1. **Water Pouring Puzzle.** You have a 3-gallon jug and a 5-gallon jug, neither of which have any markings. Can you pour water between the two jugs to get exactly 4 gallons of water in the 5-gallon jug?

2. **Stone Weighing Puzzle.** You have 9 identical-looking stones. One of them is slightly heavier and contains a valuable jewel. You also have a balance scale. Can you figure out which stone contains the jewel using only two weighings on the scale?

3. **Grid Tiling Puzzle.** Take a $4 \times 4$ grid, and remove the two opposite corner squares. Can you cover the remaining squares with non-overlapping dominoes that each cover two adjacent squares?

4. **String Burning Puzzle.** You have two pieces of string, each of which will burn for exactly one minute, but not uniformly along its length. How can you use them to measure 45 seconds?

5. **Party Puzzle.** How many people must you invite to a party to ensure that either three of them all know each other, or three of them all don’t know each other?

6. **Three Utilities Puzzle.** Can three houses each be connected to three utility buildings (gas, water, and electricity) so that none of the lines cross?

7. **Peg Jumping Puzzle.** You have 15 pegs arranged in a $4 \times 4$ grid. You can jump a peg over an adjacent peg horizontally or vertically, and then remove the peg you jumped over. Can you get down to only one peg?

8. **Necklace Designing Puzzle.** In how many ways can four distinct beads be arranged on a string to make a necklace? (Two necklaces are the same if one can be moved around in space to look like the other.)

9. **Snow Plowing Puzzle.** In a $5 \times 5$ city grid, a snow plow makes a path through the city, plowing the road in front of it as it goes. What’s the smallest number of city blocks the plow needs to traverse more than once to plow all the streets?

10. **Queens Domination Puzzle.** How many queens do you need place on an $8 \times 8$ chessboard to attack every square?

11. **Orchard Planting Puzzle.** Can you plant 8 trees so that you have 7 rows of three trees each?

12. **Chicken Nuggets Puzzle.** McDowell’s fast food restaurants sell chicken nuggets in boxes of 5 and 8. Verify that you can’t buy exactly 12 nuggets. What quantities of nuggets can you buy?
13. **Sitting and Standing Puzzle.** Four people are sitting in a row. They win the game if they all stand up. The following moves are allowed:

- Person 1 can stand or sit at any time.
- Person 2 can stand or sit only if person 1 is sitting.
- Person 3 can stand or sit only if person 2 is sitting and person 1 is standing.
- Person 4 can stand or sit only if person 3 is sitting and the others are standing.

Can they win the game?

14. **Find the Leak Puzzle.** Three of the mayor’s nine advisors are telling state secrets to the press. The mayor devises a list of false secrets to tell her advisors. She will tell different groups of advisors the false secrets, and use the information of which secrets get printed in the newspaper to figure out which of her advisors are leaking the information. The reporters won’t print the stories unless they get confirmation from all three advisors (so if the mayor tells only two of them a false secret, it won’t get printed). The goal is to find the leakers telling as few false secrets as possible, and printing as few as possible. How well can she do?

15. **Tip the Die Puzzle.** Alice and Benicio play the following game with a six-sided die. They start with the die on a flat table, with the 1 side up. Players alternate turns tipping the die along an edge to an adjacent side, and adding the result to the current total. A player wins if she gets a total of exactly 22, or forces the other player above 22. Does one of the players have a winning strategy?

16. **Egg Drop Puzzle.** You live in a 15-story building, and you want to know which floors are safe to drop eggs from, and which floors will cause the eggs to break. You only have 2 eggs. You know that:

- Any egg which survives a fall can be reused.
- Any egg which breaks cannot be reused.
- If an egg breaks, it would have broken from a larger height.
- If an egg survives, it would have survived from a smaller height.
- The first floor might already be too high, or it could be that the 15th floor might still be safe.

What is the smallest number of egg-droppings that is guaranteed to work?

17. **Piling Dice Puzzle.** How many 6-sided dice can you arrange so that they all touch each other?

18. **Dissected L Puzzle.** Make an L-shape out of three squares, then cut the L-shape into four identical pieces.
19. **Sensor Beam Puzzle.** A hexagonal room has 6 exterior walls and 2 interior walls. Each interior wall is constructed from one corner of the hexagon to another, straight through the interior of the room. You are standing outside the room. Your job is to determine where the interior walls are using sensor beams. You can project a sensor beam through the center of an exterior wall to the center of another exterior wall, and it will tell you how many interior walls it intersects along the way. How many sensor beams do you need to determine where the interior walls are?

20. **Coin Predictor Puzzle.** You have a robot coin flipper which will flip a coin so that it always lands heads, but it has a virus, so that exactly one in every three flips it will make the coin land tails instead. You are betting an unsuspecting friend that the coin will land heads each time. You start with $100, and you can decide how much to bet each time. How much can you make in three bets?

21. **Sequence Solitaire Puzzle.** Diana plays a game of solitaire with the following rules. She starts with one pile of six cards. On each turn she takes one card from all the piles she has and makes a new pile with them. Will she at some point during the game make six piles of one card each?

22. **Elevator Stops Puzzle.** An apartment building has 4 elevators which each stop at 3 different floors, and it’s possible to travel from any floor to any other floor without switching elevators. How many floors can the building have?

23. **Cops and Robbers Puzzle.** Two cops and one robber are moving on a $5 \times 5$ city grid. On each turn, first each cop moves along a single street to a neighboring corner, then the robber does. Players are allowed to stay still, and multiple cops are allowed to occupy the same corner at the same time. The cops win if either of them catches the robber. The robber wins if she can avoid getting caught indefinitely. Can the cops catch the robber?

24. **Fire Station Placement Puzzle.** In a $5 \times 5$ city grid, we place a number of fire stations at the corners of the grid. What’s the fewest fire stations we need to have every house in the city no more than 2 blocks away from a fire station?

25. **Coloring Game Puzzle.** Aliyah and Bob alternate color the squares of a $3 \times 3$ chessboard red, blue, or green, with the rule that two adjacent squares can’t be the same color. Alice wins if they finish coloring the board, and Bob wins if they get stuck and can’t finish. Can Bob win the game?

26. **Tetris Enclosing Puzzle.** Using two of each of the different Tetris pieces, what’s the largest amount of empty area you can enclose?

27. **Patio Planting Puzzle.** What’s the largest number of $1 \times 1$ gaps you can make (to plant flowers in) by arranging twenty $2 \times 1$ patio bricks?