PSE 2025 Grade 4 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. What is the remainder when 103 is divided by 9?

2. Evaluate $2 \cdot 0 + 2 \cdot 5$.

3. Jenny sleeps for the same amount of time each day. If she slept for 4 hours and 19 minutes last week, how much time does she sleep per day (in minutes)?

4. A regular, 6-sided die is rolled. What is the probability (in fraction form) that the number is prime?

5. In inches, how much larger is 3 yards than 2 feet?

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

7. Benny carries only quarters, dimes, and pennies. What is the least amount of coins that he needs to make 80 cents?

8. 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?

9. Find the sum of all the prime numbers less than 20.

10. A number leaves a remainder of 3 when divided by 7, and a remainder of 2 when divided by 5. What is the smallest positive such number?

11. In a sequence, the first term is 2, and each term is 3 more than the previous. What is the 15th term?

12. 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?

13. Let $a@b$ equal $\text{lcm}(a, b) + \gcd(a, b)$. Find $(((12 \,@\, 18) \,@\, 6) \,@\, 64)$.

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

15. On January 1st, a Wednesday, John cut his lawn. He then cut his lawn every 20 days after that. He ends up cutting his lawn twice in October. Find the sum of the dates that he cut his lawn on in October.

16. A diagonal is a line connecting two vertices of a shape that is not a side of the shape itself. How many diagonals does a regular heptagon have?

17. Arjun has sticks of length 2, 3, 5, 6, 8, and 10. How many distinct triangles can he make by using the sticks as the sides of the triangle?

18. $N!$ 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.

19. 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.

20. 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.

21. The CEO of a company is choosing an executive board of 6 people. He can choose from 5 managers and 4 workers. Due to their experience, there must be strictly more managers than workers on the board. If each of the managers and workers are indistinguishable (meaning that they are different from each other), how many ways can the executive board be chosen?

22. An arithmetic sequence is a sequence where the difference between two adjacent numbers is the same. For example, 1, 3, 5, and 7 is arithmetic because the difference is 2. If the first term of an arithmetic sequence is 24 and the last term is 60, how many possible arithmetic sequences exist?

23. A pizza is cut with 8 straight cuts. Considering that slices don't need to be the same size, what is the maximum amount of pieces that can be made?

24. A square is drawn in a circle with radius 12 such that each vertex of the square is on the circle. Find the area of the square.

25. Anna, Ben, Chris, and Dana each are either telling the truth or lying.

> Anna: "Ben and Dana are lying!"
> Ben: "Exactly 2 of us are telling the truth!"
> Chris: "Anna is telling the truth!"
> Dana: "Ben is telling the truth!"

How many of them are lying?

26. Each corner of a cube is labeled with a number from 1–8, without repeats. Find the smallest difference between the product of the top half numbers and the product of the bottom half numbers.

27. Two people are playing rock, paper, and scissors. Player A only throws rock and scissors, each with equal probability, while Player B can choose any action with equal probability. If they play 2 games, what is the probability that player A wins 1 game and player B wins 1 game?

28. 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?

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

30. 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.