



Puzzle 1: Material Mystery

Question:

You are in a lab that has three different powder materials for additive manufacturing: titanium, aluminum, and stainless steel. Each material is stored in an identical, unlabeled container. The only tool you have is a magnet. How can you identify which container holds which material?

Hint:

Consider the magnetic properties of each material.

Puzzle 2: Layer Height Optimization

Question:

Imagine you are tasked with 3D printing a small prototype of a complex gear. You have to choose the layer height to balance print quality and time. If a layer height of 0.1 mm gives a perfect finish but takes 8 hours to print, and a layer height of 0.3 mm reduces print time to 2 hours but with visible layers, what layer height would you choose to print the gear in 4 hours, while keeping the best possible quality?

Hint:

Consider proportional scaling of layer height and print time, and also the impact on surface finish.

Puzzle 3: Support Strategy Challenge

Question:

You are 3D printing a part with a large overhang angle. You have three support material options: soluble supports, breakaway supports, and no supports. Each option has a different cost and time factor. Soluble supports take 2 hours to dissolve but are expensive. Breakaway supports can be removed manually in 30 minutes but may leave rough surfaces. No supports risk print failure if overhangs are too steep. How would you decide which support method to use?

Hint:

Think about the overhang angle, the importance of surface finish, and the budget constraints.

Puzzle 4: Temperature Trouble

Question:

During a print using a polymer material, you notice that the layers are not adhering well, leading to weak bonding and a rough surface finish. You have a temperature control for the print bed and the nozzle. Increasing which temperature (bed or nozzle) would most likely improve the layer adhesion, and why?



Hint:

Consider the role of bed and nozzle temperatures in polymer printing.

Puzzle 5: Build Orientation Dilemma

Question:

You are given a part that has both intricate details on one side and a flat, wide base on the other. You can choose to orient the part for printing with the intricate details facing up, down, or sideways. Each orientation affects print quality and support requirements differently. Which orientation would you choose to minimize support material use while maintaining high detail quality?

Hint:

Consider the ease of support removal and the impact on detail preservation.