2019
Science Destination Challenge

Guidelines and Rules

Revised 11/14/18

May 3, 2019
Grades 3-12
SCIENCE DESTINATION CHALLENGE

May 3, 2019 – CMA, Iron Mt. Facility

Sponsored by
DeQueen Mena Education Service Cooperative

Start Time: 9:30 am
Pre-Challenge Meeting @ 9:15 a.m. in the Hospitality Room @ CMA, Iron Mt.

--------------------------------------------------------------------------------------------------

April 12, 2019 Deadlines:

* Registration – Include school purchase order with registration

* Materials Check-Out

* Engineering Notebooks, Roller Coaster Measurements, Multimedia

* DMESC Scoring of Engineering Notebooks
  (Register on ESCWorks! for session #368120)
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Determination of Medals:

Gold Medal - Highest combined total score
Silver Medal - Second highest combined total score
Bronze Medal – Third highest combined total score

Score 1: Challenge Placement

1\textsuperscript{st} place 100 pts.
2\textsuperscript{nd} place 90 pts.
3\textsuperscript{rd} place 80 pts.

Score 2: Engineering Notebook Score _______/100

Combined Total Score:

Sum of Score 1: (Challenge Placement 1-3 placements only) and Score 2: (Engineering Notebook).
Grades 3-4
Rules and Regulations

Challenges:
Catapult, Egg Drop, Earthquake Challenge, Paper Airplane, Mousetrap Car, Paper Rocket, Sailboat, Toothpick Bridge

1. It is mandatory for school districts participating in the competition to have at least one teacher attend a planning meeting or call Brian Schuller or Neal Jenkins for a site visit. Please check ESC Works for the dates of these meetings. They will be listed as Science Destination Challenge.

2. Students must submit an engineering notebook for each competition; a rubric is available. Students competing in more than one challenge may use the same engineering notebook, but must identify each challenge. Students must score 70% (42/60) for the engineering notebook to be eligible for competition at DMESC’s Science Destination to be held on May 3, 2019.

3. Students must design and construct all parts of the project used for competition. Students must create their own cylinders for the Paper Rocket Challenge. No Toilet Paper, Paper Towel, or Wrapping Paper Rolls may be used.

4. All projects must have the following information visible on the project:
   Student(s) name(s), School name, Teacher name, and Grade.

5. All objectives must be met for each area of competition or disqualification will occur. The competition judges have the final word. These judges, who share the responsibility for the students’ well being, are volunteers. They give of their time unselfishly, effectively, and with a desire to perpetuate an idea of fair competition.

6. A designated area (fix-it shop) will be available for problem solving and repairs. A designated volunteer will be provided in this area. It is designated for students only.

7. Non-competitors must remain in the spectator area, or the competitor(s) may be disqualified.

8. # of participants per team
   Challenge
   1 Egg Drop, Paper Airplane, Mousetrap Car, Paper Rocket, Sailboat
   1 or 2 Catapult, Earthquake, Toothpick Bridge

9. Only schools’ first, second, and third place winners in each challenge for the 3-4 grade band may attend the competition.

10. Students may compete in more than one challenge. Competitors will be called to the challenges. Students are responsible for checking in at each challenge on their own.

11. Competitors pay a $5.00 registration fee for each challenge. (This means that if Jane Doe competes in two challenges, $10.00 is due for her). Fees are billed by purchase order from the school district. Please make sure the bookkeepers are aware of this.

12. An audio/visual Release Form, signed by a parent/guardian must accompany each student registration.

13. Medallions will be awarded for first, second, and third place for each challenge.
   *A concession stand will be provided on site for meals and/or snacks.
   *If you have any questions, please feel to email Brian Schuller at brian.schuller@dmesc.org or Neal Jenkins at neal.jenkins@dmesc.org or call 870.386.2251.
Grades 5-6
Rules and Regulations

Challenges:
Catapult, Earthquake Challenge, Egg Drop, Electric Car, Generator, Mousetrap Car, Multimedia Projects, Paper Rocket, Paper Roller Coaster, Robotics Maze Challenge, Sailboat, Toothpick Bridge

1. It is mandatory for school districts participating in the competition to have at least one teacher attend a planning meeting or call Brian Schuller or Neal Jenkins for a site visit. Please check ESC Works for the dates of these meetings. They will be listed as Science Destination Challenge.

2. Students must submit an engineering notebook for each competition; a rubric is available. If a student competes in more than one challenge, he/she may use the same engineering notebook, but must identify each challenge.

3. Students must design and construct all parts of the project used for competition. Students must create their own cylinders for the Paper Rocket Challenge. *No Toilet Paper, Paper Towel, or Wrapping Paper Rolls may be used.*

4. All projects must have the following information visible on the project:

   Student(s) name(s), School name, Teacher name, and Grade.

5. All objectives must be met for each area of competition or disqualification will occur. The competition judges have the final word. These judges, who share the responsibility for the students’ well being, are volunteers. They give of their time unselfishly, effectively, and with a desire to perpetuate an idea of fair competition.

6. A designated area (fix-it shop) will be available for problem solving and repairs. A designated volunteer will be provided in this area. It is designated for students only.

7. Non-competitors must remain in the spectator area, or the competitor(s) may be disqualified.

8. # of participants per team Challenge

<table>
<thead>
<tr>
<th>1</th>
<th>Catapult, Egg Drop, Electric Car, Mousetrap Car, Paper Rocket, Sailboat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 2</td>
<td>Earthquake, Generator, Toothpick Bridge</td>
</tr>
<tr>
<td>1, 2, or 3</td>
<td>Multimedia Project, Paper Rollercoaster, Robotics</td>
</tr>
</tbody>
</table>

9. Only schools’ first, second, and third place winners in each challenge for the 5-6 grade band may attend the competition.

10. Students may compete in more than one challenge. Competitors will be called to the challenges. Students are responsible for checking in at each challenge on their own.

11. Competitors pay a $5.00 registration fee for each challenge. (This means that if Jane Doe competes in two challenges, $10.00 is due for her). Fees are billed by purchase order from the school district. Please make sure the bookkeepers are aware of this.

12. An audio/visual Release Form, signed by a parent/guardian must accompany each student registration.

13. Medallions will be awarded for first, second, and third place for each challenge.

*A concession stand will be provided on site for meals and/or snacks.

*If you have any questions, please feel to email Brian Schuller at brian.schuller@dmesc.org or Neal Jenkins at neal.jenkins@dmesc.org or call 870.386.2251.
Grades 7-8
Rules and Regulations

Challenges:
Catapult, Earthquake Challenge, Egg Drop, Electric Car, Generator, Multimedia Projects, Mystery Box, Paper Rocket, Paper Roller Coaster, Robotics Maze Challenge, Sailboat, Toothpick Bridge

1. It is mandatory for school districts participating in the competition to have at least one teacher attend a planning meeting or call Brian Schuller or Neal Jenkins for a site visit. Please check ESC Works for the dates of these meetings. They will be listed as Science Destination Challenge.

2. Students must submit an engineering notebook for each competition; a rubric is available. If a student competes in more than one challenge, he/she may use the same engineering notebook, but must identify each challenge.

3. Students must design and construct all parts of the project used for competition. Students must create their own cylinders for the Paper Rocket Challenge. No Toilet Paper, Paper Towel, or Wrapping Paper Rolls may be used.

4. All projects must have the following information visible on the project:
Student(s) name(s), School name, Teacher name, and Grade.

5. All objectives must be met for each area of competition or disqualification will occur. The competition judges have the final word. These judges, who share the responsibility for the students’ well being, are volunteers. They give of their time unselfishly, effectively, and with a desire to perpetuate an idea of fair competition.

6. A designated area (fix-it shop) will be available for problem solving and repairs. A designated volunteer will be provided in this area. It is designated for students only.

7. Non-competitors must remain in the spectator area, or the competitor(s) may be disqualified.

8. # of participants per team | Challenge
--- | ---
1 | Catapult, Earthquake, Egg Drop, Electric Car, Paper Rocket, Sailboat, Toothpick Bridge
1 or 2 | Generator, Paper Rollercoaster
1, 2, or 3 | Multimedia Project, Robotics
1, 2, 3, or 4 | Mystery Box

9. Only schools’ first, second, and third place winners in each challenge for the 7-8 grade band may attend the competition.

10. Students may compete in more than one challenge. Competitors will be called to the challenges. Students are responsible for checking in at each challenge on their own.

11. Competitors pay a $5.00 registration fee for each challenge. (This means that if Jane Doe competes in two challenges, $10.00 is due for her). Fees are billed by purchase order from the school district. Please make sure the bookkeepers are aware of this.

12. An audio/visual Release Form, signed by a parent/guardian must accompany each student registration.

13. Medallions will be awarded for first, second, and third place for each challenge.
*A concession stand will be provided on site for meals and/or snacks.
*If you have any questions, please feel to email Brian Schuller at brian.schuller@dmesc.org or Neal Jenkins at neal.jenkins@dmesc.org or call 870.386.2251.
Grades 9-12
Rules and Regulations

Challenges:
Catapult, Earthquake Challenge, Egg Drop, Electric Car, Generator, Multimedia Projects, Mystery Box, Paper Rocket, Paper Roller Coaster, Robotics Maze Challenge, Sailboat, Toothpick Bridge

1. It is mandatory for school districts participating in the competition to have at least one teacher attend a planning meeting or call Brian Schuller or Neal Jenkins for a site visit. Please check ESC Works for the dates of these meetings. They will be listed as Science Destination Challenge.

2. Students must submit an engineering notebook for each competition; a rubric is available. If a student competes in more than one challenge, he/she may use the same engineering notebook, but must identify each challenge.

3. Students must design and construct all parts of the project used for competition. Students must create their own cylinders for the Paper Rocket Challenge. No Toilet Paper, Paper Towel, or Wrapping Paper Rolls may be used.

4. All projects must have the following information visible on the project:
   Student(s) name(s), School name, Teacher name, and Grade.

5. All objectives must be met for each area of competition or disqualification will occur. The competition judges have the final word. These judges, who share the responsibility for the students’ well being, are volunteers. They give of their time unselfishly, effectively, and with a desire to perpetuate an idea of fair competition.

6. A designated area (fix-it shop) will be available for problem solving and repairs. A designated volunteer will be provided in this area. It is designated for students only.

7. Non-competitors must remain in the spectator area, or the competitor(s) may be disqualified.

8. # of part. per team
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<thead>
<tr>
<th>Challenge</th>
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<tbody>
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<tr>
<td>1 or 2</td>
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<tr>
<td>1, 2, or 3</td>
</tr>
<tr>
<td>1, 2, 3, or 4</td>
</tr>
</tbody>
</table>

9. Only schools’ first, second, and third place winners in each challenge for the 9-12 grade band may attend the competition.

10. Students may compete in more than one challenge. Competitors will be called to the challenges. Students are responsible for checking in at each challenge on their own.

11. Competitors pay a $5.00 registration fee for each challenge. (This means that if Jane Doe competes in two challenges, $10.00 is due for her). Fees are billed by purchase order from the school district. Please make sure the bookkeepers are aware of this.

12. An audio/visual Release Form, signed by a parent/guardian must accompany each student registration.

13. Medallions will be awarded for first, second, and third place for each challenge.
   *A concession stand will be provided on site for meals and/or snacks.
   *If you have any questions, please feel to email Brian Schuller at brian.schuller@dmesc.org or Neal Jenkins at neal.jenkins@dmesc.org or call 870.386.2251.
Catapult Challenge
Grades 3-6

Objective:

Design, engineer, and build a catapult/trebuchet that will launch a hacky sack with a mass of 30g-35g at circular targets 35.56cm (14in) high and 60.96 cm (24in) in circumference and land into a bucket and accumulate as many points possible.

Rules:

1. No kits!

2. The dimensions of the catapult or trebuchet will not exceed 30cm high X 30cm wide X 30cm deep in size for the base and the lever arm may not exceed 60cm. This will be measured from the fulcrum.

3. The catapult may be powered by any means possible, such as rubber bands, counterbalance weights, or elastic lever arms.

4. The device must have some type of trigger to set it off from a minimum of one meter around the entire device. Simply pulling the lever back and letting go will not be allowed in the competition.

5. Each competitor will be given 1 practice attempt. After the practice, each competitor will have three shots; a single attempt at 1 meter, 3 meters, and 5 meters.

6. The winner of the challenge is the competitor who accumulates the most points.

7. All contestants will be allowed 5 minutes at the Fix-It-Shop to make adjustments before the challenge begins.

8. Projects must have the following information visible on the project:

   9. Student(s) name(s), School name, Teacher name, and Grade.

Scoring:

The hacky sack must land in the bucket to receive point(s). The score will be allotted as follows:

1 pt. at 1 meter, 2 points at 3 meters, and 3 points at 5 meters.

See catapult target on page 11.
Catapult Challenge
Grades 7-12

Objective:

Design, engineer, and build a catapult/trebuchet that will launch a hacky sack with a mass of 30g-35g at circular targets 35.56cm (14in) high and 60.96 cm (24in) in circumference and land into a bucket and accumulate as many points possible.

Rules:

1. No kits!

2. The dimensions of the catapult or trebuchet will not exceed 60cm high X 60cm wide X 60cm deep in size for the base and the lever arm (which needs to be removable) may not exceed 120cm. This will be measured from the fulcrum.

3. The catapult may be powered by any means possible, such as rubber bands, counterbalance weights, or elastic lever arms.

4. The device must have some type of trigger to set it off from a minimum of one meter around the entire device. Simply pulling the lever back and letting go will not be allowed in the competition.

5. Each competitor will be given 1 practice attempt. After the practice, each competitor will have three shots; a single attempt at 5 meters, 7 meters, and 9 meters.

6. The winner of the challenge is the competitor who accumulates the most points.

7. All contestants will be allowed 5 minutes at the Fix-It-Shop to make adjustments before the challenge begins.

8. Projects must have the following information visible on the project:

9. Student(s) name(s), School name, Teacher name, and Grade.

Scoring:

The hacky sack must land in the bucket to receive point(s). The score will be allotted as follows:

1 pt. at 5 meter, 2 points at 7 meters, and 3 points at 9 meters.

See catapult target on page 11.
CATAPULT TARGET

5 meters (3-6)
9 meters (7-12)

3 meters (3-6)
7 meters (7-12)

1 meter (3-6)
5 meters (7-12)

Launching Pad (3-6)
60cm x 60cm

Launching Pad (7-12)
120cm x 120cm
Earthquake Challenge
Grades 3-12

Objective:
Design, engineer, and build a structure with the highest load-to-weight capacity ratio. The structure must withstand earthquake conditions at varying intensities for spans of 20 seconds.

Rules:  See Diagram Page 14
The structure may be of any design but MUST conform to the rules stated below.

1. Projects must have the following information visible on the project:
   Student/School/Teacher’s Name and Competition Grade Level

2. The Earthquake Structure kit, which contains hot glue sticks, spaghetti sticks, cardboard squares, and Velcro, must be purchased from DMESC at a cost of $3.00 each. The box containing the spaghetti sticks MAY NOT be used in construction of the structure.

3. The kit contains 4 – cardboard squares (12” x 12”). One of the cardboard squares will serve as the foundation piece. A clearance of 1” on all sides must exist so the structure can be clamped to the earthquake table. Therefore, the maximum footprint for the structure will be 11” x 11,” with the bottom cardboard measuring 12” x 12.”

4. All other floor levels may range from 4” x 4” minimum to 12” x 12” maximum. Excess cardboard (trimmings) MAY NOT be used in any way in the construction of the structure. * Plan well BEFORE cutting cardboard!

5. Glue no more than 5% (very small amount).

6. Height is measured from foundation to roof.
   Maximum structure height is 36 inches.
   Minimum structure height is 30 inches.

7. Must have 3 stories (levels) with top. A floor level height can be no less than 10 inches.

8. The provided Velco will need to be affixed (glued) to the center of cardboards 2, 3, & 4. For competition - 300 grams of weight will be added to cardboards 2, 3, & 4.

9. Legs/columns (vertical members) are constructed of 4 spaghetti sticks and can only be used at the corners.

10. Cross braces (horizontal/diagonal members) are constructed of 2 spaghetti sticks, and they may be used anywhere in the structure.

11. Types of joints:
   Butt – pieces are joined end-to-end (see diagram, page 14).
   Lap – pieces are overlapped (see diagram, page 14).
Scoring:

1. An individual or partnership may register only one earthquake structure.

2. Prior to testing, each structure will be inspected and weighed by the judges to indicate compliance with contest construction specifications. **Weight of structure may not exceed 745g.**

3. Weight will be applied to the top surface of cardboards 2, 3, & 4 (see diagram, next page). The structure must withstand the stress weight.

4. The structure will then be tested using a series of increasing levels of earthquake stress. Each test will require the structure to maintain integrity for 20 seconds.

5. Highest score wins: load-to-weight ratio plus highest magnitude level = Total Score.

Load/Structure Weight + Magnitude Level = Total Score

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**Example A:**

Structure #1 holds 900g of load and structure weight is 500g and maintains integrity to level 3  
Total Score: 4.8

Structure #2 holds 900g of load and structure weight is 425g and maintains integrity to level 3  
Total Score: 5.1 – **WINNER!!**

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**Example B:**

Structure #1 holds 900g of load and structure weight is 625g and maintains integrity to level 5  
Total Score: 6.4

Structure #2 holds 900g of load and structure weight is 550g and maintains integrity to level 6  
Total Score: 7.6 – **WINNER!!**
# Earthquake Challenge Diagram

<table>
<thead>
<tr>
<th>Parts</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg/Column</td>
<td><img src="image" alt="Leg/Column" /></td>
</tr>
<tr>
<td>Cross brace</td>
<td><img src="image" alt="Cross brace" /></td>
</tr>
<tr>
<td>Butt Joint</td>
<td><img src="image" alt="Butt Joint" /></td>
</tr>
<tr>
<td>Lap Joint</td>
<td><img src="image" alt="Lap Joint" /></td>
</tr>
</tbody>
</table>

![Detailed Diagram](image)
Egg-drop Challenge  
Grades 3-8

Objective:
Design, engineer, and build a cargo crate that will prevent a large egg from breaking when dropped from increasing heights using only the materials listed. You do not have to use all of the materials. The egg must be sealed inside a snack-sized zip-lock bag to prevent splatter in case of injury to the egg. DMESC will provide eggs.

Rules:
Projects must have the following information visible on the project:
Student(s) name(s), School name, Teacher name, and Grade.

Materials List:
1. Popsicle sticks OR tongue depressors (No pre-notched popsicle sticks) - Ten (or fewer)
2. Toothpicks - Ten (or fewer)
3. Drinking straws; see/print chart: http://bit.ly/2RSNIZL  
   Any size straw on this chart is acceptable - Ten (or fewer).
4. Pipe cleaners - Three (or fewer)
5. String or yarn - Forty-eight cm (or fewer)
6. Masking tape one inch wide (must not be attached to egg in any manner) - Twenty-four cm (or fewer)
7. White glue or hot glue for gluing things together (must not stick to egg)
8. Rubber bands, 3” long x ¼” wide maximum - Three (or fewer)
9. No altering the plastic bag
10. Distance dropped will be 6 meters and 9 meters.
11. Parachutes – student discretion – see p. 17 Parachute Packing Score

Analysis:
Any structure that does not adhere to the materials list will be automatically disqualified.

Scoring:
The winning entry is comprised of:

a. an egg which survives the "CRASH LANDING" without cracks or being broken with the least amount of mass

b. the lowest Parachute Packing Score
Egg-drop Challenge
Grades 9-12

Objective:
Design, engineer, and build a cargo crate (on site the day of competition in 1 hour or less) that will prevent a large egg from breaking when dropped from increasing heights using only the materials listed (students will supply all materials except for what DMESC supplies). You do not have to use all of the materials. The egg must be sealed inside a snack-sized zip-lock bag to prevent splatter in case of injury to the egg. DMESC will provide eggs and hot glue.

Rules:
Projects must have the following information visible on the project:
Student(s) name(s), School name, Teacher name, and Grade.

Materials List:
1. Popsicle sticks OR tongue depressors (No pre-notched popsicle sticks) - Ten (or fewer)
2. Toothpicks - Ten (or fewer)
3. Drinking straws; see/print chart: http://bit.ly/2RSNIZL
   Any size straw on this chart is acceptable - Ten (or fewer).
4. Pipe cleaners - Three (or fewer)
5. String or yarn - Forty-eight cm (or fewer)
6. Masking tape one inch wide (must not be attached to egg in any manner) - Twenty-four cm (or fewer)
7. White glue or hot glue for gluing things together (must not stick to egg)
8. Rubber bands, 3” long x ¼” wide maximum - Three (or fewer)
9. No altering the plastic bag
10. Distance dropped will be 6 meters and 9 meters.
11. Parachutes – student discretion – see p. 17 Parachute Packing Score

Analysis:
Any structure that does not adhere to the materials list will be automatically disqualified.

Scoring:
The winning entry is comprised of:
a. an egg which survives the “CRASH LANDING” without cracks or being broken with the least amount of mass
b. the lowest Parachute Packing Score
## Parachute Packing Score

### Canopy Area Score

<table>
<thead>
<tr>
<th>Canopy radius (centimeters)</th>
<th>X</th>
<th>=</th>
<th>Canopy Area Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>_________________________</td>
<td></td>
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</tr>
</tbody>
</table>

### Suspension Line Length Score

| _________________________ | 4 | X | _________________________ | = | _________________________ |
| _________________________ |   |   | _________________________  |   | _________________________ |
| Length of one suspension line (centimeters) |   |   | Suspension Line Length Score |

### Total Parachute Packing Score

<table>
<thead>
<tr>
<th>Canopy Area Score</th>
<th>+</th>
<th>Suspension Line Length Score</th>
<th>=</th>
<th>Total Parachute Packing Score</th>
</tr>
</thead>
</table>
Electric Car Challenge
Grades 5-12

Objective:
To design, engineer, and build a vehicle, powered solely by stored energy that will travel a set linear distance. Note: by definition, a vehicle is a device with wheels or runners used to carry something (e.g., car, bus, bicycle, or sled).

Construction:

1. The device must be powered by stored energy.

2. NO VEHICLES MADE FROM KITS. The vehicle may be modeled after a kit, but cannot be made from a kit.

3. All parts of the vehicle must remain with the vehicle as it travels down the track and completes the heat.

4. The vehicle must steer itself; no outside forces may be used to guide it.

5. The vehicle must be started by turning on a switch and may not receive a push in the forward direction or side direction.

6. The judge has the final decision as to the appropriateness of any additional items that might be used in the construction of the vehicle.

7. The Electric car must fit in a 30.48cm x 30.48cm x 30.48cm (12” x 12” x 12”) box.

8. The final winner will be determined by weight of payload and engineering notebook.

9. The Electric Car kit, which includes battery storage, gears, and an electric motor, must be purchased from DMESC at a cost of $6.00 each.

10. Must use double A (AA) battery. (Can only bring two double A batteries and these are used for the entire day. Cannot switch out batteries.)

11. Projects must have the following information visible on the project:

   Student(s) name(s), School name, Teacher name, and Grade.
**Competition:**

1. The track will be a smooth floor with side borders and a length of 10 meters long and 61 centimeters wide.

2. Heats will be run until a winner is declared.

3. There will be an opportunity to check your car at the very beginning of the competition to make sure the car works.

4. For repairs, a car may be taken to the fix-it shop and repaired. Soldering must be performed by the student under supervision of the fix-it shop manager.

5. The heaviest payload of a heat will continue to the next heat and so on and the heaviest payload along with the best engineer notebook will be declared the winner.

6. Weights will be provided at the competition. (Starting weight of 25 grams with 25 gram increments)
**The minimum Engineering Notebook Score required for qualification for DMESC competition is 42 points (70%).**

Label notebook with SCHOOL NAME, STUDENT NAME(S), GRADE LEVEL, TEACHER NAME, and CHALLENGE NAME. The engineering notebook should be a composition or spiral notebook (6 x 9 or larger).

During your work for your Science Destination challenge, you will be required to keep a completed, neat, and concise engineering notebook.

**What is the purpose of the notebook?**
The engineering notebook will be used to record your progress, ideas, notes, sketches, questions, and thoughts. It is evidence of the work you have done.

**Why use an engineering notebook?**
The Engineering Notebook is documentation of your design and records the time spent doing research, trial and error, and plans for growth.

**How do I develop my engineering notebook?**

1. Use a TABLE of CONTENTS to organize your notebook.
2. Use a PEN for written entries and sketches.
3. Decide if you will use both fronts and backs of pages. If a back is unused, it should be cross-hatched, dated, & initialed.
4. Write NEATLY! Everyone should be able to read it.
5. Write down EVERYTHING AS IT HAPPENS. If it is NOT documented, it did NOT happen.
6. Begin your notebook by introducing yourself/each team member with a brief biography that includes name(s), age(s), school, school year, and interests.
7. Number pages in PEN.
8. Date EACH ENTRY in chronological order.
9. Clearly SEPARATE each day’s entry by using a new page in the journal for each day.
10. Entries should include enough INFORMATION so someone else could successfully duplicate your work.
11. LABEL figures, calculations, and sketches.
12. Use COMPLETE sentences for the INTRODUCTIONS and CONCLUSION/REFLECTIONS. A complete sentence is a complete thought that begins with capitalization and ends with a form of punctuation.
13. Draw a SINGLE line through any errors and enter the correct information nearby. Initial all corrections.
14. Never, under any circumstances, REMOVE pages from your engineering notebook.
15. Never let ANYONE other than YOURSELF or a TEAM MEMBER write in your engineering notebook.
# Engineering Notebook Rubric/Score Sheet

Engineering Notebook Percentage Score (B) ______

Student(s) ____________________ School ______________________ Challenge ______

<table>
<thead>
<tr>
<th>Content</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear, logical, mature, and thorough development and documentation of ideas. Includes min. of 3 trials.</td>
<td>Somewhat clear, logical, mature, and thorough development and documentation of ideas. Includes fewer than 3 trials.</td>
<td>Lacks development of ideas/weak documentation. Includes fewer than 3 trials.</td>
<td></td>
<td>______/15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Imagery</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imagery, sketches, and drawings are clearly labeled, formatted, and further the overall project design.</td>
<td>Imagery, sketches, and drawings are somewhat labeled, formatted, and show some relation to the overall design and development of the project.</td>
<td>The notebook lacks sufficient credible imagery, sketches, and drawings that relate to design and development.</td>
<td></td>
<td>______/15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organization &amp; Neatness</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notebook is clear and concise with necessary information; reader is able to navigate through the notebook with full understanding of the project; Table of Contents is appropriate.</td>
<td>Notebook is somewhat clear and concise with necessary information; reader is unable to navigate through the notebook with full understanding of the project; Table of Contents is lacking one or more entries.</td>
<td>Notebook is not clear and concise with necessary information; notebook lacks some necessary information; reader is unable to navigate through the notebook with full understanding of the project; Table of Contents missing.</td>
<td></td>
<td>______/9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bibliography includes 3 or more resources appropriately cited in APA format.</td>
<td>Bibliography includes fewer than 3 resources appropriately cited in APA format.</td>
<td>Bibliography includes fewer than 3 and inappropriate citation (not APA, errors, etc.).</td>
<td></td>
<td>______/6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grammar &amp; Mechanics</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control of grammar, usage, and mechanics; almost entirely free of spelling, punctuation, and grammatical errors.</td>
<td>Contains several spelling, punctuation, and grammar errors which may at times detract from the notebook’s readability.</td>
<td>The number of spelling, punctuation, and grammar errors cause the notebook to not be understood by the reader.</td>
<td></td>
<td>______/6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Format</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No white space, loose papers, erasures (includes white out); blank areas are cross-hatched, initialed &amp; dated.</td>
<td>Relative to completed notebook pages, few instances of white space, loose papers, &amp; erasures are evident.</td>
<td>Relative to completed notebook pages, several instances of white space, loose papers, &amp; erasures are evident.</td>
<td></td>
<td>______/6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signatures &amp; Dates</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt.(1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each entry in the notebook is dated and signed.</td>
<td>The notebook is missing one date/signature.</td>
<td>The notebook is missing two or more dates/signatures.</td>
<td></td>
<td>______/3</td>
</tr>
</tbody>
</table>

Total (A) ______/60

Engineering Notebook score (A) ______ ÷ 60 = _______ percentage score (B) Transfer to top
Generator Challenge
Grades 5-12

Objective:
Design, engineer, and build a generator that will produce the highest voltage and amps.

Rules
You are pretty much free to make your generator out of whatever you want; just keep in mind the following rules:

1. Your generator may not be commercially made.
2. Your generator must be made out of materials found around the house.
3. Your generator must produce ac or dc power.
4. The generator competition may have 2 or fewer members per team.
5. Your generator may not be powered by fossil fuels.
6. Each generator needs a 110 female receptacle for testing.
7. Your generator cannot utilize a store-bought battery.

Scoring
The generator that produces the highest voltage and amps wins.
Mousetrap Car Challenge
Grades 3-6

Objective:

To design and engineer a vehicle, powered solely by the energy of one standard sized mousetrap, which will travel the greatest linear distance. Note: By definition, a vehicle is a device with wheels or runners used to carry something (e.g., car, bus, bicycle, or sled). Therefore, launching a ball (e.g., marble) from the mousetrap will be ruled illegal.

Construction:

1. The mousetrap car must be powered by a single wooden mousetrap measuring 1-3/4 in. wide x 3-7/8 in. long. ([https://www.docfizzix.com/products/parts-supplies/supp001df.shtml](https://www.docfizzix.com/products/parts-supplies/supp001df.shtml)).
2. NO VEHICLES MADE FROM KITS. The vehicle may be modeled after a kit, but cannot be made from a kit.
3. The mousetrap cannot be physically altered except for the following: 4 holes can be drilled only to mount the mousetrap to the frame, and a mousetrap’s spring can be removed only to adjust the length of its lever arm.
4. The device cannot have any additional potential or kinetic energy at the start other than what can be stored in the mousetrap's spring itself. This also means that the student cannot push start the vehicle.
5. All parts of the vehicle must remain with the vehicle as it travels down the track and stops.
6. The spring from the mousetrap cannot be altered or heat-treated. Do Not double wind the spring!
7. The spring cannot be wound more than its normal travel distance, or 180 degrees.
8. The vehicle must steer itself; no outside forces may be used to guide it.
9. The vehicle must be self-starting and may not receive a push in the forward direction or side direction.
10. The judge has the final decision as to the appropriateness of any additional items that might be used in the construction of the vehicle.
11. Projects must have the following information visible on the project: Student(s) name(s), School name, Teacher name, and Grade.

Competition:

1. The racetrack will be a smooth floor marked three meters in width.
2. Distance will be measured from the edge of the starting line to the front of the vehicle after it stops or leaves the track way. (Even if the vehicle turns, the front of the vehicle is considered the starting point.)
3. Each contestant will be given two attempts.
4. The longest single run by a contestant will decide winner.
Multimedia Projects Challenge
Tyra Hobson – tyra.hobson@dmesc.org

Rules and Regulations:
Competitions categories: GRADES 5-6, 7-8, 9-12

Multimedia and STEM are important because they pervade every part of our lives. Science is everywhere in the world around us. Technology is continuously expanding into every aspect of our lives. Engineering is the basic designs of roads and bridges, but also tackles the challenges of changing global weather and environmentally-friendly changes to our homes. Mathematics is in every occupation, every activity we do in our lives. By integrating multimedia with STEM, we are giving students the opportunity to explore STEM-related concepts and hopefully students will develop a passion for it and pursue a job in a STEM field.

Please read the following rules and regulations before beginning your project. Review them with your parent(s) and teacher. Follow the rules and complete the form as required. FAILURE to do so may disqualify your entry.

1. All participants must follow copyright laws and guidelines.

2. Final Checklist and Goals Summary must be completed and accompany each project.

3. All the videos and presentations should tell a complete story in less than five minutes.

4. Evaluation of projects in these categories will consider writing and explanation as well as technical expertise.

5. Maximum group size of three.

6. Projects must have all personal information removed. Please assign school identifiers to the projects. EX: #1AshdownJr8WebPresence2 (Entry, School, Grade Level, Category, number of students involved with project)

7. Major Topics: Pick ONLY one of the following for a category.
   1. Scientist or Engineer
   2. Major Contribution to Science or Engineering
   3. Scientific Design or Engineering Design
   4. STEM

Each student may submit only one entry from one of the categories.
A. Web Presence:
An entry in this category could be a web page (wix, duda, google sites, etc.), or social media presence (Instagram, Twitter, YouTube, etc.), with school and guardian permission. Projects should run from a computer provided by the school on the day of Science Destination.

Sites are evaluated for:
- Goals of Website
- Content
- Technical Features
- Creativity and Originality
- Design

B. Video Competition:
An entry in this category is an original, non-interactive presentation that runs without operator assistance. Creation and presentation may be by computer or video. No iMovie trailer templates or other video templates. Green screens may be used (ex: doink.com may be used). Video examples: (PSA on scientific topic like volcanoes, global warming, etc.), Rube Goldberg video, etc. If a student wants to use the element of audio (original digitally created aural or sound), a music video may also be created under this category.

Videos are evaluated for:
- Goals of the Video
- Content
- Technical Performance
- Creativity and Originality
- Production Value

Terms and condition: It is assumed that the entire content of the submitted video is original and the entrants to the competition have the right/s, and where applicable, the permission, to use the images and audio/music they used in putting the video together. The organizer of this competition is not liable for any copyright infringements on the part of the entrant/s.

C. Virtual Reality Experience:
An entry in this category is a virtual reality experience created by the student regarding anything STEM (Science, Technology, Engineering, Math). Students may use the software of their choice (Ex: Unity, Blender, Unreal Engine, AFrame, patches.vizor.io, etc.). Students can:

1. Make an immersive 360-degree video in a real-world environment or
2. A 3D animation that goes beyond real-life limits.
This can be a VR APP or experience available to be shared digitally with DMESC.

Experiences are evaluated for:

- Goals of the VR Experience
- Content
- Innovation
- Technical – Performance, Interactive Features, Navigability
- Creativity and Originality
- Production Value

D. Innovative Technology Use:
An entry in this category is a product that does not neatly fit into any of the other categories. Technology is continually progressing and this category encourages you to use innovative ideas. This may include STEM projects, Makerspace projects (cardboard construction, prototyping, digital fabrication, 3D printing, etc.). Microcontrollers (Makey Makey, Arduino, Raspberry Pi, etc.), Coding projects (make a website, web application (an interactive game), APP, etc.), or other imaginative applications.

Experiences are evaluated for:

- Goals of the Innovative Technology Project
- Content
- Technical
- Creativity and Originality
- Innovation
Multimedia Projects Challenge Checklist
(must be initialed by student & teacher and submitted with project)

___ 1. I have checked my project carefully for copyright violations.
___  My students have documented all sources properly.

___ 2. I have double-checked to make sure that my project actually runs properly without assistance. (DMESC cannot be responsible for missing movie files, missing animations, missing stacks, or lost pictures.)
___  I have double-checked to make sure that this project actually runs properly.

___ 3. I have reviewed the multimedia rubric for my project and assessed my work.
___  I have reviewed the multimedia rubric for this project and assessed the student’s work.

___ 4. I have checked to see that the personal information has been removed from the project and a project number has been assigned. I have correctly labeled my project using my entry number, school name, grade level, category and the number of students involved.
EX: #1AshdownJR8WebPresence2
___  I have provided my students with the correct entry number and check to make sure the personal information has been removed from the project. I also have checked the labeling of the entry.

___ 5. I have indicated my project platform (PC or Mac) and software required to run my project.
___  I have ensured the project package platform and software are indicated.
# ENTRY INFORMATION

Entry information must follow Science Destination Guidelines.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>List the category you enter.</td>
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<tr>
<td>Name of project:</td>
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</tr>
<tr>
<td>Grade Level:</td>
<td></td>
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<tr>
<td>Web URL:</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DESCRIPTION OF GOALS of Website (as provided by entrant)</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>You should provide a clear, concise description of your goals for the website, its target audience, and any other factors that would help the judges evaluate the success of the website. You can include additional comments other than those in the description above. This must be turned in with the project.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - CONTENT - Quality of Information/ Quality of Writing and Images</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the entry appear to be reliable and accurate?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is the content of the website important and audience appropriate.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is it interesting to browse/read?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is it well written, with minimal spelling/grammar errors?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Enough rich content that will likely lead to return visits?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is there a good mix of text and images?</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - TECHNICAL - Functionality, Performance, Interactive Features</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Links work properly.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Graphics optimized for best appearance and fast download? Usable at various connection speeds and different screen resolutions?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Takes advantage of interactive features and technology?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Uses multiple media types effectively?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>The technical features, functionality, performance, and interactive features of the website are functional.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Creativity and Originality</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the website original and innovative?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Did the students create the template design?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Are the materials used consistent and fit aesthetically with the concept and purpose of the website?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>How well does the website draw in the viewer and keep their attention?</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - DESIGN</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does entry achieve its stated goals?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is it easy to navigate/use?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Does the design fit the content?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is it aesthetically pleasing?</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Overall quality of the website.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Is the website presented in a clear and understandable format?</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

| JUDGE'S COMMENTS, SUGGESTIONS, ETC. | 1 2 3 4 5 |
## ENTRY INFORMATION

Entry information must follow Science Destination Guidelines.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>List the category you enter.</td>
<td></td>
</tr>
<tr>
<td>Name of project:</td>
<td></td>
</tr>
<tr>
<td>Grade Level:</td>
<td></td>
</tr>
<tr>
<td>Web URL:</td>
<td></td>
</tr>
</tbody>
</table>

| Does the video follow the guidelines? |  |
| Does the video run within the 5-minute time limit? |  |
| Is the information included in the video accurate and current? |  |
| Are any copyrighted materials used in the video? |  |
| Is any portion of the video inappropriate? |  |
| Did the student/team complete all necessary forms? |  |

### DESCRIPTION OF GOALS of the Video (as provided by entrant)

You should provide a clear, concise description of your goals for the video, its target audience, and any other factors that would help the judges evaluate the success of the video. You can include additional comments other than those in the description above. This must be turned in with the project.

### JUDGE'S EVALUATION - Content

<table>
<thead>
<tr>
<th></th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the content informational?</td>
<td></td>
</tr>
<tr>
<td>All information is clear, appropriate, and correct.</td>
<td></td>
</tr>
<tr>
<td>Provide examples of the potential impact in science and/or society.</td>
<td></td>
</tr>
<tr>
<td>Is the content accurate and relevant?</td>
<td></td>
</tr>
<tr>
<td>Does the project have a clear goal that is related to the topic?</td>
<td></td>
</tr>
<tr>
<td>Is the information well organized and presented in an engaging visual manner.</td>
<td></td>
</tr>
<tr>
<td>Is the video structured in a logical and sequential manner. Clear evidence that higher level thinking skills were used in the creation of this project.</td>
<td></td>
</tr>
</tbody>
</table>

### JUDGE'S EVALUATION - Technical - Performance

<table>
<thead>
<tr>
<th></th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was there a special skill involved (shows characteristics of specialization)?</td>
<td></td>
</tr>
<tr>
<td>What innovative techniques were used in the project?</td>
<td></td>
</tr>
<tr>
<td>Does it push the boundaries of innovation?</td>
<td></td>
</tr>
<tr>
<td>Does the video flow from a strong introduction to a natural conclusion?</td>
<td></td>
</tr>
<tr>
<td>Was the video presented information in a clear and understandable way?</td>
<td></td>
</tr>
<tr>
<td>Does it produce the desired response/emotional reaction from the audience?</td>
<td></td>
</tr>
</tbody>
</table>

### JUDGE'S EVALUATION - Creativity and Originality

<table>
<thead>
<tr>
<th></th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The approach to developing the video is creative.</td>
<td></td>
</tr>
<tr>
<td>The video is original.</td>
<td></td>
</tr>
<tr>
<td>Equipment/Software is creatively used or modified by the students.</td>
<td></td>
</tr>
<tr>
<td>Does the video connect to the topic in a creative manner?</td>
<td></td>
</tr>
<tr>
<td>Does the video draw in the participant and keep their attention?</td>
<td></td>
</tr>
<tr>
<td>Methods used created entertainment value.</td>
<td></td>
</tr>
</tbody>
</table>

### JUDGE'S EVALUATION - Production Value

<table>
<thead>
<tr>
<th></th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The overall quality of the video is clear and concise, including visual and sound elements.</td>
<td></td>
</tr>
<tr>
<td>The video is constructed of well composed and shot images. Video transitions should be consistent and fit aesthetically with the concept and purpose of the video.</td>
<td></td>
</tr>
<tr>
<td>All audio must be recorded at appropriate levels and be free of distortion and extraneous noise.</td>
<td></td>
</tr>
</tbody>
</table>

29
**ENTRY INFORMATION**

Entry information must follow Science Destination Guidelines.

**CATEGORY**

List the category you enter.____________________________________

Name of project:____________________________________________

Grade Level: ______

Experience Location: ________________________________________

**DESCRIPTION OF GOALS OF VR EXPERIENCE (as provided by entrant)**

You should provide a clear, concise description of your goals for the VR Experience, its target audience, and any other factors that would help the judges evaluate the success of the experience. You can include additional comments other than those in the description above. This must be turned in with the project.

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Content</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the content informational?</td>
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<tr>
<td>Is the content relevant and engaging?</td>
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<tr>
<td>Does the experience have a clear goal that is related to the topic?</td>
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<tr>
<td>Is the content accurate? Is the information well organized and presented in an engaging visual manner?</td>
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<tr>
<td>Is the experience structured in a logical and sequential manner?</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Innovation</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does it push the boundaries of real-time rendering or immersive techniques?</td>
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<tr>
<td>Does it push the boundaries of innovation?</td>
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</table>

<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Technical - Performance, Interactive Features, Navigability</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the performance of the experience complete?</td>
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<tr>
<td>Does the experience provide Interactivity and Navigability for the user?</td>
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<tr>
<td>Does it produce the desired response/emotional reaction from the audience?</td>
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<tr>
<td>Science and or technology must be grounded in an accurate understanding and representation of the subject. Experience runs perfectly with no technical problems.</td>
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<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Creativity and Originality</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software is creatively used or had to be made/modified by the students.</td>
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<tr>
<td>Does the VR Experience draw in the participant and keep their attention?</td>
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<tr>
<td>Is the experience original?</td>
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<tr>
<td>The majority of the content and many ideas are fresh, original, and inventive.</td>
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<table>
<thead>
<tr>
<th>JUDGE'S EVALUATION - Production Value</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The overall quality of the experience is clear and concise.</td>
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<tr>
<td>Are the materials used consistent and fit aesthetically with the concept and purpose of the VR Experience?</td>
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<tr>
<td>Are the visual and sound elements appropriate for the experience?</td>
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<tr>
<td>Is the VR Experience presented in a clear and understandable format?</td>
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<tr>
<td>High level of coding language, skills, etc. are visible.</td>
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</tbody>
</table>

**JUDGE'S COMMENTS, SUGGESTIONS, ETC.**
**ENTRY INFORMATION**

Entry information must follow Science Destination Guidelines.

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>1 2 3 4 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>List the category you enter.</td>
<td></td>
</tr>
<tr>
<td>Name of project:</td>
<td></td>
</tr>
<tr>
<td>Grade Level:</td>
<td></td>
</tr>
<tr>
<td>Web URL (if applicable):</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION OF INNOVATIVE TECHNOLOGY PROJECT GOALS**

You should provide a clear, concise written or typed description of your goals for the Innovative Technology project, its target audience, and any other factors that would help the judges evaluate the success of the project. You can include additional comments other than those in the description above. This must be turned in with the project.

**JUDGE'S EVALUATION - Content**

Is the content informational?
All information is clear, appropriate, and correct.
Provide examples of the potential impact in science and/or society.
Is the content relevant and engaging?
Does the project have a clear goal that is related to the topic?
Is the content accurate?
Clear evidence that higher level thinking skills were used in the creation of this project.

**JUDGE'S EVALUATION - Technical**

Was there a special skill involved? (shows characteristics of specialization)
Did the project run without any technical problems? No error messages. All sound, video, other files are found, if applicable.

**JUDGE'S EVALUATION - Creativity and Originality**

The approach to solving the problem is creative.
Equipment is creatively used or had to be made/modified by the students.
The project shows significant evidence of originality and inventiveness.
The majority of the content and many ideas are fresh, original, and inventive.
Does the experience connect to the topic in a creative manner?
Does the project draw in the others and keep their attention?
Is it original?
Does it produce the desired response/emotional reaction from the audience?

**JUDGE'S EVALUATION - Innovation**

Does it push the boundaries of innovation?
Does the project exhibit examples of innovative techniques?

**JUDGE'S COMMENTS, SUGGESTIONS, ETC.**
Objective:

Solving STEM tasks, teams will unlock materials necessary to construct a specific mystery object within a given time.

Rules:

1. One team per school may compete.
2. Teams consist of four or fewer members.
3. Teams will have a maximum of two hours to complete the challenge.
4. Only the materials supplied in the box may be used.
5. The only outside resource to be consulted during the Mystery Box Challenge will be the student Engineering Notebook.
6. On Thursday, April 15, 2019 a clue for solving the Mystery Box Challenge will be posted on the DMESC Science page under the Science Destination tab for students to use in preparation for the Challenge.

Scoring:

The team that utilizes the provided information and clues, unlocks successive levels, and solves the Mystery Box Challenge by constructing the target object correctly in the shortest time places first in the challenge. Second and third places will follow according to completion time. Challenge event scores (first, second, and third place finishes) will then be combined with the student Engineering Notebook scores to determine overall placement for the Mystery Box Challenge.
Paper Airplane Challenge
Grades 3 & 4

Objective:
Competitors will design, engineer, and build an airplane constructed of PAPER to fly through doorways.

Rules:
1. Airplane is to be constructed of \textit{paper} only. (No tape, staples, etc. to be used).
2. The airplane is to be no more than 46cm long; 31cm wide; and 5cm from bottom to top of plane body section.
3. The student will have two launches that will result in a cumulative point value for both launches.
4. Students will launch their airplanes from behind a table. They will not be allowed to step into the launch. Both legs must touch the table during the launch.
5. Airplanes will be thrown through PVC doorways.
6. Three doorways (2m x 1m) will be lined up at 2.5m, 5m, and 7.5m from the throwing point.
7. Each competitor may bring one airplane.
8. Projects must have the following information visible on the project:
   Student(s) name(s), School name, Teacher name, and Grade.

Scoring:
1. Airplanes will be scored using the number of doorways through which they travel.
2. Points will be allotted as follows: 1 door = 1 point, 2 doors = 2 points, 3 doors = 3 points.
3. The score will be the best 2 out of 3 flights awarded.
4. Formula for calculations will be as follows: best trial + best trial = total points

See Airplane Diagram next page.
Paper Airplane Challenge
Diagram

3 points

2 points

1 point

Path of Airplane

7.5m

5m

2.5m

Point of Launch

Student
Paper Rocket Challenge
Grades 3-12

Objective:
Design, engineer, and build a model rocket of original design, with certain criteria, that will launch into the air using a launcher and land on a target at a distance of 10 meters and 20 meters.

Rules - Rocket Construction:
1. The rocket may be constructed from paper, poster board, or pipe insulation (gray or black in color). You may use a combination of these for one rocket.
2. The rocket can be held together using clear tape and 150cm (4’11”) of one-inch painters tape.
3. The diameter of the inner cylinder of the rocket must be able to slide onto a 1/2-inch PVC pipe.
4. The minimum length of the rocket may be no less than 20.32cm long or (8 inches).
5. The maximum length of rocket may not exceed 60.96cm or (24 inches).
6. The device must free-fall (no parachutes).
7. Projects must have the following information visible on the project:
   Student(s) name(s), School name, Teacher name, and Grade.

Methods and Analysis:
1. Competitor will place the rocket on the launcher.
2. Once the rocket is launched and lands, it is to remain at its landing site until a judge gives permission for it to be removed from the spot.
3. Each competitor will be given 1 practice attempt. After the practice, each competitor will have three shots; one attempt at target 1 (10 meters), one attempt at target 2 (20 meters) and a final attempt at either target.
4. The competitor will be allowed to release the launching mechanism at the competition.
5. All competitors will be allowed to set psi as needed with a maximum psi allowed of 25.

Scoring:
1. The score will be the best from target 1 and target 2.
2. Formula for calculations will be as follows: best trial target 1 + best trial target 2 = total points

See Rocket Target next page.
Rocket Target

1 points
240cm in diameter

2 points
120cm in diameter

3 points
60cm in diameter
Objective:
The team will design, engineer, and build a paper roller coaster using templates that are available by request. You must use paper products only to construct the roller coaster. No poster board will be allowed.

Rules:
1. You must use paper products only and clear packing or clear tape. No duct tape or wooden sections of roller coaster allowed.
2. Paper Rollercoaster is an open track and must include five design elements:
   a. Vertical Loop
   b. Wide turn
   c. Vertical Double loop – no corkscrew loops are allowed.
   d. Narrow turn
   e. Incline that is not a part of any other element. – Must be on its own.
   f. * An inclined plane is a simple machine. It is a flat surface that is higher on one end. You can use this machine to move an object to a lower or higher place. All other design elements are optional.
3. The coaster will be tested using a glass cat-eye marble launched from the highest point of the coaster. The first completed run will be the final run!
4. The total length of the coaster track must be a minimum of 3 meters and a maximum of 6 meters. The exact measurements must be sent in by the April 12, 2019 deadline.
5. Contestants cannot hold any part of the track during the competition.
6. Projects must have the following information visible on the project:
   Student(s) name(s), School name, Teacher name, and Grade.

Methods and Analysis:
1. The total length of the roller coaster will be measured and recorded.
2. The length of time that it takes the marble to travel the coaster will be recorded.

Scoring:
1. The speed of the marble will be calculated using distance/time, and the highest speed calculated will determine the winner.
2. In the event of a tie, a larger marble will be used, and the same procedure will be followed.
Robotics Maze Challenge
(Dead Reckoning)
Grades 5 & 6

Objective:

Participants will code their robots to navigate a maze.

Rules:

1. A team will consist of three or fewer members.
2. No sensors will be allowed in this competition.
3. Each team will provide its own robot and device for coding the robot.
4. One hour will be allotted for students to create a replica maze, brainstorm, compute, etc. Masking tape, tape measures, and dimensions will be provided.
5. Teams will draw for 5-minute competition slots for the Robotics Maze Challenge.
6. Three navigation routes will be available. Teams may select the route they wish to navigate.
7. Each team may choose to run the challenge maze one, two, or three times within a five-minute window.
8. The Robotics Maze Challenge is divided into three competition categories:
   A. Spheros & Ollies
   B. Legos
   C. Vex

Scoring:

Teams will code their robots during the 60 minutes allotted prior to competition. Placement for the competition will be determined using a point system, whether the robot completes the maze or not.

A 10-point bonus will be awarded to each robot that completes the maze. Competition points will then be averaged with the Engineering Notebook score to determine placement in the Robotics Maze Challenge.
Robotics Maze Challenge  
(Dead Reckoning)  
Grades 7-12

Objective:
Participants will code their robots to navigate a maze.

Rules:
1. A team will consist of three or fewer members.
2. No sensors will be allowed in this competition.
3. Each team will provide its own robot and device for coding the robot.
4. Teams will draw for 5-minute competition slots for the Robotics Maze Challenge.
5. Teams will be given a single practice run (5 min. maximum) prior to the competition run. Any minutes remaining of the five after the practice run may be utilized for problem solving, but no additional practice runs will be permitted.
6. Three navigation routes will be available. Teams may select the route they wish to navigate.
7. The Robotics Maze Challenge is divided into three competition categories:
   A. Spheros/Ollies
   B. Legos
   C. Vex
8. On Monday, April 29, 2019 a link to a template for A and B, Rule 7 (Spheros/Ollies and Legos) will be posted on the DMESC Science page under the Science Destination tab for students to use in creating a replica maze, brainstorm, compute, etc. No time will be given the day of the competition for this work.
9. On Friday, December 14, 2018 a link to a template for C, Rule 7 (Vex) will be posted on the DMESC Science page under the Science Destination tab for students to use in creating a replica maze, brainstorm, compute, etc. No time will be given the day of the competition for this work.

Scoring:
Placement for the competition will be determined using a point system, whether the robot completes the maze or not.

A 10-point bonus will be awarded to each robot that completes the maze. Competition points will then be averaged with the Engineering Notebook score to determine placement in the Robotics Maze Challenge.
Objective:

Design, engineer, and build a sailboat to sail a set distance with the heaviest mass in the shortest amount of time.

Rules:

You are pretty much free to make your boat out of whatever you want; just keep in mind the following rules:

1. Your boat may not be commercially made.
2. Your boat must be made out of materials found around the house.
3. Your boat must be at or under 30cm long.
4. Your boat must be at or under 15cm wide. This includes the sail.
5. There is no height limit.
6. The tube will have water to a depth of 10cm.
7. Boat must fit into the gauge box or will be disqualified.
8. Projects must have the following information visible on the project: Student(s) name(s), School name, Teacher name, and Grade.

Methods & Analysis:

1. You will race your sailboat in the trench.
2. You will place your boat in the water.
3. The boat will be held in place until you are ready to compete.
4. You will turn on the switch at the end of the trench to provide the wind energy for the sails of your boat.
5. You will not be able to touch it again until you're finished with that trial of the competition.
6. You will be able to make modifications between the first and second trials.
7. If the sailboat sinks, then it is automatically disqualified.
8. There will be NO mass cargo provided at the competition. You will need to bring that with you.
Scoring:

The winner of the challenge will be the entrant that makes it completely across the trench with the lowest score based upon the following formula:

\[(1000/W) \times T\]

W = Mass of boat  \( T = \) Sailing time

**HINT:** Notice in scoring that MASS counts.
Toothpick Bridge Challenge  
Grades 3-12

Objective:  
Design, engineer, and build a structure with the highest load-to-weight capacity ratio (Failure Load/Bridge Weight) over a predetermined span using toothpicks and colored glue.

Rules:  
The Bridge may be of any design but MUST conform to the BRIDGE CODE stated below. If the bridge does not meet the code, it will be disqualified from the competition.

3. Projects must have the following information visible on the project:  
   Student/School/Teacher’s Name and Competition Grade Level

4. The Toothpick Bridge kit, which includes glue and toothpicks, must be purchased from DMESC at a cost of $2.50 each.

5. Toothpicks may be used in any configuration. Glue may be applied sparingly to only 10% of each toothpick.  
   *Toothpicks are to be the primary stress (load) carrying element. The glue is to be used only to attach toothpicks together. Using glue as a primary stress-carrying element will be grounds for disqualification. Glue will be scrutinized both before and after stress test. If excessive glue is found to have been applied, the bridge will be disqualified.  
   *Layering of toothpicks is permitted as long as a “layer” is no more than 1cm thick.

3. Bridge must have a roadbed or at least road tracks for vehicular crossing.

4. The roadbed and support structure below the roadbed, together, may not exceed 5cm in height.

5. Bridge must be at least 5cm from the “river.” In other words, from the base of the piers to the base of the bridge structure, there have to be at least 5cm distance.

6. Bridge must be 4-7cm wide.

7. Bridge must have at least 20cm clearance between the inside of piers. Piers are to be no more than 5cm². Piers may be attached to 5cm² pieces of cardboard.

NOTE: This conforms to established template (page 43). Teachers may use the template for training purposes; however, templates will not be allowed at competition.
Materials:
- Glue and toothpicks (purchased from DMESC).
- Cardboard on which to attach piers.

Scoring:
6. An individual or team may register only one bridge.
7. Prior to testing, each bridge will be inspected and weighed by the judges to indicate compliance with contest construction specifications. **Weight of bridge may not exceed 160g.**
8. Weight will be applied to the roadbed of the bridge in a downward direction. The bridge must withstand the stress weight for 10 seconds.
9. When the bridge breaks (stress failure), the stress weight will be established.

**Example A:**
Bridge #1 held 11.34 kg (25lbs) of load and weighed 160g  
Score: 7.09
Bridge #2 held 13.61 kg (30lbs) of load and weighed 160g  
Score: 8.5  WINNER!

**Example B:**
Bridge #1 held 11.34 kg (25lbs) of load and weighed 130g  
Score: 8.7  WINNER!
Bridge #2 held 13.61 kg (30lbs) of load and weighed 160g  
Score: 8.5
BASIC BRIDGE PROFILE
YOU ARE ABLE TO ADD A TOP TO THE BRIDGE
YOU ARE ABLE TO ADD BELOW THE DECK AS LONG AS IT DOES NOT GO BELOW THE 5 CM MIN POINT

5.00 MAXIMUM

5.00 MINIMUM

5.00 MINIMUM

5.00

20.00

30.00

DECK / ROAD BED
Cardboard Template
Photo Release Form for Minors (if under 18)

The DeQueen Mena Education Service Cooperative has my permission to use my or my child’s photograph publically to promote the Science Destination Challenge. I understand that the images may be used in print publications, online publications, presentations, websites, and social media. I also understand that no royalty, fee or other compensation shall become payable to me by reason of such use.

Waiver of Liability for Minors (if under 18)

By signing this waiver, I acknowledge the risks involved in my child’s participation in any and all activities of DMESC’s Science Destination Challenge. I understand that although students will be supervised by their school and DMESC staff, I do assume the risk in my student’s participation in the event. I acknowledge that I will not seek to have DMESC held liable in the event that any accident, injury, loss of property or any other circumstance or incident occurs during or as a result of my child’s participation in Science Destination 2018. This release of liability includes accident, injury, loss, or damages to the student, as well as, to other individuals or property that may result from the student’s participation in the event. I hereby release and agree to hold harmless the DeQueen Mena Education Service Cooperative, its officials, agents and employees, from any claims arising out of my child’s participation in the event(s).

Parent/Guardian’s signature: ____________________________ Date________

Parent/Guardian’s Name: ____________________________________________

Child’s Name: ______________________________________________________

School: ___________________________________________________________

Phone Number: _____________________________________________________

------------------------------------------------------------------------------------------------------------------

Photo Release Form for Adults

The DeQueen Mena Education Service Cooperative has my permission to use my photograph publically to promote the Science Destination Challenge. I understand that the images may be used in print publications, online publications, presentations, websites, and social media. I also understand that no royalty, fee or other compensation shall become payable to me by reason of such use.

Waiver of Liability for Adults

By signing this waiver, I acknowledge the risks involved in my participation in any and all activities of DMESC’s Science Destination Challenge. I understand that I assume all risk during the event. I acknowledge that I will not seek to have DMESC held liable in the event that any accident, injury, loss of property or any other circumstance or incident occurs during or as a result of my participation in Science Destination 2018. This release of liability includes accident, injury, loss, or damages to the individual, as well as, to other individuals or property that may result from participation in the event. I hereby release and agree to hold harmless the DeQueen Mena Education Service Cooperative, its officials, agents and employees, from any claims arising out of my participation in the event(s).

Signature: ____________________________ Date________

Name: ____________________________________________

School: ____________________________________________

Phone Number: _________________________________________
RESOURCES

The Pitsco Bridge Book, Pitsco, Copyright 1989
Building Toothpick Bridges Grades 5-8
Dale Seymour Publications
ISBN # 0-86651-266-7

Explore large structures and what it takes to build them with BUILDING BIGTM, a five-part PBS television series and Web site from WGBH Boston. Here are the main features of the site:
http://www.pbs.org/wgbh/buildingbig/

Lesson Plans for building a Paper coaster:
http://www.mrwaynesclass.com/ProjectCoaster/Lab/index.html
http://paperrollercoasters.com/
http://www.ehow.com/how_6737513_build-styrofoam-sailboat.html
https://www.docfizzix.com/products/parts-supplies/supp001df.shtml