SECME ENGINEERING DESIGN - MOUSETRAP CAR CONSTRUCTION AND OPERATION (ELEMENTARY SCHOOL DIVISION ONLY)

ENGINEERING DESIGN COMPETITION REQUIREMENTS:

The Engineering Design Competition requires participation in these two areas:

- 1. Mousetrap Car Construction and Run
- 2. Written Report on Mousetrap Car

This is a team competition and three (3) students must be on each team.

CAR CONSTRUCTION AND DESIGN:

- 1. A <u>standard mousetrap</u>, usually about 4.5 X 10 centimeters and weighing about 25 grams <u>MUST</u> be used to build the car.
- 2. The standard mousetrap MUST have <u>one single spring</u> (not two small springs). Standard mousetraps with more than one spring are not allowed.
- 3. Components of the mousetrap are: wooden base (on which other components are mounted), spring, bail, locking lever, and bait hook (see component sketch on next page).
- 4. The mousetrap's "single" spring must be the sole source of power. You may <u>NOT</u> use rubber bands, CO₂ boosters, or any other agent or element for extra power.
- 5. In the design and construction of the car, the original mousetrap spring and wood base <u>MUST</u> remain intact. These two components may <u>NOT</u> be cut or altered in any way— physically, chemically, or thermally. Only the locking lever and bait holder (and the staples that hold them on) may be removed from the base, if desired. The bail may be straightened from its original bent configuration but <u>NOT</u> cut (shortened), added to (lengthen), or reinforced. It must remain as a component of the completed car.
- 6. The spring must be visible and/or accessible to the judges for inspection.
- 7. The car must have a minimum of three wheels and can be made as long or short as desired as long as requirement #5 above is met.
- 8. Mousetrap cars will be tested on a smooth flat surface. Distance will be measured from the front of the front wheel(s) at the starting point to the front of the front wheel(s) at the stopping point of travel, utilizing a straight line to connect the two points (**total displacement and not the path traveled**).
- 9. There will be two runs for each car and the run with the highest performance score will be used for final scoring of the mousetrap car's performance.



NOTE: Red parts may be removed.

CALCULATING THE ENGINEERING DESIGN (MOUSETRAP CAR) SCORE

ELEMENTARY PERFORMANCE SCORE

The Performance Score (P) and the Final Performance Score (F) for the Mousetrap car run is calculated using the following equation:

$$P = \frac{D}{L} + \frac{3D}{T} \qquad \qquad F = \frac{P}{P_H} \times 100$$

where:

D is distance the mousetrap car travels (measured in centimeters).

L is the length of the competing mousetrap car (measured in centimeters).

T is time measured from the time the mousetrap car is released until the car has stopped (measured in seconds).

P is the mousetrap car performance run score.

 \mathbf{P}_{H} is the highest performance mousetrap car score on the competition.

F is the final performance score (to be combined with score from the Written Report).

Distance will be measured from the front of the front wheel(s) at the starting point to the front of the front wheel(s) at the stopping point of travel, utilizing a straight line to connect the two points. There are **NO MINIMUM OR MAXIMUM distances.** If the mousetrap car stops due to hitting an object or wall, the distance will be measured from the starting point to the point of impact. So that all teams have the same advantages/disadvantages, **OBJECTS WILL NOT BE MOVED (chairs, cones, tables, signs, etc.)** during the competition to allow a mousetrap car to gain more distance.

Overall Team Score in this competition is sum of:

- 1. Performance (car run) as calculated above (max. 100 points)
- 2. Written Report (max. 100 points)
- 3. Bonus Handwritten Calculations (max. 15 pts)
 - Show hand written calculation of hypothesis of the mousetrap car performance.

Therefore, the maximum total is **215 points**.

SECME ENGINEERING DESIGN: MOUSETRAP CAR WRITTEN REPORT REQUIREMENTS (Elementary School)

As a part of the Design Competition, the team is required to write a Written Report describing the design, construction, and operation of the Mousetrap Car. The main body of the report should be a maximum of 1-2 pages. Your written report should be a reflection of this year's efforts by your team. Evidence of plagiarism or re-submission of previous years' reports will result in deduction of points or zero score

STRUCTURE: (0-25 points)

1. Cover page (0-5 points)

a. Title of the Written Report (SECME Engineering Design Competition: Mousetrap Car Written Report)

- b. Competition Division (Elementary School Division)
- c. Team Name
- d. Each individual team member's name and grade
- e. Team's school name & address
- f. School System/District name
- g. School Coordinator's name
- h. Date (date of competition)

2. Double-spaced text (0-5 points)

3. $8\frac{1}{2}$ " × 11" white paper with one-inch borders at the top, bottom, and on each side (0-5 points)

4. 12 pt. standard font, computer typed (0-5 points)

5. Report is neat and thorough; pages are numbered and in order (0-5 points)

CONTENT: (0-50 points)

1. Writing includes an original, age-appropriate introduction (0-10 points)

2. Writing includes ideas that are fully developed, fully supported, and describe the design,

- construction and operation of the car and age-appropriate (0-10 points)
- 3. Writing is logical and coherent as a whole and age-appropriate (0-15 points)

4. Writing includes an original, age-appropriate close (0-15 points)

MECHANICS, SPELLING & GRAMMAR: (0-25 points)

Written Report reflects the team's pride by being submitted as error-free as possible

- 1. Writing is free of (age-appropriate) punctuation errors (0-5 points)
- 2. Writing is free of (age-appropriate) spelling errors (0-8 points)
- 3. Writing is free of (age-appropriate) sentence errors (misplaced sentence parts, subject/verb agreement, sentence fragments, run-ons, etc.) (0-12 points)

Arial	This is an example of 12 point Arial font		
Calibri	This is an example of 12 point Calibri font		
Courier New	This is an example of 12 point Courier New font		
Times New Roman	This is an example of 12 point Times New Roman font		

ACCEPTABLE FONTS:

SECME ENGINEERING DESIGN COMPETITION: MOUSETRAP CAR WRITTEN REPORT EVALUATION Elementary School Division

Team Name		
School Name		
District	State	
Student Name #1	Grade	
Student Name #2	Grade	
Student Name #3	Grade	
Judge's Name	Date	

STRUCTURE (0 – 25 pts): Points

\Box Cover Page (0 – 5 pts)	/5
\square 8 ¹ / ₂ " x 11" white paper w/ 1" margins (0 – 5 pts)	/5
\Box 12 pt./Standard Font/Computer Typed (0 – 5 pts)	/5
\Box Double-spaced Text (0 – 5 pts)	/5
\Box Report is neat and thorough; pages are numbered and in order (0 – 5 pts)	/5
STRUCTURE TOTAL (max 25 pts)	/25
CONTENT (0 – 50 pts):	
\Box Writing includes an original, age-appropriate introduction (0 – 10 pts)	/10
□ Writing includes ideas that are fully developed, supported and describe the	
design, construction and operation of the car $(0 - 10 \text{ pts})$	/10
\Box Writing is logical and coherent as a whole $(0 - 15 \text{ pts})$	/15
\Box Writing includes an original, age-appropriate close (0 – 15 pts)	/15
CONTENT TOTAL (max 50 pts)	/50
MECHANICS, SPELLING & GRAMMAR (0 – 25 pts):	
\Box Writing is free of punctuation errors (age-appropriate) (0 – 5 pts)	/5
□ Writing is free of spelling errors (age-appropriate) $(0 - 8 \text{ pts})$	/8
□ Writing has correct subject/verb agreement and free of sentence errors, misplaced	
sentence parts, sentence fragments, run-ons, etc. (age-appropriate) $(0 - 12 \text{ pts})$	/12
MECHANICS, SPELLING & GRAMMAR TOTAL (max 25 pts)	/25
OVERALL TOTAL (max 100 nts)	/100

Judge's Notes:

SECME ENGINEERING DESIGN COMPETITION: MOUSETRAP CAR CONSTRUCTION AND OPERATION (Elementary Evaluation Sheet)

Team Name		
School Name		
District	State	
Student Name #1	Grade	
Student Name #2	Grade	
Student Name #3	Grade	
Judge's Name	Date	

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Mousetrap Car Performance Point Score:

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F =	

(Note: F is the best final Performance score (to be combined with score from the Written Report).

Written Report (Max 100 pts.)	
Bonus Handwritten Calculations (Max 15 pts)	
Best Performance Run F (Max 100 pts)	
Overall TOTAL (Max 215 pts)	

¹Distance is measured from the **marked starting line** to the **front wheel(s)** of the mousetrap car in centimeters (cm).

²Time is measured from the **time the mousetrap car is released until the vehicle stopped** in seconds (s).

³This is the **highest performing mousetrap car on competition day**.