Education researchers have studied physics problem solving and found there are important differences between expert and novice physics problem solvers. Correspondingly, they have advocated a number of structured problem solving approaches, which all have similar features. In this class I'll advocate the following approach:

1. **Visualize**: Draw a diagram with labels of what's going on in the problem. If this is an optics problem, a ray diagram is a good choice. It should be thorough and relevant variables should have names.
2. **Collect Relevant Equations**: Write out equations from the relevant physics (or math) that govern aspects of the situation in the problem. You don't necessarily need all of them. For example, if a problem involves a mirror, you could include the law of reflection. If a problem involves triangles you might include the Pythagorean theorem or trigonometric relations. You could also write out a principle or law (for example, the principle of least time) if it's a conceptual question or conceptual aspect of the problem.
3. **Solve Symbolically**: Solve equations without plugging in until the last step. If this is a conceptual problem that doesn't involve equations you can instead write out a paragraph explaining your reasoning.
4. **Check**: By using a method other than what you used to solve the problem, or by looking at specific aspects of it, check if your answer is reasonable. Some examples are checking units (write out the full unit dimensional analysis), plugging particular values into your equations to see if the results make sense, solving an alternative way (different sequence of steps) or using an alternative method (use a ray diagram if you used equations or vice versa). ***Important point: double-checking your algebra does not count as a check since that's not independent from your original solution method and does not involve a different perspective of the problem.***

You won't be required to follow this method except on exam corrections. I won't be pedantic about it, but you'll notice I'll generally follow it when solving problems in class on the board or in office hours.

However you choose to approach physics problems, the ability to solve more complex, multi-step problems is a learning goal of all physics courses.