

1. If eleven riders on bicycles and tricycles and twenty-nine cycle wheels went by my house, how many bicycles and how many tricycles were there?
- (a) Two bicycles and nine tricycles
 - (b) Three bicycles and eight tricycles
 - (c) Four bicycles and seven tricycles
 - (d) Five bicycles and six tricycles
 - (e) Six bicycles and five tricycles
2. An equation of the perpendicular bisector of the line segment joining the points $(-3, 1)$ and $(5, 3)$ is given by
- (a) $x + 4y = -2$
 - (b) $4x - y = -6$
 - (c) $x - 4y = -2$
 - (d) $-4x - y = -6$
 - (e) $4x + y = -6$
3. If a country's population increases by a factor of 10 every 400 years, how many months does it take for the country's population to double?
- (a) 80
 - (b) $\sqrt{80}$
 - (c) 960
 - (d) 1024
 - (e) None of the above
4. Let A be a square with side length 2 and let B be the square inscribed in A formed by joining the midpoints of the sides of A . The area of a circle inscribed in B is
- (a) 2π
 - (b) π
 - (c) $\frac{\pi}{2}$
 - (d) $\frac{\sqrt{2}}{2}\pi$
 - (e) $\frac{\pi}{4}$

5. What day would yesterday be if Tuesday were five days before the day after tomorrow?
- (a) Monday
 - (b) Tuesday
 - (c) Wednesday
 - (d) Thursday
 - (e) Friday
6. If the sum of five consecutive numbers is 30, what is their product?
- (a) 6,720
 - (b) 720
 - (c) 1,000
 - (d) 15,120
 - (e) None of the above
7. If x/y is the reduced fraction that equals $43.121212\dots$, then $x + y$ equals
- (a) 485
 - (b) 1456
 - (c) 4302
 - (d) 4368
 - (e) None of the above
8. Bob's room is square and Pete's room is rectangular (but not square). Pete's room measures 5 feet less on one side than Bob's, 4 feet more on the adjacent side, and has an area of 360 square feet. What is the difference in the areas of the two rooms?
- (a) 1 square foot
 - (b) 36 square feet
 - (c) 40 square feet
 - (d) 104 square feet
 - (e) None of the above

9. Which of the following numbers is equal to $\sqrt[4]{8}\sqrt[5]{4}$?
- (a) $\sqrt[9]{32}$
 - (b) $2\sqrt[20]{16}$
 - (c) $2\sqrt[20]{8}$
 - (d) $\sqrt[9]{12}$
 - (e) None of the above
10. If X and Y are the midpoints of the sides AB and AC , respectively, of a triangle and the length of the line segment joining X and Y is 24, what is the length of side BC of the triangle?
- (a) 9
 - (b) 12
 - (c) 36
 - (d) 48
 - (e) 72
11. What is the least number of cards that satisfy the following conditions?
- If all of the cards are put into five equal piles, there is one card left over.
 - If all of the cards are put into seven equal piles, there is one card left over.
 - If all of the cards are put into eleven equal piles, there is one card left over.
- (a) 36
 - (b) 78
 - (c) 385
 - (d) 3081
 - (e) None of the above
12. Find the reciprocal of the positive difference of the reciprocals of the two greatest one-digit primes.
- (a) $2/15$
 - (b) $15/2$
 - (c) $2/35$
 - (d) $35/2$
 - (e) None of the above

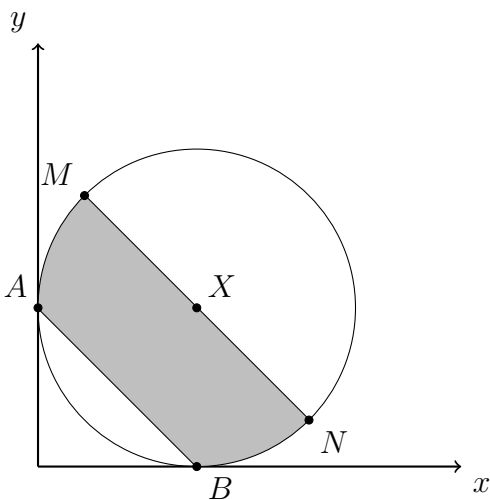
13. How many positive even integers less than 1,000 can be written using each of the digits 2, 3, 4, or 5 exactly once?
- (a) 12
 - (b) 18
 - (c) 20
 - (d) 42
 - (e) 48
14. Two lights blink with frequencies of 60 and 75 blinks per minute. If the lights blink together once, how many seconds will it take before the lights blink together again?
- (a) 2
 - (b) 4
 - (c) 5
 - (d) 7.5
 - (e) None of the above
15. If the hypotenuse of an isosceles right triangle is $18\sqrt{2}$ feet, what is the area of the triangle in square feet?
- (a) 124
 - (b) 144
 - (c) 152
 - (d) 162
 - (e) 172
16. The first two terms in a sequence are $x_1 = 7$ and $x_2 = 8$. Each new term after these is the ratio of the previous two: $x_{n+1} = x_n/x_{n-1}$. What is the eighth term of the sequence?
- (a) $\frac{1}{7}$
 - (b) 7
 - (c) $\frac{1}{8}$
 - (d) 8
 - (e) $\frac{8}{7}$

17. The solution set of the equation $\frac{x^2 + 2x}{x^2 - 4} - \frac{2}{x - 2} - \frac{2x + 4}{x + 2} = 0$ is
- (a) $\{2\}$
 - (b) $\{-2, 2\}$
 - (c) All real numbers
 - (d) All real numbers except -2 and 2
 - (e) No real solutions
18. I have some change (pennies, nickels, and dimes) in my pocket. Fourteen of the coins are dimes, 25% are nickels, and five-ninths of them are pennies. What is the total value of my change?
- (a) \$2.46
 - (b) \$2.54
 - (c) \$2.70
 - (d) \$2.84
 - (e) None of the above
19. One zip weighs as much as three zaps. Two zaps weigh as much as five zowwies. Three zowwies weigh as much as two swooshes. If one swoosh weighs sixty pounds, how many pounds does one zip weigh?
- (a) 40 pounds
 - (b) 60 pounds
 - (c) 100 pounds
 - (d) 300 pounds
 - (e) 640 pounds
20. Let $f(x) = x^5 - x^4 - 15x^3 + 25x^2 + 14x - 24$. Assuming that $f(x)$ has five distinct real roots, what is the sum of their squares?
- (a) -1
 - (b) 1
 - (c) 15
 - (d) 31
 - (e) 38

21. The sum of the first 100 positive odd numbers is
- (a) 2,500
 - (b) 5,050
 - (c) 9,000
 - (d) 10,000
 - (e) 10,201
22. How many zeros appear at the end of the product of the first twenty-three natural numbers?
- (a) 0
 - (b) 1
 - (c) 2
 - (d) 3
 - (e) 4
23. Let A , B , and C be the points $(3, 1)$, $(7, -3)$, and $(5, 1)$ respectively. If $\triangle XYZ$ is the triangle whose vertices are the midpoints of the sides of $\triangle ABC$, then the shortest side of $\triangle XYZ$ has length
- (a) $\sqrt{2}/2$
 - (b) 1
 - (c) $\sqrt{5}$
 - (d) $2\sqrt{2}$
 - (e) None of the above
24. If the parabola $y = ax^2 + bx + c$ has vertex $(2, -2)$ and crosses the x -axis at $x = 3$, then what is $ac - b$?
- (a) -4
 - (b) 4
 - (c) 20
 - (d) 24
 - (e) 36

25. The circle given by the equation $x^2 + y^2 - 6x - 6y + 9 = 0$ is tangent to the coordinate axes at the points A and B . The segment MN is parallel to the segment AB and passes through the center X of the circle. The area of the shaded region in the figure below is

- (a) $\frac{9}{2}(\pi - 2)$ (b) $\frac{9}{4}(\pi - 2)$ (c) $\frac{9}{2}(\pi + 2)$ (d) $\frac{9}{4}(\pi + 2)$ (e) None of the above



26. For real numbers x and y , define $x \odot y = x^2 - y$. Let a , b , and c be real numbers such that $a \odot (b \odot c) = 3$, $b \odot (c \odot a) = 1$, and $c \odot (a \odot b) = -2$. Then $a + b + c$ equals
- (a) 0
 (b) 1
 (c) 2
 (d) 3
 (e) None of the above

27. The simplest form of the fraction

$$\frac{\left(\frac{a-b}{a} - \frac{a+b}{b}\right)}{\left(\frac{a-b}{b} + \frac{a+b}{a}\right)}$$

is given by

- (a) 1
 - (b) -1
 - (c) $a + b$
 - (d) $a - b$
 - (e) None of the above
28. Pete loaned \$7 to Bob. But Pete borrowed \$15 from Emma and \$32 from Gus. Moreover, Gus owes \$3 to Emma and \$7 to Bob. One day they got together to straighten out their accounts. Which person left with \$18 more than they came with?
- (a) Pete
 - (b) Bob
 - (c) Emma
 - (d) Gus
 - (e) None of the above
29. The twenty-third prime number is
- (a) 71
 - (b) 73
 - (c) 79
 - (d) 83
 - (e) 89
30. A class consists of 18 boys and 22 girls. The average weight of the boys is 110 pounds and the average weight of the girls is 90 pounds. How many pounds does the average student in the class weigh?
- (a) 90 pounds
 - (b) 99 pounds
 - (c) 101 pounds
 - (d) 110 pounds
 - (e) None of the above