PSE 2025 Grade 5 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. 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?

2. Aldric is trying to deliver pizza to 5 different houses. How many paths can he take to deliver all the pizzas if he needs to go to each house exactly one time?

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. What is the largest prime divisor of 3570?

5. A triangular number is defined as a number that can be represented as $1 + 2 + 3 + \dots$ as long as needed. For example, 10 is a triangular number because $10 = 1+2+3+4$. Find the largest triangular number that is less than 100.

6. 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?

7. In a group of animals, 40% are cats, $\frac{1}{4}$ are dogs, and the remaining 18 are birds. How many animals are there in total?

8. 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?

9. Sales are happening across the HSN store! Every item has a 20% price decrease. Jill buys two shirts worth \$26 each and a hat worth \$18. If she pays a sales tax of 10% at the end of her purchase, how much did she spend?

10. Find the sum of the number of edges, vertices, and faces of a pyramid with a hexagonal base.

11. 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.

12. 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?

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

14. $N!$ is defined as being $n(n-1)(n-2)\cdots 2 \cdot 1$. Find the remainder when $1! + 2! + \cdots + 9!$ is divided by 9.

15. Parker collects shapes. He has 83 shapes in his collection, each of them being either a pentagon or a nonagon. If his shapes have 587 sides in total, find the number of pentagons that he has.

16. An arithmetic series of positive integers has 9 terms and a sum of 2025. What is the smallest possible value of any member of the series?

17. A 100 digit number is made up of only 1's and 0's. If the number is divisible by 9, find the difference between the maximum and minimum number of 0's in the number.

18. 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?

19. 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?

20. The value of 111^2 is 12321. Find the value of 111111^2.

21. Parallelogram JKLM has 3 vertices, not necessarily in order, at (0,0), (5,0), and (4,5). Find the absolute difference between the areas of the largest parallelogram and smallest parallelogram possible.

22. Suppose the mean of the set $\{3, 4, 6, 7, 10, 11, 14, 16, x\}$ is two less than the median. Find the sum of all possible values of x.

23. 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?

24. Adrian's Market sells mangoes for \$3, mustard for \$5 and Tótya 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.)

25. A perfect magic square is a 3×3 grid where every row, column, and diagonal has the same sum. If the center number is 5, and the grid contains the numbers 1–9, find the sum of the two largest numbers in the corners.

26. Into how many pieces do the functions $y = x$, $y = x^2 - x + 1$, and $x^2 + y^2 = 9$ cut the coordinate plane into?

27. 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?

28. A number is called lucky if apart from itself and 1, it has only 7 divisors. How many lucky numbers are less than 1,000?

29. 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.

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?