1. Jane has 4 pears, 5 bananas, 3 lemons, 1 orange, and 6 apples. If she uses one of each fruit to make a fruit smoothie, what is the total number of fruits that she has left?

A) 13 B) 14 C) 16 D) 18 E) 19

- 2. Given that 2x + 7y = 3, find $2^{6x+21y-4}$. A) 4 B) 8 C) 16 D) 32 E) 64
- 3. What percent of the small squares are black in the following image?

A) 25 B) 50 C) 48 D) 30 E) 32

- 4. Compute the remainder when $\left(\frac{2^5}{2}\right)^5$ is divided by 5. A) 0 B) 1 C) 2 D) 3 E) 4
- 5. A box of strawberries, containing 12 strawberries total, costs \$2. A box of blueberries, containing 48 blueberries total, costs \$3. Suppose that for \$12, Sareen can either buy m strawberries total or n blueberries total. Find n m. A) 60 B) 110 C) 120 D) 180 E) 200
- 6. Ken has a six sided die. He rolls the die, and if the result is not even, he rolls the die one more time. Find the probability that he ends up with an even number.
 A) 1/3 B) 1/2 C) 2/3 D) 3/4 E) 5/6

- 7. To fold a paper airplane, Austin starts with a square paper FOLD with side length 2. First, he folds corners L and D to the square's center. Then, he folds corner F to corner O. What is the area of the resulting figure?A) sqrt(2) B) sqrt(3) C) 1 D) 1.5 E) 2
- 8. If the five-digit number 3AB76 is divisible by 9 and A < B < 6, what is B A? A) 1 B) 2 C) 3 D) 4 E) 5
- 9. Let N be the product of the first nine multiples of 19 (i.e. $N = 19 \times 38 \times 57 \times \cdots \times 152 \times 171$). What is the last digit of N? A) 0 B) 2 C) 4 D) 6 E) 8
- 10. A man who is 2 meters tall is standing 5 meters away from a lamppost that is 6 meters high. How long is the man's shadow cast by the lamppost, in meters?A) 1 B) 1.5 C) 2 D) 2.5 E) 5
- 11. An isosceles right triangle with legs of length 8 is partitioned into 16 congruent triangles as shown. The shaded area is



12. How many positive integers less than or equal to 1000 are divisible by 2 and 3 but not by 5?A) 100 B) 133 C) 166 D) 167 E) 200

- 13. Compute the smallest nonnegative integer that can be written as the sum of 2022 consecutive integers.A) 0 B) 1010 C) 1011 D) 2021 E) 2022
- 14. If a triangle has three altitudes of lengths 6, 6, and 6, what is its perimeter?A) 18 B) 6sqrt(3) C) 12sqrt(3) D) 9sqrt(2) E) 18sqrt(3)
- 15. It takes 3 rabbits 5 hours to dig 9 holes. It takes 5 beavers 36 minutes to build 2 dams. At this rate, how many more minutes does it take 1 rabbit to dig 1 hole than it takes 1 beaver to build 1 dam?A) 4 B) 6 C) 8 D) 10 E) 12
- 16. The trapezoid below has bases with lengths 7 and 17 and area 120. Find the difference of the areas of the two triangles.



A) 50 B) 60 C) 85 D) 90 E) 91

- 17. Rectangle ABCD has perimeter 178 and area 1848. What is the length of the diagonal of the rectangle?A) 61 B) 62 C) 63 D) 64 E) 65
- 18. On December 18th, 2022, Sally notices that her 7 children have ages which sum to a perfect square: their ages are 1, 3, 5, 7, 9, 11, and 13, with 1 + 3 + 5 + 7 + 9 + 11 + 13 = 49. Let N be the age of the youngest child the next year the sum of the 7 children's ages is a perfect square on January 18th, and let P be that perfect square. Find N + P.

A) 85 B) 92 C) 218 D) 322 E) 498

19. A tortoise is given an 80-second head start in a race. When Achilles catches up to where the tortoise was when he (Achilles) began running, he finds that while he is now 40 meters ahead of the starting line, the tortoise is now 5 meters ahead of him. At this point, how long will it be, in seconds, before Achilles passes the tortoise?

A) 5/4 B) 10/7 C) 2 D) 15/8 E) 25

20. In the diagram below, what is the value of $\angle DD'Y$ in degrees? The diagram may not be drawn to scale.



A) 81 B) 87 C) 90 D) 93 E) 99

- 21. Alice and Bob each pick a number from 1 to 10 at random. Given that Alice's number is a perfect square and Bob's number is prime, what is the probability that Alice's number is greater than Bob's number?A) 1/2 B) 2/3 C) 3/4 D) 2/5 E) 3/5
- 22. The base 4 repeating decimal $0.\overline{12}_4$ can be expressed in the form \overline{b} in base 10, where a and b are relatively prime positive integers. Compute the sum of a and b. A) 5 B) 7 C) 10 D) 15 E) 21

a

23. In a three by three grid of squares, determine the number of ways to select four squares such that no two share a side.A) 2 B) 4 C) 6 D) 8 E) 10

24. A unit square is rotated 45 degrees counterclockwise around one of its vertices, as shown. The area it sweeps out can be expressed as (a*pi+b)/c, where gcd(a,c)=1. Find a+b+c.



A) 5 B) 6 C) 7 D) 8 E) 9

25. Evaluate



(A)
$$\frac{\sqrt{3}}{2}$$
 (B) $\frac{1+\sqrt{5}}{2}$ (C) $\frac{2+\sqrt{3}}{2}$ (D) $\frac{3+\sqrt{5}}{2}$ (E) $\frac{3+\sqrt{13}}{2}$

Answers:

- 1. B
- 2. D
- 3. E
- 4. B
- 5. C
- 6. D
- 7. D
- 8. B
- 9. A
- 10. D
- 11. B
- 12. B
- 13. C
- 14. C
- 15. D
- 16. A
- 17. E
- 18. C
- 19. B

20. A	
21. A	
22. B	
23. C	
24. E	
25. B	