Physics   **TOTAL: 36**
Lab - *Road Rally (from Space?)*

Title   **(+1)**

Objective   **(+1)**

Materials   **(+1)**

Procedure   **(+2)**

Data:
Picture   **(+1)**
Scale   **(+1)**
Radius clearly drawn   **(+1)**

Analysis:

Calculation of Radius   **(+1)**

Make a side view drawing of your car as it rounds the turn. Draw a **Free Body Diagram** labeling and resolving ALL forces. For the banked turn you can assume a 5° bank. You can assume the coefficient of friction is 0.700 for rubber on concrete. Determine the maximum speed *in miles per hour* for the following cases...

For FULL CREDIT you must DERIVE all results from Σ F=ma...

(i) car on your turn with no bank, no friction   (+3)
(ii) car on your turn with no bank, friction   (+5)
(iii) car on your turn with a 5° bank, no friction   (+5)
(iv) car on your turn with a 5° bank, friction   (+5)

Questions:
   1.) What angle would be needed for a banked turn of 200m radius to be maneuvered by a car at 60 miles per hour with no friction? (+1)

   2.) Does the maximum speed calculated in part (i) make sense? Explain in terms of Newton's Laws. (+1)

   3.) How does the maximum speed compare for the four situations? Rank them from slowest to fastest. Does the order make sense? (+1)

   4.) How would your answers for the four speeds differ if your road was on the moon? (+1)

   XC.) <u>Derive a formula</u> for the banking angle needed to make a turn with friction in terms of v, r, and g. (+1)

   Error Analysis   **(+2)**
   Conclusions   **(+3)**