

## Modeling Problems → Three-Act Tasks

Dan's Modeling Steps (based on CCSSM description):

1. Identify variables.
2. Formulate models.
3. Perform operations.
4. Interpret results.
5. Validate conclusions.

Dan's Three-Acts These tentative descriptions are NOT Dan's! He's thinking about it.

1. Video, picture, or situation that provokes questions.
  2. Gathering questions and gathering information. Includes Modeling Steps 1-4
  3. The punch line. Modeling step 5. Possible sequels.
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A list of modeling problems follows. Some are Fermi problems (Wikipedia description below). The rest are modeling problems from sources other than textbooks.

Pick at least one of each type. For each:

1. How would you "fill it out" into a three-act task?
2. Which modeling steps does your task include? Which are not included or barely included?

From Wikipedia: In [physics](#) or [engineering education](#), a **Fermi problem**, **Fermi question**, or **Fermi estimate** is an [estimation](#) problem designed to teach [dimensional analysis](#), [approximation](#), and the importance of clearly identifying one's assumptions. Named after physicist [Enrico Fermi](#), such problems typically involve making justified guesses about quantities that seem impossible to compute given limited available information.

**1. Fermi Problems**

- a. Fermi Problems on pages 2 and 3 of Monday's *Fermi Estimates* handout.
- b. The McDonald's Problem:

McDonald's Claim

Wikipedia reports that 8% of all Americans eat at McDonalds every day. There are 310 million Americans and 12,800 McDonalds...

Do you believe the Wikipedia report to be true? Create a mathematical argument to justify your position.

**2. Modeling Problems**

- a. From Henry Pollak  
Your grandmother will be arriving at the airport at 6:00 pm. You live 20 miles from the airport. The speed limit is 40 miles per hour. When should you leave to get her?
  
- b. From Appendix D of the CA Math Framework, line 28.  
“Giant’s Shoes.” In a sports center on the Philippines, Florentino Anonuevo Jr. polishes a pair of shoes. They are, according to the Guinness Book of World Records, the world’s biggest, with a width of 2.37 m and a length of 5.29 m. Approximately how tall would a giant be for these shoes to fit? Explain your solution. (Picture: Blum & Ferri 2009, 45.)