



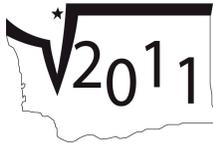
Instructions: Problems 1 – 10 are multiple choice and count towards your team score. Bubble in the letter on your answer sheet. Be sure to erase all mistakes completely.

- Which of the following points lies on the line that passes through the points with coordinates $(3, 4)$ and $(1, 0)$?
A. $(2, 3)$ B. $(-3, -8)$ C. $(5, 6)$ D. $(-2, -3)$ E. $(-1, 8)$
- If the point with coordinates $(-2, 3)$ is reflected across the x -axis and then across the y -axis, in what quadrant does the point now lie?
A. I B. II C. III D. IV
- If Aaron is taller than Bal, Chris is shorter than Darrel, and Bal is shorter than Chris, which person is the tallest?
A. Aaron B. Bal C. Chris D. Darrel E. Cannot be determined
- Suppose that your parents just purchased a used car that will lose 10% of its value each year from when they bought it. How many years after the original purchase will it be first valued at half or less of its original value?
A. 2 B. 5 C. 6 D. 7 E. 10
- If a is a prime number, which of the following statements is always true?
A. $a + 1$ is even B. $a + 2$ is prime C. $2a + 2$ is not prime
D. a^2 is prime E. $a + 1$ is not prime
- In how many distinct ways can you sum three distinct positive integers to get 9?
A. 3 B. 4 C. 7 D. 9 E. 16
- Which of the following lines is perpendicular to the line $3x + y = 2$?
A. $3x + y = -2$ B. $y = 3x - 2$ C. $3y - x = 2$
D. $y = -\frac{1}{3}x$ E. $-3x - y = -2$
- How many unique non-empty subsets of the set $\{1, 2, 3, 4, 5\}$ contain only prime numbers?
A. 0 B. 3 C. 4 D. 5 E. 7
- Which of the following has the greatest number of faces, edges, and vertices in total?
A. cube B. sphere C. cylinder D. square pyramid E. tetrahedron
- What is the product of 2.9×10^8 and 3.7×10^{-22} ?
A. 1.073×10^{-13} B. 1.073×10^{30} C. 7.6×10^{-14}
D. 7.6×10^{30} E. 1.073×10^{-14}



Problems 11 – 30: Bubble in your answers on the answer sheet. Be sure to erase all mistakes completely. You do not need to bubble in leading zeros – the answer of “7” does not need to be answered as “007”. If your answer is a fraction like $\frac{3}{16}$, bubble in 316.

11. Suppose that the probability that you will drop a penny on the ground is $\frac{1}{5}$, and the probability that you will find a penny on the ground today is $\frac{1}{4}$. If the two events are independent, what is the probability that at least one of the two events will occur? **Express your answer as a percent.**
12. Sophia, a bookworm, loved books so much that she filled her bookcase with 40 books on each shelf. After noticing that the shelves were starting to bend, she decided to buy another smaller bookcase that had 4 shelves. When she distributed all of her books equally between all of the shelves on the two bookcases, there were 24 books on each shelf. How many shelves were on her original bookcase?
13. In a poll of a group of 200 parents, 55 said they have secretly watched Hannah Montana, 30 said they secretly watched iCarly, and 25 said they have secretly watched both Hannah Montana and iCarly. How many parents have watched neither Hannah Montana nor iCarly?
14. Sitting in front of you is a locked safe containing \$1,000,000. If you know that the five digits in the code to unlock the safe are 2, 3, 3, 8, and 9, how many unique codes are possible?
15. If a rectangular prism has a width of 12 inches, a length of 5 inches, and a height of 12 inches, what is the surface area, in square inches, of the prism?
16. In order to win a new set of computers for their classroom, twenty students in a class needed to read an average of at least 6 books. Among the first 16 students, the average number of books read was 4 books per person. What is the least number of books, on average, that each of the last four students has to have read in order to win the computers?
17. Suppose you have 7 unique books that need to be placed on a shelf. Three of the books are mathematics books, and you want to keep those as a group, but you do not care about the order of the other books. How many different arrangements are possible?
18. Start with the sum of the positive odd integers less than 2000, then take the square root, and finally, subtract the least common multiple of 9 and 11. What is the resulting number?
19. Suppose you have five straight sticks whose lengths are 2 inches, 5 inches, 7 inches, 9 inches, and 10 inches. Using any three sticks as the three sides, how many unique triangles could you create?
20. What is the sum of all integer values of x that satisfy the inequality: $|4x - 4| \leq 8$?



21. What is the next term in the following arithmetic sequence? **Express your answer as a reduced fraction.**

$$\frac{5}{9}, \frac{19}{36}, \frac{1}{2}, \frac{17}{36}, \frac{4}{9}, \dots$$

22. What is the distance between the point with coordinates (2, -3) and the point with coordinates (-3, 2)? **Express your answer to the nearest tenth.**

23. What is the value of the expression $x + y + z$ based on the following system of equations?

$$2x + 6y - z = -7$$

$$-x - y + z = 9$$

$$8x - 3y - 2z = -6$$

24. If the surface area of a cube is decreased by 7%, by what percentage is the volume decreased? **Express your answer to the nearest whole percent.**

25. For what positive integer value of b will the equation $4x^2 + bx + 9 = 0$ have exactly one real solution?

26. Suppose that a 4-inch by 8-inch piece of paper is rolled up so that the two 4-inch sides meet with no overlap. If a circular top and bottom were fitted in order to complete the cylinder, what is the volume, in cubic inches, of the cylinder? **Express your answer to the nearest cubic inch.**

27. In baseball, a player's batting average is determined by dividing the number of hits by the number of at-bats. Suppose Ichiro Suzuki's batting average over his first 200 at-bats was 0.350. What is the minimum number of at-bats that he would need to have in order to reach a 0.400 batting average?

28. What is the distance between the point with coordinates (0, 0) and the vertex of the parabola given by $y = 2x^2 - 8x + 7$? **Express your answer to the nearest tenth.**

29. A group of eight friends, made up of 5 girls and 3 guys, are lining up at a dance to take a group picture. For their goofy picture, they decided to line up in random order. What is the probability that there will be a guy on both ends of the line? **Express your answer as a reduced fraction.**

30. What is the area of the triangle defined by the following inequalities?

$$y \leq 2x + 2$$

$$y + 3x \leq 42$$

$$y \geq 6$$