PSE 2025 Grade 6 Problem Set

Instructions: You will have 60 minutes to complete 30 questions. Your answer is the number of problems you get correct. Only answers written on the provided answer sheet will be graded. This is an individual test; anyone caught talking with others will have their score disqualified. You are allowed a pencil/pen/writing utensil and scratch paper, which will be provided. Calculators, compasses, rulers, protractors, formula sheets, and the Internet are not allowed.

Solve as many problems as you can. Good luck, and have fun!

1. Every day, John eats two potatoes. If a month has 31 days, then he eats 3 potatoes on only the last day. How many potatoes does he eat in a non-leap year?
2. What is the value of $2 + 0 + 2 + 5 \times 2 - 0 + 2 - 5$?
3. Presidents Obama, Trump, and Biden are giving speeches. They started at 3:51 PM. Obama's speech was 42 minutes long, Trump's speech was 32 minutes long, while Biden's speech was 68 minutes long. At the end of all their speeches, what time is it?
4. Student council elections are happening! 375 kids voted for one of 2 candidates, X and Y. All students voted. If X got 135 more votes than Y, what percent of the kids voted for X?
5. Bob is ordering ice cream. He has 10 flavors and 4 toppings to choose from. If an order consists of 1 flavor and a maximum of 2 toppings, how many different orders does Bob have?
6. What is the largest prime factor of 3570?
7. Some edges of a regular cube are painted green such that every face of the cube has at least 1 green edge. What is the minimum amount of painted edges needed to satisfy this requirement?
8. On the number line of integers, compute the sum of all whole numbers that have a distance from 93 that is twice their distance from 42.
9. How many different ways are there to rearrange the letters of the word "COLOR"?
10. Aprameya is biking to his Tetris competition 12 miles away from his house. He starts biking at 6:30 in the morning at a pace of 18 mph. However, he gets a flat tire halfway there and has to run the rest of the way. If the competition starts at 8:02, what is the slowest speed Aprameya could run at and still make it in time?
11. A rope has a length of 50 centimeters. How many different locations to cut the rope are there such that the two pieces of the rope have lengths that are both prime numbers?
12. Find the greatest N where $1 + 3 + 5 + 7 + \cdots + N < 2025$.
13. A square and an equilateral triangle have the same area. Find the ratio of the side length of the square to the side length of the triangle.
14. Mason has 4 pencils of length 3, 4, 10, and x inches, where x is a positive integer. How many values of x are there such that Mason's pencils can form a quadrilateral?
15. John is failing his English class! He is currently averaging 61% after taking 8 tests. He needs a 70% to pass the class, and he only has 3 more tests. What mark does he need to average over the last 3 tests in order to pass the class?

16. Let $\text{LCM}(9, x) = 225$. Find the sum of all possible x.

17. What is the probability of getting a sum divisible by 3 when rolling 2 dice?

18. John is tiling a floor that is 8 feet by 10 feet. He has access to 2×2 in, 4×4 in, and 12×12 in tiles, which cost \$0.75, \$2.25, and \$24.50, respectively. If John chooses the option that costs him the least money, how much will he pay to tile his floor?

19. A Pythagorean number is defined as a positive integer of the form $a^2 + b^2$, where a and b are positive integers. What is the largest Pythagorean number less than 200?

20. In triangle ABC, the incircle is tangent to sides AB, BC, and CA at points P, Q, and R, respectively. If AB = 13, BC = 14, and CA = 15, find the radius of the incircle.

21. After winning the Tetris tournament, Aprameya is competing in a trivia contest. There are 6 problems, of which Aprameya solves at least 3 of them. How many different combinations of problems solved does Aprameya have?

22. A circle is inscribed in a quadrilateral ABCD such that it is tangent to sides AB, BC, CD, and DA at points P, Q, R, and S, respectively. If AB = 10, BC = 15, and CD = 12, find the length of DA.

23. A movie theater contains 10 rows, with each row having 20 seats. If Aahan and his pet cow pick two different seats from the movie theater at random, what is the probability that they will be sitting in the same row or same column? Express your answer as a fraction reduced to lowest terms.

24. Let r, s, t be the roots of the cubic polynomial $P(x) = x^3 - 6x^2 + 11x - 6$. Find the value of $r^2s + s^2t + t^2r$.

25. Consider triangle ABC with vertices $A(1, 2)$, $B(4, 5)$, and $C(7, 1)$. Let triangle $A'B'C'$ be the reflection of triangle ABC over the line $y = x$, shifted down 3 units. Find the area of the hexagon $AC'BCB'A'$.

26. Adrian's Market sells mangoes for \$3, mustard for \$5, and for \$7. If Steven has \$67, how many ways can he spend all of his money? (He does not need to buy at least one of each item.)

27. Alvin is on the XYZ plane, and he starts at $(0, 0, 0)$. He picks 3 random cards from a deck numbered 1–10. He goes the value of the first card in the x direction, the value of his second card in the y direction, and the value of his last card in the z direction. Then, he measures the distance from his starting point. If the expected value of the square of his distance from the origin can be represented as X, find $2X$.

28. Aldric and Jophy are shooting free throws. They each take turns shooting, and give the basketball to the other person when they miss. The game ends when one player makes 3 shots in a row. If Aldric has a 3/4 chance of making a shot, Jophy has a 2/3 chance of making a shot, and Jophy starts, find the probability that Jophy wins the game.

29. Eric and Aldric are playing a game on an infinite triangular lattice, alternating turns with Eric moving first. Every move consists of choosing some edge and coloring it either red or blue. If there exists a cycle of uniform color, Aldric wins. In how many total moves can Aldric guarantee that he can win? If he cannot, submit -1.

30. Joseph said, "My dad's age has an odd number of factors." John replied, "That's not enough information," so Joseph added, "My dad's age does not have a prime number of factors." Still, John asked for another hint. Joseph, fed up, exclaimed that "Twice my dad's age is not a multiple of 3!" "Aha!" says John, "I know his age now!" What is the age of Joseph's dad?