Engin 103 February 17, 2011 back to e-syllabus	Topics: Differences between Science & Engineering A design example CW2 Project 1 Logbook questions

Differences between Science and Engineering:

Copy this page and fill in your team response below. Then save as a web page: name "engsci.**html**" and upload to your *files* folder.

Indicate at least one difference between your engineering field (as assigned in Project 0) and a related science subject such as Physics (including mechanics, thermodynamics, electricity and magnetism, static, fluids), Chemistry, Biology, Computer Science. Please try to be specific. Since they are not the same thing, avoid words like "engineering science", or "engineering is a branch of physics". Since they have different missions, avoid comparisons such as one is generally better than the other, etc.

Team #	Difference between Engineering and Science	Rating (1-5)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Team #	Explain any connection between what you said above and any difference between the outcomes of a science/math homework and an engineering project	Rating (1-5)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

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A Design Example

Science	Engineering
Theory Uses math, equations Build knowledge	Applications Uses math, equations , and physical tools Build devices with practical applications

Math/Physics homework	Engin 103 projects
One solution	Many solutions

"Peak Performance Competition"

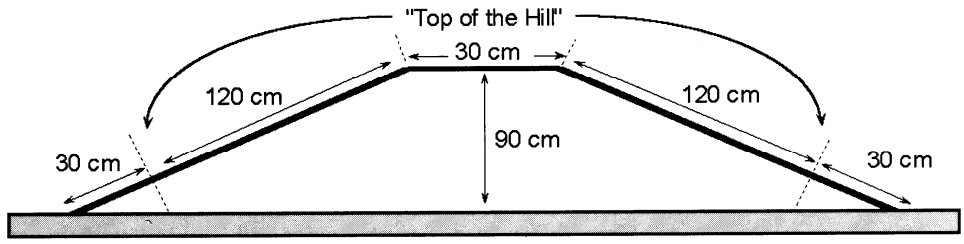
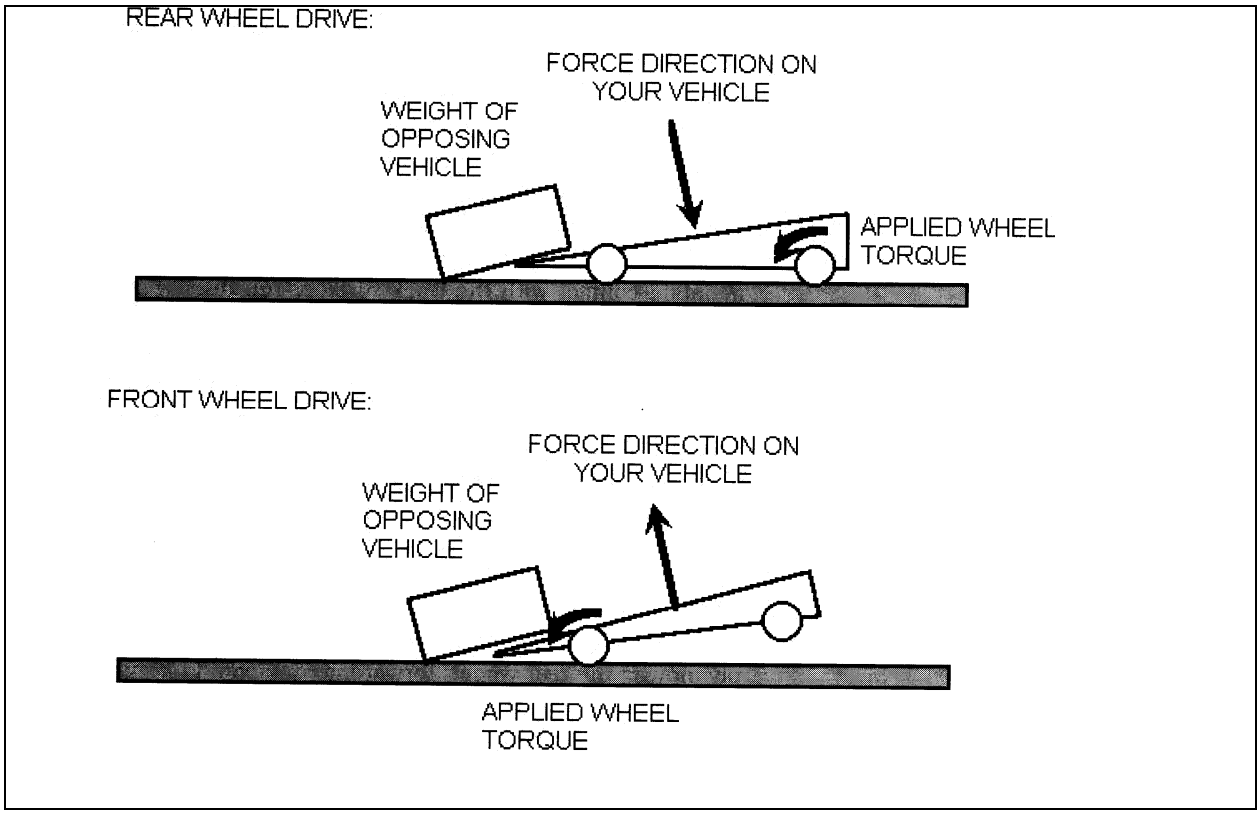


Figure 2.5. Ramp specifications for the Peak Performance Design Competion.

Design Strategies: what to keep in mind? -> Competition rules

- -Active defense
- -Passive defense
- -Engine location
- -Vehicle length

The Design Cycle: conceptual design, testing, documenting, prototype, modifying, testing,… (not in correct order)


REAR WHEEL DRIVE:
FORCE DIRECTION ON YOUR VEHICLE
WEIGHT OF OPPOSING VEHICLE
APPLIED WHEEL TORQUE
FRONT WHEEL DRIVE:
FORCE DIRECTION ON YOUR VEHICLE
WEIGHT OF OPPOSING VEHICLE
APPLIED WHEEL TORQUE

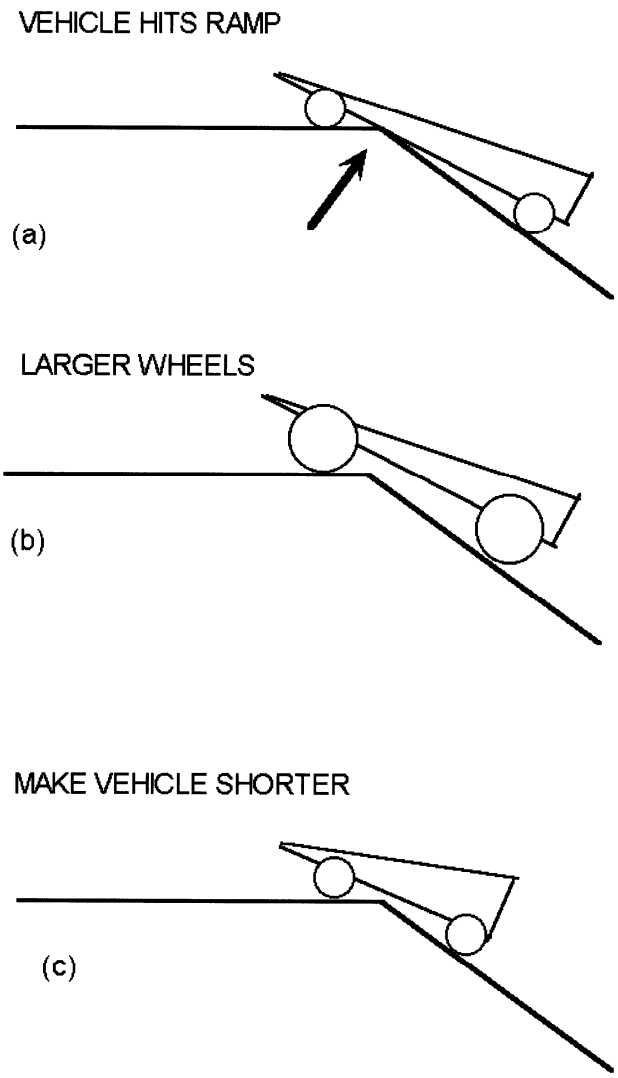
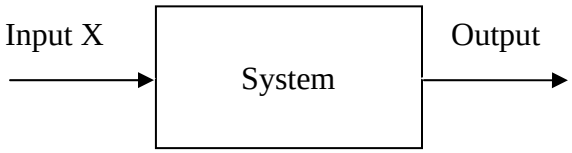


Figure 2.10. Vehicle at the top of the ramp. a) Bottom of vehicle hits the ramp; b) vehicle with larger wheels; c) a shorter vehicle.

Introduction to Project 1

Systems

A system is a physical object that produces a measurable output (Y) for every measurable input (X).



$Y' = f(X)$

Examples of a system could be a catapult (X=initial height of a weight; Y=range for a clay ball), a pendulum (X=period; Y=length needed to produce that period), or a car on an inclined ramp (X=ramp angle; Y=distance traveled in 2s). When random factors affecting the system are controlled (task of the engineering design team), it can be described with an equation or model, that is, using this model it is possible to predict the output given an input.

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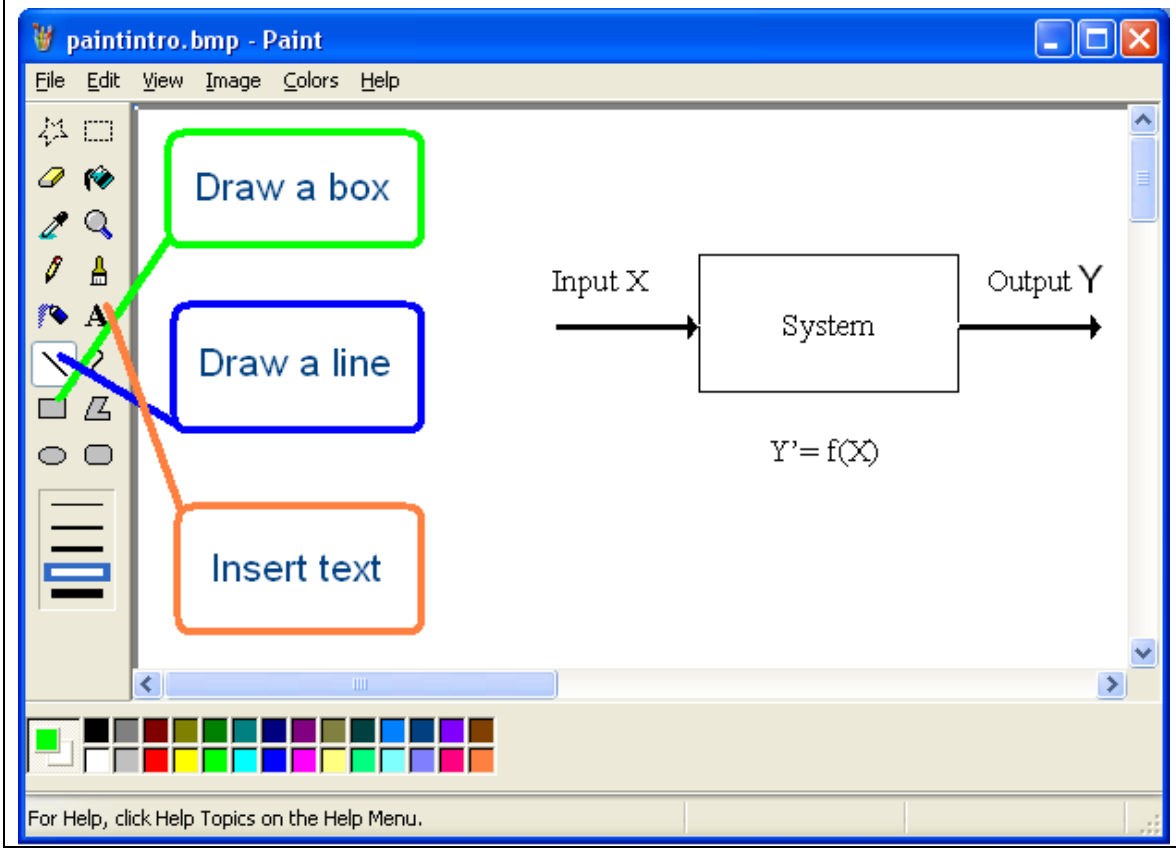
Engineering 103 -UMass Boston

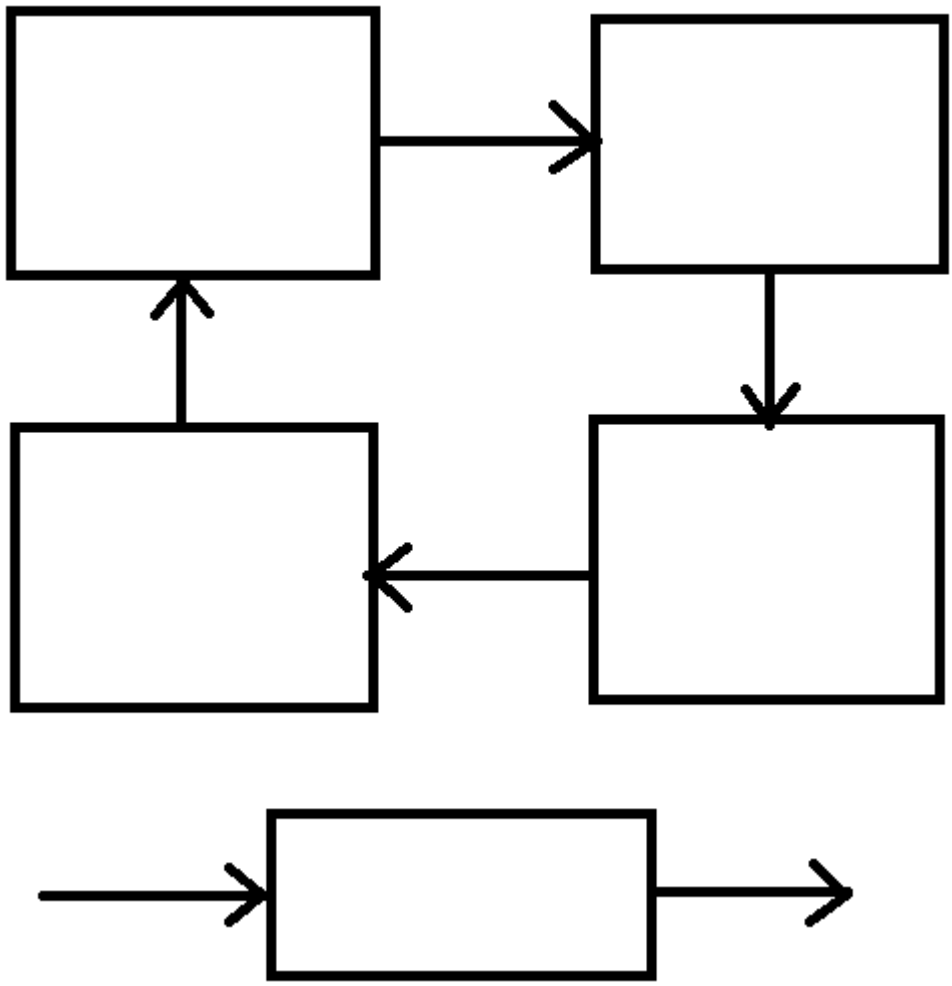
CW 2

(Class Work #2)

1) Why do we have cycles in engineering design? Draw a flow chart with four most important steps in an engineering design cycle, in the correct order.
2) Draw a flow chart for an in-out system. Label the input and output variables as X and Y, respectively, and explain what are they for at least two simple systems based on gravity. Given a value for an input X, is it possible to determine exactly the value of the output, yes or no, explain why.

In each team, students working together at a computer numbered between 1 and 10 will submit file cw2_XX_a.html and folder cw2_XX_a_files, students working at a computer numbered between 11 and 20 will submit file cw2_XX_b.html and folder cw2_XX_b_files, to the *files* folder in the server. Replace XX by 01 if team 1, etc. Include your names within the files.





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LOGBOOK: example of a logbook page

-Use a quadrille notebook; number all pages; date all entries
-Write your notes for all activities, thoughts, problems and solutions, and learning conclusions related to Engin 103. You should write down progress, outcomes, and conclusions on projects and teamwork; conclusions from class work (including LabVIEW) and homework.
-In addition you should answer in the logbook all questions listed in these notes in blue, as shown below:

11) Explain at least one difference between your engineering field (as assigned in Project 0) and a related science subject such as Physics (including mechanics, thermodynamics, electricity and magnetism, static, fluids), Chemistry, Biology, Computer Science. Please try to be as specific as you can. Avoid phrases like "engineering science", or "engineering is a branch of physics". Avoid comparisons such as one is generally better than the other,

etc. Is there any instance in which an engineering advancement helps discover new science? Explain.

12) Write your answer to CW2 here.

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