

## Autorama Unit ! Understanding forces & Motion

**OBJECTIVE:** To design and build a battery powered motorcar and race the car in a timed competition.

**TEAMWORK:** Students may work alone or in teams with 1 or 2 other students but must sign consent form saying they may not complain about unfulfilled partner responsibilities !

### **MATERIALS:**

#### To be used in the **circuit**:

- \* 1 small electric motor (provided)---1.5 volt
- \* 50 - 60 cm copper wire (provided)
- \* 2 standard 1.5 Volt "AA" batteries students bring in !

#### To be used in the **body** of the car:

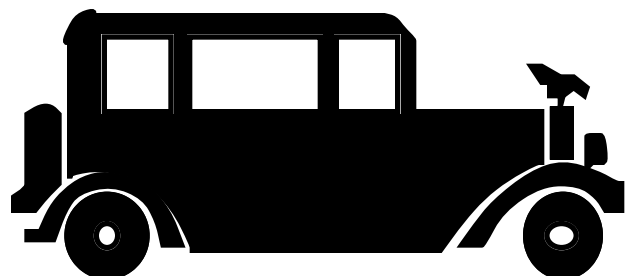
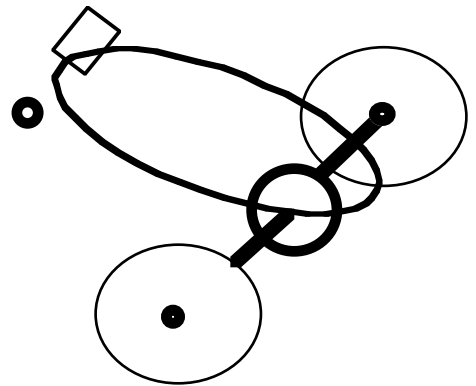
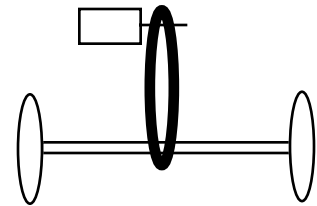
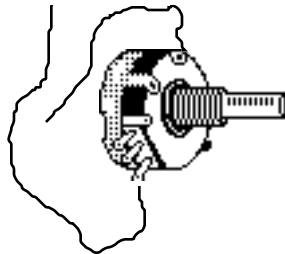
- \* The body of the car must be "hand made."
- \* You may not use commercially manufactured materials in the vehicle; e.g. wheels, switches, gears, battery holders, Lego's, or converted toy cars (or any parts of) may not be used.
- \* You must be creative and find items to use for the body, axle & wheels, off/on switch, etc.

### **RULES:** *Read these carefully*

1. The car must be self-propelled, powered only by the battery operated motor.
2. Each team will be allowed to use only 1 motor per car, then experiment with making the the best auto they can.
3. The Autorama course will be the floor of the gym, starting from the basketball half court line and finishing at the basketball court baseline (47 feet). [weather pending]

### **RACE DAY IS \_\_\_\_\_**

4. The entire car must be behind the starting line at the time the starting signal is given to begin the race.
5. Cars that cross the sidelines, or move out of bounds, will be disqualified.
6. The judge reserve the right to disqualify any team if deemed that the "spirit of competition" has been compromised, i.e. violating a rule, cheating, stealing, sabotage another's project, etc.
7. The decisions of the judge are final.



## SCORING POINTS and EARNING A GRADE:

A) **Race Time:** The fastest cars completing the race receive maximum points.

Car crosses the finish line in . . .	
Under 6.00 seconds	<b>40 pts.</b>
6.01 to 14.00 seconds	<b>35 pts.</b>
14.01 to 20.00 seconds	<b>30 pts.</b>
20.01 to 25.00 seconds	<b>25 pts.</b>
Over 25.00 seconds	<b>20 pts.</b>
Car moves but doesn't finish	<b>15 pts.</b>
Car does not move or operate	<b>10 pts.</b>

<b>GRADES:</b>	
<b>Above 100</b>	<b>= A+</b>
<b>90-99</b>	<b>= A</b>
<b>80-89</b>	<b>= B</b>
<b>70-79</b>	<b>= C</b>
<b>60-69</b>	<b>= D</b>
<b>Below 60</b>	<b>= F</b>

B) **Aesthetic:** Cars will be judged as to the physical stability and appropriate electrical systems !

<b>Detailed diagrams:</b> Both small scale and enlarged drawings	<b>+20 pts.</b>
<b>Electrical switch:</b> Auto contains an off/on switch	<b>+10 pts.</b>
<b>Lights:</b> The car has lights, wired into auto with switch and motor circuitry	<b>+10 pts.</b>
<b>Neatness:</b> Quality workmanship is clear (e.g. no loose wires, tape, or glue mess).	<b>+20 pts.</b>

c) **Extra credit !**

Letter in response to letter sent to car company explaining project or asking questions **+ 10 pts.**

Headlights on Auto are wired properly with extra battery to turn on lights **+ 10 pts**

## AutoRama Student Group Roles and Responsibilities

**SHOP LEADER:** Runs the group. The Shop Leader makes the final decision in a dispute. The leader is the one who pushes the group to never give up and is responsible for the materials necessary to make the car move. Leaders will periodically meet with the teacher and are responsible for the overall success of the group.

**BODY TECHNICIAN:** Drives the car. The Body Tech is responsible for the automobile. He/ she makes sure that the car is up to specs, with the lights functioning, gear ratios correct, and all the parts in place. Body Tech is also responsible for the materials necessary to score points in the body of the car.

**MEASUREMENTS SPECIALIST:** Clocks the car. The M-Spec is responsible for the timing of the test runs of the automobile. The M-Spec suggests to the Body Tech ways to improve the performance of the vehicle. The M-Spec is responsible for the Blue Print and Parts list, and making sure the Body Tech has done all possible to score points

Students can work alone or in teams with 1 or 2 other students. Teamwork skills are graded by students and teacher.