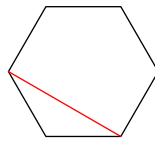


1. What is $1 - 2 + 3 - 4$?
(A) -2 (B) -1 (C) 1 (D) 4 (E) 9
2. What is the sum of all x that satisfy $|2x - 4| = 2$?
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5
3. A square with sides of length 6 has the same area as a rectangle with a length of 9. What is the width of the rectangle?
(A) 2 (B) $\frac{7}{3}$ (C) 3 (D) $\frac{10}{3}$ (E) 4
4. Which operation makes the following expression true: $(4 _ 1) \times (3 _ 2 - 1) = 2$?
(A) $+$ (B) $-$ (C) \times (D) \div (E) There is no such operation
5. In the regular hexagon shown below, how many diagonals are longer than the red diagonal?



- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4
6. If $a + 3b = 9$ and $a + 11b = 21$, what is the missing coefficient in the expression $2a + _b = 27$?
(A) 5 (B) 6 (C) 9 (D) 12 (E) 14
7. At a length of 104 miles, the Danyang-Kushan Bridge holds the title for being the longest bridge in the world. A car travels at a constant speed of 39 miles per hour across the Danyang-Kushan Bridge. How long does it take the car to travel across the entire bridge?
(A) 2 hours, 12 minutes (B) 2 hours, 20 minutes (C) 2 hours, 25 minutes
(D) 2 hours, 30 minutes (E) 2 hours, 40 minutes
8. Anna is buying fruits at a grocery store. If she loses a nickel, she still has enough money to buy exactly 16 lemons. Similarly, if she loses a quarter, she has enough money to buy exactly 14 lemons. What is the cost of each lemon?
(A) $\$0.05$ (B) $\$0.10$ (C) $\$0.15$ (D) $\$0.20$ (E) $\$0.25$
9. Which answer choice correctly fills the blank in the statement below?
"The probability of flipping heads on a fair coin is the equal to the probability of rolling a _____ on a fair dice."
(A) prime number (B) number divisible by 3 (C) number with four factors (D) 2 or 3 (E) 4

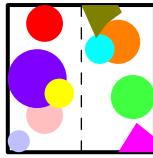
10. In the equation below, x is a nonzero real number such that

$$\frac{1}{729} (3^t) = 3^x.$$

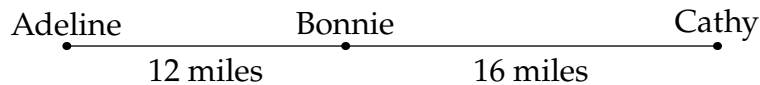
Which of the following is equal to t ?

- (A) $\frac{1}{6}x$ (B) $\frac{1}{3}x$ (C) $6x$ (D) $x - 6$ (E) $x + 6$
11. A *semi-palindrome* is a four-digit number whose first two digits and last two digits are identical. For instance, 2323 and 5757 are semi-palindromes, but 1001 and 2324 are not. What is the difference between the largest semi-palindrome and smallest semi-palindrome?
- (A) 7979 (B) 8080 (C) 8181 (D) 8484 (E) 8989
12. There are ten apples and p pears in a basket. Anna eats two apples, and she finds that there are now more pears than apples. She then eats four pears. After eating the pears, she notices that there are more apples than pears. What is the sum of all possible values of p ?
- (A) 19 (B) 28 (C) 30 (D) 42 (E) 45
13. Five cards numbered 1, 2, 3, 4, and 5 are given to Paige, Quincy, Ronald, Selena, and Terrence. Paige, Quincy, and Ronald have the following conversation:
- Paige: My number is between Selena's number and Quincy's number.
 - Quincy: My number is between Ronald's number and Terrence's number.
 - Ronald: My number is between Paige's number and Quincy's number.
- Who received the card numbered 3?
- (A) Paige (B) Quincy (C) Ronald (D) Selena (E) Terrence
14. Kylie randomly selects two vertices of a rectangle. What is the probability that the two chosen vertices are adjacent?
- (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{2}{3}$ (D) $\frac{5}{6}$ (E) 1
15. Given that $a > 2b$ and $b > 2c$ and a , b , and c are nonzero, which of the following statements must be true?
- (A) $a + b > c$ (B) $a - c > 0$ (C) $abc > 0$ (D) $\frac{a}{b} > 2$ (E) none of these

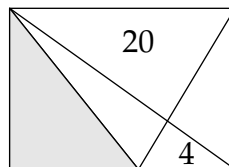
16. Masaru randomly paints 50% of the area of a square. What is the probability that at least 60% of the left side of the square is painted?



- (A) 25% (B) 30% (C) 35% (D) 40% (E) 45%
17. Adeline, Bonnie, and Cathy are walking along a long flat path, with their initial distances shown below.

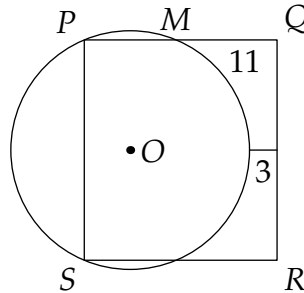


- Adeline and Bonnie walk towards each other at constant speeds of 1 and 2 miles per hour, respectively. Cathy walks in the same direction as Bonnie. If all three girls meet each other at the same time, what is Cathy's walking speed, in miles per hour?
- (A) 4 mph (B) 4.5 mph (C) 5 mph (D) 5.5 mph (E) 6 mph
18. The diagram below shows a rectangle and two triangles with areas 20 and 4. What is the area of the shaded triangle?



- (A) 12 (B) 14 (C) 16 (D) 18 (E) 20
19. Jane writes the numbers $\{1, 2, 3, 4, 5\}$. Jena picks 3 of the numbers, without replacement. What is the probability that their sum is odd?
- (A) $\frac{1}{10}$ (B) $\frac{1}{5}$ (C) $\frac{2}{5}$ (D) $\frac{1}{2}$ (E) $\frac{3}{5}$

20. In the diagram below, the circle centered at O has radii OP and OS with length 13. The rightmost point on the circle is 3 units away from QR , and $QM = 11$. What is the area of rectangle $PQRS$?



- (A) 144 (B) 252 (C) 336 (D) 504 (E) 672
21. What is the area of a triangle with side lengths $\sqrt{10001}$, $\sqrt{2504}$, and $\sqrt{2501}$?
- (A) 50 (B) 75 (C) 100 (D) 125 (E) 150
22. What is the value of
- $$\frac{1}{1(1 + \frac{1}{1})} + \frac{1}{1(1 + \frac{1}{2}) + 2(1 + \frac{1}{2})^2} + \frac{1}{1(1 + \frac{1}{3}) + 2(1 + \frac{1}{3})^2 + 3(1 + \frac{1}{3})^3} + \dots + \frac{1}{1(1 + \frac{1}{20}) + \dots + 20(1 + \frac{1}{20})^{20}}?$$
- (A) $\frac{10}{21}$ (B) $\frac{20}{21}$ (C) $\frac{21}{20}$ (D) $\frac{40}{21}$ (E) $\frac{41}{20}$
23. If m and n are positive integers such that $m^2 - n^2 = 2^{11}$, what is the sum of the possible values of m ?
- (A) 511 (B) 1023 (C) 1024 (D) 2047 (E) 2048
24. There are 1610 people sitting at a very large round table, each of whom is either a student or a teacher, but not both. It is known that 60% of the teachers are sitting to the left of a student, and two-thirds of the students are sitting to the right of another student. How many teachers are sitting at the table?
- (A) 545 (B) 560 (C) 575 (D) 590 (E) 605
25. Given that $N = 1248163264$ leaves a remainder of 64 when divided by 128, in how many ways can a digit of N be replaced with another digit so that 128 divides the new number?
- (A) 4 (B) 5 (C) 8 (D) 10 (E) 15