Senior Project "Project"
"Let's go to the movies…!!"

Your physics expertise is needed to analyze the physics in three Disney/Pixar[1] and/or Marvel[2] movie clips of your choosing. You will use your supernatural physics powers to analyze and evaluate the realism of the animation and/or special effects in your movie clips.

Project Requirements:

1. Choose **THREE** different movie clips that demonstrate **at least two interacting physics** models (e.g., "Kinematics and Energy", "Force and Energy", "Momentum and Kinematics", etc.) as you have seen in AP-style problems. One of the three video clips may analyze a scene that clearly (or subtly) defies the laws of physics; your AP-style solution will quantitatively prove "why" and/or "how" the laws of physics are being defied.

2. For each clip, provide the following:
    a. a detailed **qualitative description** of the physics models present in the scene.
    b. a color OR black-and-white **student hand-drawn** rendition of the scene,
    c. a student-authored "AP-style" problem statement requiring TWO quantitative solutions and ONE qualitative solution. For example,
        (a) calculate Lightning McQueen's velocity after accelerating at 3 m/s^2 for 4 s.
        (b) calculate the magnitude of the frictional force acting on McQueen when his tire blows out and he "skids" along the ground.
        (c) briefly explain how would McQueen's velocity would be affected if there were no friction between his tire and the ground.
    d. solve each problem using a full "Given, Find, Solution" problem solving format.

3. Slopes and Areas - The following must be addressed in one or more of the problem statements:
    a. one or more problem requires an analysis of the slope/derivative in its graphical solution (v = dx/dt, a = dv/dt, F = -dU/dx)
    b. one or more problem requires an analysis of the area under a curve in its graphical solution (area under F vs. x graph, area under F vs. t graph)

4. Each model (Kinematics, Force, Energy, Momentum) must be addressed at least once and solved using its full problem-solving format (i.e., Kinematic Model, Force Model, Energy Model, Momentum Model).

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 **in detail** ONE Physics concept that was clarified or solidified for you in this project?
    d. Describe **in detail** ONE Physics concept that is still unclear/confusing to you.
    e. What did you think of this project overall (now that you have completed it)? Why?

6. This project will be worth a test grade for the Spring Semester.

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[1] Disney/Pixar movies strictly adhere to the law of physics, hence the realistic movement/motion in their movies
[2] Please ensure that the clip is "PG-13"…no blood and guts, please.