$ has two solutions. The equation $x^2 = x$ also has two solutions. Find the sum of all four of these solutions.
9. The length of each side of an equilateral triangle is $2\sqrt{3}$. Find the exact area of that triangle.
10. If $\begin{bmatrix} y & -1 \\ 1 & x \end{bmatrix} \cdot \begin{bmatrix} 20 \\ 17 \end{bmatrix} = \begin{bmatrix} 23 \\ 88 \end{bmatrix}$, find the value of x .
11. The sequence $20, a, 17, b, \dots$ is an arithmetic progression. Find the value of $a + b$.
12. In the Fibonacci sequence $1, 1, 2, 3, 5, 8, 13, 21, \dots$, each term (starting with the third term) is found by adding the two previous terms ($1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5$, etc.) What is the value of the first term in this sequence that is larger than 2017?

Section C. Each correct answer is worth 3 points.

13. Solve this system of equations:
$$\begin{cases} a + b + c = 36 \\ 2a - c = 41 \\ 3b + c = 50 \end{cases}$$
14. Find the number that is $\frac{2}{3}$ the distance from $7\frac{2}{3}$ to $10\frac{1}{4}$. Express your answer as a mixed number in simplest form.
15. Simplify: $\frac{20-17i}{3+i} + 12.7 + 27.1i$

Section A. Each correct answer is worth 1 point.

- On your answer sheet, circle the letter of the one set which is not equal to the other four.
A) counting numbers B) whole numbers C) $\{1, 2, 3, 4, \dots\}$
D) natural numbers E) positive integers
- What name is given to the sum of the lengths of the sides of a polygon?
- Four consecutive odd integers have a sum of 1720. What is the largest of these four integers?
- Dakota's test scores are 75, 86, 82, and 77. On the next test, Dakota brought her average up 3 points. What score did Dakota get on that fifth test?
- Points A , B , and C lie on a circle. The measure of \widehat{AB} is 110° , and the measure of \widehat{BC} is 120° . Find the measure of $\angle ABC$.
- A water lily doubles itself in size every day. From the time the original plant was placed in a pond until the surface was completely covered took 30 days. How many days did it take for the pond to be half-covered?
- There are 435 students at Bluffton University. If the ratio of men to women is 2 to 3, how many women are at Bluffton?

Section B. Each correct answer is worth 2 points.

- How many of these expressions are equal to one-half of 4^{432} ?
A) 2^{432} B) 4^{216} C) 8^{288} D) 16^{216} E) $\frac{1}{2} \cdot 432^4$
- Shelli drove 20 miles from home to the Bluffton University Mathematics Contest in 30 minutes. To the nearest mph, what speed must she average *on her drive home* in order to average 45 mph for the *entire trip* to and from Bluffton?
- Define the operation \otimes to mean $a \otimes b = a^2 + 4ab + b^2 - 2b$. Find the value of $20 \otimes 17$.
- On a multiple-choice test, your grade is determined in this manner: Add 10 points for each question that you answer correctly, subtract 5 points for each question that you answer incorrectly, and you get 0 points for each question left unanswered. If there are 20 questions on the test, and you answered all of them and received a score of 155, how many correct answers did you have?
- One angle of a parallelogram contains 75° . If the adjacent sides are 20 and 17, find the area of the parallelogram to the nearest hundredth.

Section C. Each correct answer is worth 3 points.

- In a certain polygon, the sum of all the interior angles except one is 2017° . How many sides are in this polygon?
- Express in simplest form without any negative exponents: $\frac{(4a^{-2}b)^2c^{-3}d^{n+1}}{8a^3(b^{-1}c)^3d^{n-1}}$
- In a right triangle, 2017 is the length of the hypotenuse. If the difference in length between the legs is 1063, find the length of the longer leg.