

Stop on a Loonie Car Project

The Challenge:

To build a car that will travel down a ramp to the floor, and then continue forward in a straight line for 3.0 metres before stopping on a Loonie. The Loonie will be placed 3.0 m from the bottom of the of the launching ramp.

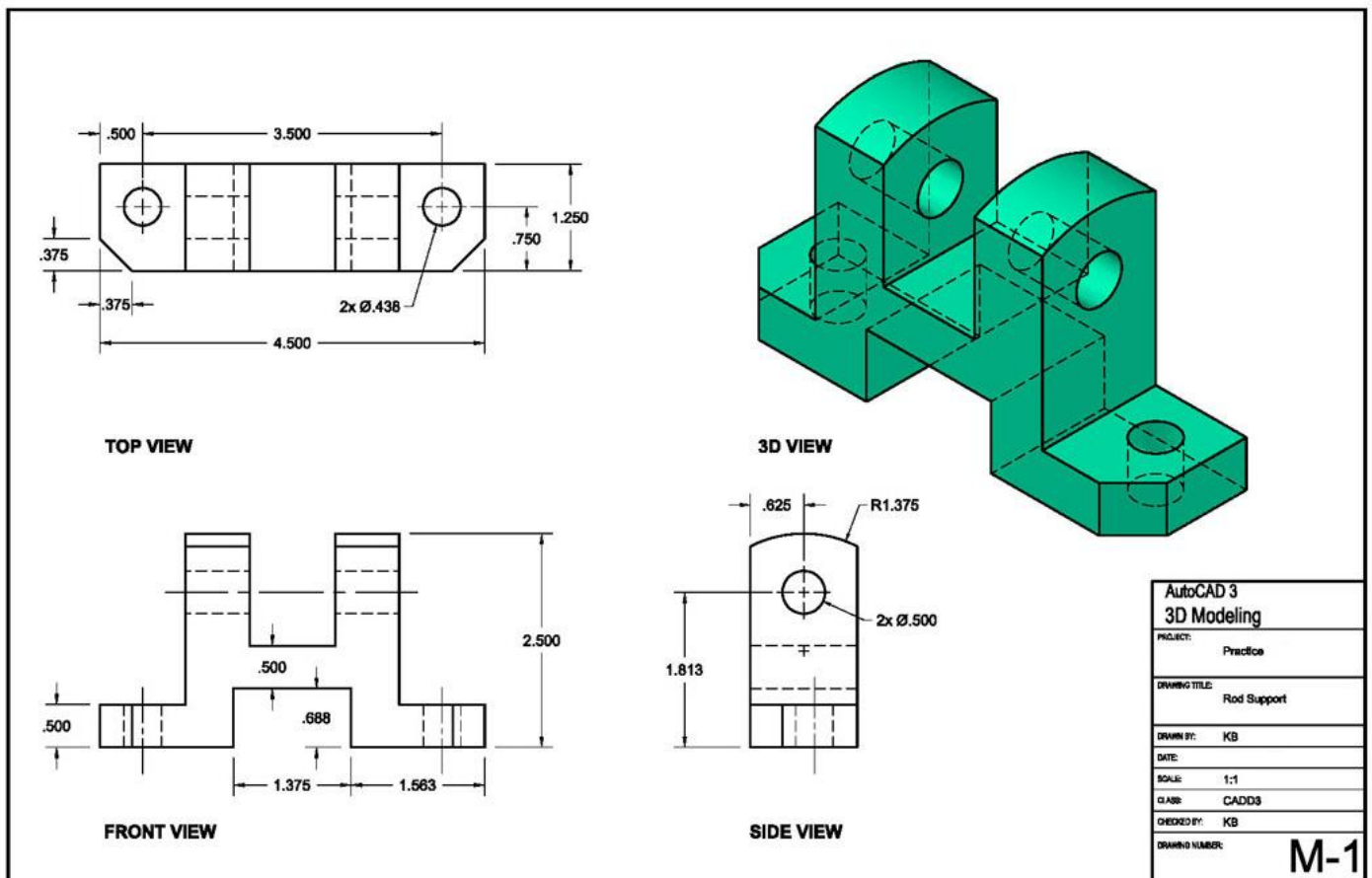
You may work individually or with 1 or 2 partners. A group may not have more than 3 members.

Conditions for the construction of your car:

1. You may not use any type of prefabricated wheels (i.e. no LEGO® wheels, wheels from your bike/toy car, etc.).
2. The body of the car may not be from a prefabricated kit.
3. Propulsion of the car will come from being launched from rest on an inclined plane (i.e. the wooden ramp). The distance up the ramp where the car will start, and ramp angle will be decided by your team.
4. No external tracks, guide wires, or strings allowed. Internal wires, gears, pulleys, etc. are allowed.
5. **ANY PARTS USED THAT ARE PREFABRICATED/MANUFACTURED WILL RESULT IN A TOTAL DISQUALIFICATION OF THE CAR AND A MARK OF ZERO.**

Preliminary design: DUE – _____

1. You must have preliminary design drawings of your car submitted by the date above.
2. Design drawings should be to scale, drawn with a ruler, and on one side of a piece of blank paper.
3. The design drawing must consist of a front, side, and top view of the car. An exemplar is shown below.
4. All dimensions and materials must be labeled.
5. Include the name of your car— be creative, but appropriate.
6. The final product may differ from your preliminary design.



Presenting your car: DUE – _____

1. Before you run your car down the ramp, your group must present the car to the class.
2. All group members must participate equally in the presentation.
3. Presentation should take no more than 3 minutes and must be well organized.

Presentation must include:

- how the car was designed
- construction material and rationale
- difficulties encountered during construction and solutions
- your start conditions (distance up the ramp where the car will start, ramp angle, etc.)

Performance of your car: DUE – Same Day as Presentation

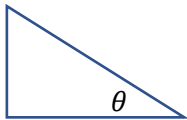
1. Choose the start position on the ramp and the angle of the incline.
2. Your car should travel 3 m forward on the floor and stop on the Loonie.
3. You will be allowed 3 trials, and the best trial will be marked.
4. The distance is measured from the center of the front wheel of the car to the center of the Loonie.

Marks will be awarded as follows:

- $3.0 \text{ m} \pm 30 \text{ cm} = 4/4$ [on the Loonie = 1 bonus mark]
- $3.0 \text{ m} \pm 50 \text{ cm} = 3/4$
- $3.0 \text{ m} \pm 100 \text{ cm} = 2/4$
- More than $\pm 150 \text{ cm} = 1/4$

Summary paper: DUE – Same Day as Presentation

1. Describe the motion and the physics of your car as it goes down the ramp, and then comes to a stop on the horizontal floor.
 - Use full sentences and do not use any of the actual values/numbers (approximately 200-300 words)
 - Describe using terminology from the Kinematics and Dynamics Units
 - Bold/highlight any key words or vocabulary
2. Draw an FBD of the car on the floor and an FBD when it is on the ramp. FBD's should be correctly labelled and drawn using a ruler.
3. You may need to measure certain quantities to help with your calculations. Clearly identify and state these measurements before completing your calculations. Plan ahead of time!
4. Show a diagram of your ramp and label all sides and angle of the ramp before your calculations.



5. Provide full and proper calculations (equations included) to determine the:
 - **acceleration down the ramp**
 - **velocity at the end of the ramp**
 - **force of friction between the car and the floor**

Stop on a Loonie Car Project Rubric

Please fill in names below and submit one copy of the rubric with your preliminary design. Summary paper due on presentation day.

Students Name: _____

Car Name: _____

Presentation - 6 marks (Communication)							MARK
Presentation time:	Organized presentation:	0	0.5	1	1.5	2	Communication: /8
Car explained - materials and construction:		0	0.5	1	1.5	2	
Start conditions explained & measurements stated:		0	0.5	1	1.5	2	
Everything submitted on time, organized, instructions are followed:		0	0.5	1	1.5	2	
Design & Construction – 14 marks (Application)							MARK
Design drawing - to scale, neat:		0	0.5	1	1.5	2	Application: /14
Design drawing - dimensions and materials labelled:		0	0.5	1	1.5	2	
Performance of car - does it stop on the Loonie?		0	1	2	3	4	
Trial 1:	Trial 2:	Trial 3:	Bonus Mark: <input type="checkbox"/> +1				
Car is neat, well constructed and low cost:		0	0.5	1	1.5	2	
Car is sturdy, road worthy and meets conditions:		0	0.5	1	1.5	2	
Car is creative with original choice of materials:		0	0.5	1	1.5	2	
Summary Paper - 12 marks (Communication & Application)							MARK
Explanation of physics during car's trip:		0	1	2	3	4	Communication: /8
FBDs complete & correctly labelled; FBDs drawn using a ruler:		0	0.5	1	1.5	2	
Measurements correct and clearly stated before calculations:		0	0.5	1	1.5	2	
Calculations complete and correct; equations included		0	1	2	3	4	Application: /4
TOTAL MARKS:	Communication: / 16			Application: / 18			

Comments: