Physics Movie Challenge
“Let’s go to the movies…”

Your physics expertise is needed to analyze the physics in Disney/Pixar© movie(s). Disney wants to make sure that their animators are strictly adhering to the laws of physics to ensure realistic animation, a fun experience for children and adults, and high profit margins! Your job is described below:

Project Requirements:
Bronze Level (82 points)
Choose and analyze a Disney/Pixar© movie scene that demonstrates one of the following Physics Models: “Kinematics” (1D or 2D), “Force” (including friction), or “Energy” (using Energy Buckets).

Silver Level (91 points)
Complete the Bronze Level AND choose and analyze a second Disney/Pixar© movie scene (different from the one used in the Bronze Level) that demonstrates two interacting Physics Models (e.g. “Kinematics and Energy”, “Force and Energy”, “Force and Kinematics”, etc.)

Gold Level (100 points)
Complete the Bronze and Silver Levels AND choose and analyze a third Disney/Pixar© movie scene (different than the ones used in the Bronze or Silver Levels) that demonstrates two interacting Physics Models (different from the two models used in the Bronze or Silver Levels). For example, if you use “Kinematics and Energy” in the Silver level, you cannot repeat those two models; “Force and Kinematics”, or “Energy and Forces” could be possible choices.

Platinum Level (104 points)
Complete the Bronze, Silver, and Gold Levels AND choose and analyze a non-Disney/Pixar© movie scene that you believe violates the laws of physics. Choose a “G-rated” scene, no blood and guts, please.

Only one set of debrief answers need to be completed for the Challenge…you DO NOT need to complete debrief questions for each level if you choose to do more than one.

See the requirements on the next page:
For each level, provide the following:

a. a detailed **qualitative description** of the physics principles/models present in the scene.

b. a detailed color OR black-and-white **student hand-drawn** rendition of the scene,

c. author a “homework-style” problem statement that asks for TWO quantitative solutions for **each** of the models addressed in the problem. *For example, part (a) of your “Find” could ask to solve for the velocity of Lightning McQueen using the Kinematics model and part (b) could ask to solve for the frictional force acting on McQueen when his tire blows out and he “skids” along the ground using the Force Model (i.e. there must be question for each model.)*

d. a full “Given, Find, Solution” **quantitative solution** for each part of the problem stated above in part (c). Use hypothetical numbers for values in the “Given.” *For example, “Lightning McQueen has an initial velocity of 25 m/s. If he accelerates at 3 m/s², how long will it take him to reach a final velocity of 50 m/s?”*

3. **Graphical Solutions** - There must be at least 1 problem whose solution requires the analysis of the slope of a line in its solution. Examples include the slope of a position vs. time graph, slope of velocity vs. time graph, etc.

4. Each model (Kinematics, Force, Energy) must be addressed at least once.

5. A typed debrief that addresses each of the following questions:
   a. What was the FUN level of the project on a scale of 1-10 (10 most fun)? Why?
   b. What was the DIFFICULTY level of the project on a scale of 1-10 (10 most difficult)? Why?
   c. Describe at least TWO Physics concepts that were clarified or solidified for you in this project? Be specific.
   d. Describe at least ONE Physics concept that is still unclear/confusing to you. Be specific.
   e. What did you think of this project overall (now that you have completed it)? Why?