**Revision Quiz**

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**Problem Definitions**

Hyman describes a four-step process in his textbook [1], *Fundamentals of Engineering Design*, for evaluating solutions to complex issues and calls it a Problem Definition. He begins with the first step—Need Recognition—which outlines the unsatisfactory situation caused by a problem and supports it with concrete data. Next, he describes the outcome—or Goal—achieved by solving the problem, which illustrates the positive response to a recognition of need. A goal that is too general increases ambiguity and causes too much distraction, while a goal that is too specific limits creativity. Third, he creates a table of qualitative criteria—or Objectives—that measure the effectiveness of different solution ideas. When brainstorming, his design team places ideas into this “Weighted Objectives Chart” and chooses the most numerically successful design. Finally, Hyman identifies the criteria—or Constraints—that automatically fail bad solutions; budget, time, and size restrictions illustrate common examples. Summarizing Hyman, these four steps systematically link between each other, characterize an effective Problem Definition, and include the following: (1) Need Recognition, (2) Goal, (3) Objectives, and (4) Constraints.

After formulating a Problem Definition, design teams brainstorm batches of ideas and evaluate them based to how well the meet the objectives and overall goal. They dismiss solutions that violate constraints, or insufficiently fulfill the recognized need, then eliminate low-scoring ideas. Finally, they discuss the feasibility of top-ranking solutions and move forward with the design process; usually, this means conducting further research or testing a small prototype in a controlled setting.

**References**

[1] B. Hyman, “Ch. 2: Problem formulation,” in *Fundamentals of Engineering Design*, Upper

Saddle River, NJ: Prentice Hall, 2002, pp. 40-54.