HILLSBOROUGH COUNTY

SCIENCE OLYMPICS

2024-2025 Science Olympics Handbook

HAEST
HILLSBOROUGH ASSOCIATION OF ELEMENTARY SCIENCE TEACHERS

Hillsborough County
PUBLIC SCHOOLS
Preparing Students for Life

K-5 Science Supervisor

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Kristen Skinner & Amber Mueller

For any questions about events, please contact Kristen Skinner at

Kristen.Skinner@hcps.net

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SCIENCE
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PHILOSOPHY

The Science Olympics have been established to:

- Strengthen student motivation and interest in science and engineering practices.
- Promote community awareness of STEM.

All events are completed in one day. Contestants are required to finish all work on site, without assistance from parents or teachers. Practice at school sites, prior to the district competition, will increase success on the day of the event.

Why compete?

The Olympic events provide an exciting atmosphere for students, teachers, and the community to demonstrate the knowledge and skills students have acquired through the science process and engineering practices. The events are designed to strengthen a student's investigative and problem-solving skills.

Who can enter the Olympics?

Any Hillsborough County public or private K-5 school may enter the Olympics. Each entry will be allowed to bring a team, which consists of the individual or team grade level representatives for each event. Students must compete in a school Olympics before they are eligible to enter the Hillsborough County Olympics. Submit your registration form by **October 1, 2024**. Student participant names are due a week prior to your scheduled competition.

Competitions

Grade Level	Event Title	Grouping
Kindergarten	Skyscrapers	1 team of 2 students
First Grade	Aqua Foils	1 student
Second Grade	Paper Airplanes	1 student
Third Grade	Wind Racers	1 team of 2 students
Fourth Grade	Marshmallow Flyers	1 team of 2 students
Fifth Grade	Marble Coasters	1 team of 2 students

Canvas Content Connections

GRADE	EVENT	NGSSS Connections	Canvas Connections
Kindergarten	Skyscrapers	SC.K.N.1.1- Collaborate with a partner to collect information. SC.K.N.1.3- Keep records as appropriate- such as pictorial records of investigations conducted. SC.K.N.1.4- Observe and create a visual representation of an object which includes its major features.	Unit 3: Nature of Science - Skyscrapers This engineering design challenge allows students to demonstrate how to work with a partner, collect data, and create a prototype representative of their blueprint (their visual representation).
First	Aqua Foils	SC.1.P.8.1- Sort objects by observable properties including size, shape, color, temperature (hot/cold), weight (heavy/light), texture, and **whether objects float or sink.**	Unit 5: Physical Properties - Aqua Foils This engineering design challenge allows students to demonstrate their understanding of sinking and floating.
Second	Paper Airplanes	SC.2.P.13.3- Recognize that objects are pulled toward the ground unless something holds them up.	Unit 4: Force and Motion - Paper Airplanes This engineering design challenge allows students to demonstrate their understanding of how objects are pulled toward the ground unless something holds them up.
Third	Wind Racers	SC.3.P.10.2- Recognize that energy has the ability to cause motion or create change.	Unit 3: Energy - Wind Racers This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion or create change.
Fourth	Marshmallow Flyers	SC.4.P.10.2- Investigate and describe that energy has the ability to cause motion and create change. SC.4.P.12.1- Recognize that an object in motion always changes its position and may change its direction.	Unit 3: Energy - Marshmallow Flyer This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion and create change, while also recognizing objects in motion always change position and may change direction.
Fifth	Marble Coasters	SC.5.P.10.2- Investigate and explain that energy has the ability to cause motion or create change.	Unit 3: Energy - Marble Coaster This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion or create change.

* Additional investigations, video clips, texts, notebook stops and exit tickets that match the grade level standards are written as 5E lessons and can be found in the canvas modules indicated.

QUESTIONS TO ENGAGE THINKING

The Science Olympics activities can all incorporate higher order questions before, during, and after completing the design challenges.

Before: Use these questions to engage students with the task or pull out and activate background knowledge.

During: Use these questions to challenge students further or guide their thinking.

After: Use these questions to have students show what they have learned as a result of completing their design challenges through notebook reflections or classroom discussions.

Applying

How is_____an example of .....?
How could you use .... ?
In your life, how would you apply .... ?

Assessing

What does the data from each trial show?
How could you improve ..... ?

Connecting/Associating

What do you already know about ..... ?
What connection can you make between...?

Inferring

What would happen if .....?
What would have happened if .....?

Evaluating

What are the advantages and disadvantages?
What is the most important..... ?

Experimenting

How can you test.....?
What could you do to .....?

Interpreting

Why is_____important?
What is the significance of..... ?
What evidence does your data provide?

Observing

What observations did you make?
What changes did you make?

Planning

What preparations would you .....?

Predicting/Hypothesizing

What would you predict.....?
If you were going to guess ..... ?

Problem solving

How would you approach the problem?
What are some possible solutions to ...?

Engineer(s):_____

Science Olympics Planning Sheet

Problem/Challenge:

_____

_____

Investigate/Brainstorm: Independently sketch possible solutions.

A.

B.

Identify the strengths and weaknesses of the designs. How will it help you to complete your proposal?

_____

_____

_____

Plan/Design: Compare your design with your partners and choose the one you want to build. Sketch your blueprint. Remember to identify materials and label your design.

Build/Test: Build and then test your solution.

Collect and Analyze Data: Collect Data throughout your trials.

Data/Observation Chart	
Trial 1	
Trial 2	
Trial 3	
Trial 4	
Trial 5	

Reflect/Improve: Was it the best solution? Why or Why not?

What would you have done differently? How would you improve your design?

Explain and Justify your answer.

Discuss your findings with the other engineers in the classroom.

Draw a conclusion using your data to justify your thoughts.

Use the data and collected observations to design and test a NEW prototype

TIMELINE

DATE	EVENT/ITEM	LOCATION
September/October *See Year at a Glance and Instructional Guides*	School Olympics	Your school site
October 1, 2024	School Registration Form & Registration Fee Due *Names can be sent after registration deadline*	*School Mail to*: Shana Tirado Elementary ScienceROSSAC Rt. 7
October 7, 2024	Participant names due for Oct. 19 competition.	*School Mail to*: Shana Tirado Elementary ScienceROSSAC Rt. 7
October 19, 2024 **Refer to finals schedule.**	Finals	MOSI 4801 East Fowler Ave. Tampa, Florida
October 21, 2024	Participant names due for Nov. 2 competition.	*School Mail to*: Shana Tirado Elementary ScienceROSSAC Rt. 7
November 2, 2024 **Refer to finals schedule.**	Finals	MOSI 4801 East Fowler Ave. Tampa, Florida

Finals Schedule

October 19, 2024 Finals			November 2, 2024 Finals		
Adum K-8	Clair Mel	Gibsonton	Lowry	Rampello K-8	Tampa Palms
Alafia	Clark	Gorrie	Lutz K-8	Reddick	Tampa Heights
Alexander	Claywell	Grady	Mabry	Riverhills	Temple Terrace
Anderson	Collins	Graham	MacFarlane Park	Riverview	Thompson
Apollo Beach K-8	Colson	Hammond	Mango	Robinson	Thonotosassa
Bailey	Cork	Heritage	Maniscalco K-8	Robles	Tinker K-8
Ballast Point	Corr	Hunter's Green	McDonald	Roland Park K-8	Town & Country
Bay Crest	Crestwood	Ippolito	McKitrick	Roosevelt	Trapnell
Bellamy	Cypress Creek	Jackson	Mendenhall	Ruskin	Turner Bartels K-8
Belmont	Davis	James	Miles	Schmidt	Twin Lakes
Bevis	Dawson	Kimbell	Mintz	Schwarzkopf	Valrico
Bing	Deer Park	Kingswood	Mitchell	Seffner	Walden Lake
Boyette Springs	DeSoto	Knights	Morgan Woods	Seminole Heights	West Shore
Brooker	Dickenson	Lake Magdalene	Mort	Sessums	West Tampa
Broward	Doby	Lamb	Muller	Shaw	Westchase
Bryan	Dover	Lanier	Nelson	Sheehy	Wilson
Bryant	Dunbar	Lewis	Northwest	Shore	Wimauma
BT Washington	Edison	Limona	Oak Grove	Springhead	Witter
Buckhorn	Egypt Lake	Lincoln	Oak Park	Stowers	Woodbridge
Burney	Essrig	Lithia Springs	Palm River	Sullivan	Woodson K-8
Cannella	FishHawk Creek	Lockhart	Pinecrest	Sulphur Springs K-8	Yates
Carrollwood K-8	Folsom	Lomax	Pizzo K-8	Summerfield	York K-8
Chiaramonte	Forest Hills	Lopez	Potter	Summerfield Crossings	
Chiles	Foster		Pride	Symmes	
Cimino	Frost			Tampa Bay Boulevard	
Citrus Park					

*charter/private schools – contact shana.tirado@hcps.net

2024 Science Olympics Registration Form

Due: October 1, 2024

School Name: _____ Route #: _____

Science Olympic Contact(s): _____ Phone: _____

Science Olympic Contact(s) email: _____

Event Date: Select your school's assigned date below:

Finals		
Check One	**Date**	**Schools**
	October 19, 2024	Refer to Finals Schedule
	November 2, 2024	Refer to Finals Schedule

Events: Select each event your school plans on participating in.
Names will be sent separately closer to finals.

Events	
Grade Level	**Confirm Participation by Checking Boxes Below**
Kindergarten	
First Grade	
Second Grade	
Third Grade	
Fourth Grade	
Fifth Grade	

REGISTRATION FEE

- *Schools with 100% HAEST membership by October 1, 2024: Free*
- Schools WITHOUT 100% HAEST membership by October 1, 2024: $30

This fee helps to cover the cost of materials and awards for the events.

Checks made payable to HAEST. No cash will be accepted.

Name on check: _____ **Check #:** _____

*Please do not staple CHECK—attach with paperclip

Due: October 1, 2024

Shana Tirado
Elementary Science
ROSSAC
Rt. 7

Shana Tirado
Elementary Science
901 East Kennedy Blvd
Tampa, FL 33602

2024 Science Olympics
Participant Registration Form

School Name:_____ Route #: _____

Science Olympic Contact(s):_____ Phone: _____

Science Olympic Contact(s) email: _____

Confirm: Did your school register for the event by the October 1st due date?

Circle one: Yes or No

Event Date: Select your school's assigned date below:

Finals		
Check One	**Date**	**Schools**
	October 19, 2024	Participant names due 10/7/2024
	November 2, 2024	Participant names due 10/21/2024

Events: Please include the name(s) of any students participating in the chart below.

Event	Grouping	First & Last Names	Signed Media Release on file. (Please initial)
K- Skyscrapers	1 team of 2 students		
1st- Aqua Foils	1 student		
2nd- Paper Airplanes	1 student		
3rd- Wind Racers	1 team of 2 students		
4th - Marshmallow Flyers	1 team of 2 students		
5th- Marble Coasters	1 team of 2 students		

Send Names to Shana Tirado via school mail or email:
School Mail- Elementary Science, ROSSAC, Route 7
Email- Suject: Science Olympics Names

Sticker Contest

HILLSBOROUGH COUNTY SCIENCE OLYMPICS

Teacher Name (per district email): _____

Student Name (First and Last): _____

School: _____ Grade: _____

Design a stick that represents your grade level event or SCIENCE OLYMPICS overall! ***Do not include individual school names on your design.**

HAEST
HILLSBOROUGH ASSOCIATION OF ELEMENTARY SCIENCE TEACHERS

Hillsborough County PUBLIC SCHOOLS
Preparing Students for Life

Please submit to Shana Tirado – ROSSAC – Route 7 - Submissions due by November 1, 2024

Materials

GRADE	EVENT	SUPPLIES
Kindergarten	Skyscrapers	20 paper cups, (8 oz-12 oz) per team* (Size can vary based upon availability) 10 plastic cups, 473 mL (16 oz) per team 5 letter-size manila file folders per team Timer or Stopwatch for judging purposes* Meter sticks or measuring tapes for judging purposes*
First	Aqua Foils	Heavy-duty aluminum foil (One 30 cm X 20 cm piece per student) Marbles (small student size)* Water* Timer or Stopwatch for judging purposes* Strawberry baskets or other similar container (to hold marbles for weigh-in) Plastic Bins approx. 40 cm x 14 cm x 27 cm (for water to float foil boats) Scales (to weigh marbles for judging)
Second	Paper Airplanes	1 sheet of 8 ½" x 11" white copy paper per student* 1-5 small sized #1 vinyl-coated paper clips (any color) Timer or Stopwatch for judging purposes* Meter sticks or measuring tapes for judging purposes*
Third	Wind Racers	One letter-sized manila file folder* Two chenille pipe cleaners (12" long, 6mm wide) Two wooden 4.5-inch regular craft popsicle sticks One sheet of 8 ½" x 11" copy paper* One pair of scissors 30 centimeters of masking tape* Meter sticks or measuring tapers for judging purposes* Standard box fan will be utilized (on the medium setting)
Fourth	Marshmallow Flyers	1 paper cup, (8 oz-12 oz) per team* (Size can vary based upon availability) 25 Hand2Mind brand Snap Cubes per team 1 paint stir stick per team 2 large marshmallows (one for each trial) per team A foam mat (ex. a yoga mat) on which to place the flyer to launch Goggles for launching 4 Size-19 rubber bands per team Marker (to mark team's name on marshmallow) per team 30 cm masking tape (1") per team* Timer or Stopwatch for judging purposes* Meter sticks or measuring tapes for judging purposes*
Fifth	Marble Coasters	2 pieces of 1" pipe insulation (slit in half length-wise and approximately 1.8 meters long each) per team 1 marble (small student size glass) per team* 4 paper cups, (8 oz- 12 oz) per team* (Size can vary based upon availability) 300 cm masking tape (1") per team* 1 chair Timer or Stopwatch for judging purposes* Meter sticks or measuring tapes for judging purposes*

Cup size will be consistent during all heats of the Science Olympics District Competition.

** Items to be used in multiple events*

NOTE: Not all items need to be purchased by the school. Ask local businesses for donations. Parents are also a good source for donations either from their place of work or from home.

Skyscrapers

Kindergarten

Grouping:

Team of two (2) students

Purpose:

Build the tallest tower from the materials provided, using the beginning principles of architectural engineering.

Materials:

- 20 paper cups, 237 mL (8 oz-12 oz) per team **(size can vary based upon availability)**
- 10 plastic cups, 473 mL (16 oz) per team
- 5 letter-size manila file folders per team
- Timer or Stopwatch for judging purposes
- Meter sticks or measuring tapes for judging purposes

Time Limit:

The team will have 10 minutes to create a tower.

Procedure:

A team of two engineers will create a Skyscraper. It is not required to use all materials. Materials may be manipulated. The engineers will NOT be allowed to stand/climb on chairs or any other items.

Scoring & Judging Notes:

The winning group will erect the tallest standing structure. The Skyscraper must stand until measured. If any materials fall after time is called or during judging, the engineer may not replace the fallen materials. Due to size availability of the **paper** cups, cup size may vary throughout the event. The competition will remain fair by ensuring that all groups within the same heat have the same size cup.

Safety:

Engineers will not be allowed to stand/climb on chairs, etc. They must devise ways to add height.

Next Generation Sunshine State Standards:

Big Idea 1: The Practice of Science - SC.K.N.1.1, SC.K.N.1.3, SC.K.N.1.4

This engineering design challenge allows students to demonstrate how to work with a partner, collect data, and create a prototype representative of their blueprint (their visual representation).

Skyscrapers

Dear Apprentice Engineers,

The Mayor of Tampa has asked YOU to design and build a new building in downtown Tampa! The Mayor wants a building that will be taller than all the other buildings in downtown Tampa.

In a team of two engineers, build a model of the highest possible tower from the materials you are given.

What will your building look like? How tall can you build it?

Good luck! The Mayor is counting on you!

Materials Provided

- 20 paper cups, (8 oz.-12 oz.)
- 10 plastic cups, (16 oz)
- 5 letter-sized manila file folders

Rules:

- You may use only the materials provided to you on the day of the event.
- Teams may NOT stand/climb on chairs, each other, or any other items.
- Teams will have 10 minutes to build a tower.

Procedure:

- Your team may choose to practice prior to the day of the event by gathering your own materials and building your tower to find the best method.
- On the day of the event, your team will use the materials given to you to create a skyscraper in a 10-minute period.
- If your tower falls before the 10 minutes is completed, you may rebuild.
- Towers will be measured after the 10-minute building period.
- After the 10-minute build time, you will no longer be able to work on your tower.

Scoring:

The winning group will build the tallest standing structure. The Skyscraper must stand until measured. If any materials fall after time is called or during judging, the engineer may not replace the fallen materials. Due to size availability of the **paper** cups, cup size may vary throughout the event. The competition will remain fair by ensuring that all groups within the same heat have the same size cups.

Aqua Foils

First Grade

Grouping:

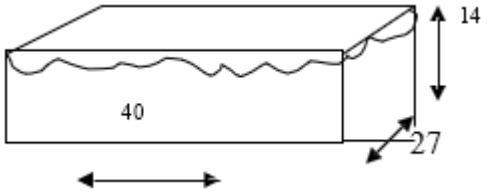
Individual Engineer

Purpose:

Using the materials provided, engineer an aluminum foil boat that can float with the greatest mass.

Materials:

- Heavy-duty aluminum foil (one 30 cm X 20 cm piece per student)
- Marbles (small student size)
- Water
- Timer or Stopwatch for judging
- Strawberry baskets (to hold marbles for weigh-in)
- Plastic Bins approx. 40 cm x 14 cm x 27 cm (water containers in which to float foil boats)
- Scales (to find the mass of the marbles during judging)



Time Limit:

The engineer is allowed 3 minutes to create the Aqua Foil boat.

Procedure:

The engineer will be given foil and will have 3 minutes to create a boat. After time is called, engineers may not manipulate their boat. Each engineer will bring their boat to the water container (see above). The engineer will place their marbles in the boat, one at a time, until the boat begins to take on water and sink. Once marbles are placed inside of the boat, they may not be picked up or moved. The judge will find the mass of the marbles using a scale. If you have no available scales, just count the marbles, but keep the marbles consistent in size and material they are made of.

Scoring & Judging Notes:

The boat holding the greatest mass, before sinking, will be the winner. The marble that sinks the boat will not be counted in the mass.

Next Generation Sunshine State Standards:

Big Idea 8: Properties of Matter - SC.1.P.8.1

This engineering design challenge allows students to demonstrate their understanding of sinking and floating.

Aqua Foils

Dear Apprentice Engineers,

The Port of Tampa is starting regular deliveries to nearby Picnic Island. They want your help in designing and building a metal boat that can carry as much cargo as possible. The more cargo your boat can carry, the less often they need to travel out to the island and can save gas. This is better for our environment.

What is the best boat design that will carry the most cargo? Not sure? Build a model out of aluminum foil to test your ideas. You can use marbles to represent the cargo. Time to get started. The City of Tampa is counting on you!!!

Materials Provided:

- 1 piece of heavy-duty aluminum foil (30cm x 20cm)
- Marbles (small student size)
- Plastic bin (in which to float boat)
- Water

Rules:

- You must build your boat in the three-minute time period.
- After the three-minute building time period, you will not be allowed to work on your boat.
- You may only use the piece of foil provided.
- You may tear your foil, but you may not use scissors or tape.
- Once marbles are placed inside, they may not be picked up or moved.

Procedure:

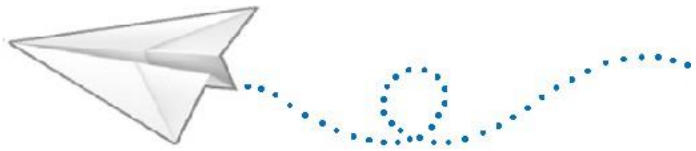
- You may choose to practice prior to the day of the event by gathering your own materials, making practice boats, and testing them.
- On the day of the event, you will build your boat in three minutes.
- You will then place your boat in a bin of water and place marbles one at a time in the boat until it begins to take on water and sink.
- When your boat sinks, the judges will find the mass of your marbles for you.

Scoring:

- The mass of the marbles your boat held will be your score.
- The boat holding the greatest mass before sinking will be the winner.
- The marble that sinks the boat will not be counted in the mass.

Paper Airplanes

Second Grade



Purpose:

Using the materials provided, build a paper airplane which will travel the greatest distance while carrying mass.

Materials:

- 1 sheet of 8 ½" x 11" white copy paper per engineer
- 1-5 small sized #1 vinyl-coated paper clips (any color)
- Timer or stopwatch for judging
- Meter sticks or measuring tapes for judging

Time Limit:

Engineers will be given three minutes to construct an airplane.

Procedure:

The engineer will construct an airplane in three minutes or less. Engineers must use at least one paper clip, but no more than five to add mass to their airplane. Paper clips must be attached (or clipped) onto the airplane and may not be manipulated or changed in any way. Standing with toes behind the start line, the engineer will toss the airplane. Engineers may be testing outside, so wind speed and direction may have to be taken into consideration.

Scoring & Judging Notes:

The distance the plane travels will be measured in meters from the starting point to the nose of the plane at the landing point or the stopping point (stopping point after slide). If a paper clip falls off during flight, distance will be measured in meters from the starting point to the landing point of the paper clip. If the plane hits an object other than the ground, the engineer will have the option to toss the airplane again. Engineers will only be allowed to re-throw a maximum of two times. We will use the GREATER DISTANCE of two trials to countas the final score.

Note: Paper balls are not considered airplanes!

Safety:

Throw planes away from other children.

Next Generation Sunshine State Standards:

Big Idea 13: Forces and Changes in Motion - SC.2.P.13.3

This engineering design challenge allows students to demonstrate their understanding of how objects are pulled toward the ground unless something holds them up.

Paper Airplanes

Dear Apprentice Engineers,

There is a crisis and airplane design engineers are requesting YOUR help!

With the rising price of fuel, a plane is needed that will use less fuel while carrying a payload (paper clip(s)). In fact, the engineers want you to build a plane that will glide through the air without using any fuel. They have requested that you design a prototype or model using one piece of 8 ½" x 11" paper and 1-5 #1 sized small vinyl-coated paperclips.

Good luck! The airplane design engineers are counting on you!

Materials Provided:

- 1 piece of 8 1/2" x 11" white, copy paper (standard weight)
- 1-5 small sized #1 vinyl-coated paper clips (any color)

Rules:

- You must build your plane in the three-minute time period.
- After the three-minute build time, you will no longer be able to adjust or work on your plane.
- You may only use the piece of paper provided.
- You may tear your paper, but no scissors will be provided.
- Paper balls are not considered an airplane.
- You may be outside, so wind speed and direction may need to be considered.
- Paper clips may not be manipulated or changed in any way.

Procedure:

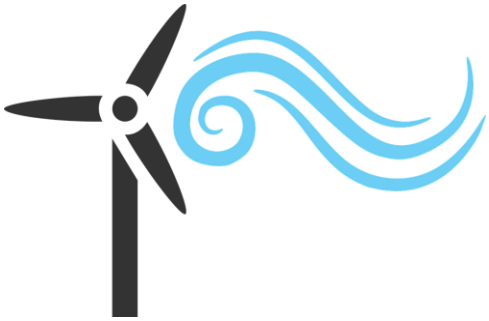
- You may choose to practice prior to the day of the event by gathering your own materials and making practice planes.
- On the day of the event, you will build your plane in three minutes using the paper provided.
- After the three-minute construction time period, you will no longer be able to adjust or work on your plane.
- Stand with your toes behind the start line. You will have two opportunities to toss your airplane straight ahead.

Scoring:

- The distance the plane travels will be measured in meters from the starting point to the nose of the plane at the landing point or the stopping point (stopping point after slide).
- If the plane slides, the point at which it comes to rest will be the point to which it is measured.
- If a paper clip falls off during flight, distance will be measured in meters from the starting point to the landing point of the paper clip.
- You will be allowed two trial throws. The GREATER DISTANCE of the two trials will count as your final score. If the airplane hits an object other than the ground, the engineer will have the option to toss the airplane again. You will only be allowed to re-throw a maximum of two times.

Wind Racers

Third Grade



Grouping:

Team of two (2) engineers

Purpose:

Using the materials provided, design and build a wind-powered vehicle that will travel the greatest distance, **ACCORDING TO PLANNED BLUEPRINT SPECIFICATIONS.**

Materials:

- One letter-sized manila file folder
- Two chenille pipe cleaners (12" long, 6mm wide)
- Two wooden 4 1/2-inch regular craft popsicle sticks
- One sheet of 8 1/2" x 11" copy paper
- One pair of scissors (used during building only)
- 30 centimeters of masking tape
- Meter sticks or measuring tapes for judging*
- Standard box fan will be utilized at the Science Olympics competition (the fan may not be manipulated or moved)
- Students have access to all the materials provided but are not required to use a component of each material.

Time Limit:

Engineers will have ten minutes to build their design based on their blueprints.

Procedure:

The team of engineers will design and build a wind powered racer. The racer will be powered by a box fan, set two feet behind the starting line. The vehicle will be placed behind the starting line and the fan turned on the medium setting for 15 seconds, then turned off. After the fan is turned off, and once the racer stops moving, it will be measured in a straight line from the closest point of the racer to the starting line. The students will have two attempts. The longest of the two attempts will count as the team's score. Engineers will have ten minutes to build their design. **A blueprint with specifications of the racer must be made on an 8 1/2" x 11" copy paper (or graph paper) and brought to the competition.**

Scoring & Judging Notes:

The winning team will create a racer that travels the furthest distance measured via a straight line from the starting line to the closest point of the device. Racers that finish behind the start line will not be measured.

After time is called, engineers may not add or alter their design. **Engineers are not allowed to cross the starting line.**

Safety:

Use correct safety measures with the scissors. Students must always remain in front of the box fan and are not allowed to touch any of the fan controls.

Next Generation Sunshine State Standards:

Big Idea 10: Forms of Energy - SC.3.P.10.2

This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion or create change.

Wind Racers

Dear Engineers,

The City of Tampa is requesting your help in designing a mode of transportation which is more environmentally friendly. The transportation committee wants their engineers to know that resources are limited. The focus is on creating the most efficient transportation device possible. Due to this, the materials will be restricted, and all devices must be powered by wind. Good Luck! The City of Tampa is counting on you to get things moving!

Materials provided:

- One letter-sized manila file folder
- Two chenille pipe cleaners (12" long, 6mm wide)
- Two wooden 4 1/2-inch regular craft popsicle sticks
- One sheet of 8 1/2" x 11" copy paper
- One pair of scissors (used during building only)
- 30 centimeters of masking tape
- Meter sticks or measuring tapes for judging
- Standard box fan will be utilized at the Science Olympics competition
- Students have access to all the materials provided but are not required to use a component of each material.

Rules:

- Your prototype must be powered by wind energy (using a box fan set on medium for 15 seconds).
- The box fan will be placed two feet behind the starting line. Students must stay in front of the fan and may not touch any of the fan controls.
- The box fan may not be manipulated or moved at all.
- You may use only the materials provided but are NOT required to use all your materials.
- A blueprint of your design must be brought to the challenge.
- Your prototype must follow the design of your blueprint.
- You have 10 minutes to build your design.
- Your prototype must start on the floor at a predetermined start line. (No part of your body may cross the start line.)

Procedure:

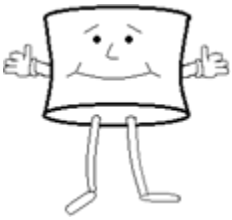
- You may choose to practice building and testing your prototype prior to the day of the event.
- On the day of the event, you will be given ten minutes to build your device based on the blueprint you bring with you (all materials will be provided).
- After the 10-minute build time, you will no longer be able to adjust or work on your build.
- When your team is called, you will place your prototype behind the start line and wait for the judge's command to test your design.
- Each team will have two trials. The trial with the longest distance will be the trial that counts.
- The wind racer may be fixed after the first trial if it breaks (1 minute repair time).

Scoring:

Judges will measure the distance between the starting point to the part of your prototype closest to the start line using a meter stick. Regardless of the path the prototype took, the distance from the two points will be measured in a straight line. Each team will have two trials, the higher score out of the two trials will be counted. The team with the furthest distance will be the winner. The device will only be measured if it has traveled in a forward motion. It cannot be measured behind the start line.

Marshmallow Flyers

Fourth Grade



Purpose:

To construct a flyer using the given materials, **ACCORDING TO PLANNED BLUEPRINT SPECIFICATIONS.**

Grouping: Team of two (2) engineers

Materials:

- 1 paper cup, (8 oz-12 oz) per team **(size can vary based upon availability)**
- 25 Hand2Mind brand Snap Cubes per team
- 1 paint stir stick per team
- 2 large marshmallows (one for each trial given 1 at a time for each launch)
- 4 size-19 rubber bands
- 30 cm masking tape (1") per team
- Timer or Stopwatch for judging
- Meter sticks or measuring tapes for judging
- Goggles to wear for launching
- 1 foam mat if launching from a hard surface (ex. yoga or placemat)

Time Limit:

Engineers will have ten minutes to build their design based on their blueprints.

Procedure:

The flyer will be built using all the supplies listed. **A blueprint with specifications of the flyer must be made on an 8 1/2" x 11" copy paper (or graph paper) and brought to the competition.** The marshmallow will be placed in the carrier that the engineers design using the material(s). The base will be made of Snap Cubes and the Snap Cubes must touch the paint stick. The base of the flyer may be held during the launch, but not attached to the floor, wall, or person. Engineers will have ten (10) seconds to launch their marshmallow after the judge gives them the marshmallow. The force must come in front of the marshmallow. The force must come from the hand (and not the foot) for safety. If the marshmallow hits anything other than the ground, the engineers will have the option to launch again up to a maximum of two re-launches. After the first launch, engineers will be given one (1) minute to repair the flyer to the original design. If it breaks during launch, replacement materials will not be provided. All materials must be used!

Definition

Carrier – the carrier is the part of the flyer in which the marshmallow can rest unassisted until launch.

Scoring & Judging Notes:

One (1) marshmallow will be given to the engineering team at each launch.

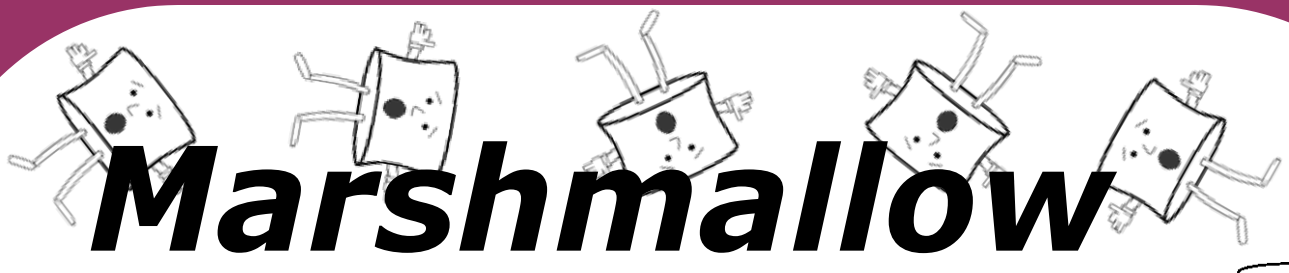
The marshmallow will be measured in meters from the starting point to the final stopping point. The BEST distance of two launches will be used as the team's score.

Next Generation Sunshine State Standards:

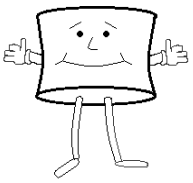
Big Idea 10: Forms of Energy - SC.4.P.10.2

Big Idea 12: Motion of Objects – SC.4.P.12.1

This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion or create change, while also recognizing objects in motion always change position and may change direction.



Marshmallow Flyers



Dear Apprentice Engineers,

The American Marshmallow Company is searching for new ways to distribute their marshmallow product s. They have asked you to design a way to send a marshmallow over a great distance. Your task is to create a flyer that will launch a marshmallow the greatest possible distance. The American Marshmallow Company has asked that you use the materials listed below, as these are products they have on hand at their factory. It is important that you use ALL the materials so that there is no waste.

Sincerely,

Al B. Flying, President

Materials for Building:

- 1 paper cup, (8 oz-12 oz)
- 25 Snap Cubes (Pop Cubes)
- 1 paint stir stick
- 4 rubber bands (size 19- 3 ½ x $\frac{1}{16}$ inches)
- 30 cm masking tape, 2.3cm (1" wide)

Materials for Launch:

- 1 foam mat (ex. yoga mat, placemat)
- 2 large marshmallows – given one at a time at each launch
- Goggles to wear for launching

Rules:

- All the materials must be completely used.
- The base is to be constructed of Snap Cubes.
- The paint stick must touch the Snap Cubes.
- Flyer may not be attached to floor, wall or person.
- The marshmallow must rest inside the carrier before launch.
- The force must come in front of the marshmallow.
- The force must be provided by a hand (and not a foot) for safety.
- The marshmallow must remain unchanged after it is received.

Procedure:

- You may choose to practice prior to the day of the event by gathering your own materials, designing your flyer and testing it.
- On the day of the event, you will be given ten minutes to build your flyer based on the blueprint or drawing you bring with you. After the 10-minute build time, you will no longer be able to adjust or work on your flyer.
- The flyer may be fixed after the first trial if it breaks (1 minute repair time).
- A blueprint of your design must be brought to the challenge, and you must follow the design of your blueprint.

Scoring:

The score will be the distance measured from the starting point to the stopping point in centimeters. If the marshmallow hits anything other than the ground, the engineers will have the option to launch again up to a maximum of two re-launches. The marshmallow that travels the greatest distance will be the winner. Each team will have two trials with the score being the BETTER of the trials.

Rockin' Roller Coasters
5th Grade

Grouping:

Team of two (2) engineers

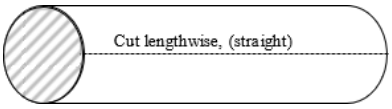
Purpose:

Construct a marble roller coaster, **ACCORDING TO PLANNED BLUEPRINT SPECIFICATIONS**, that will allow a marble to roll down the coaster, through all four obstacles, and move an unaltered cup the greatest distance at the end of the coaster.

Materials:

- Two half-pieces of 1" pipe insulation per team (see note below)
- 1 marble (small student size glass) per team
- 4 paper cups, (8 oz-12 oz) per team **(size can vary based upon availability, 3 must be used in the design of the coaster and 1 must remain unaltered for the end of the track)**
- 300 cm of 1" masking tape per team
- Timer or Stopwatch for judging
- Meter sticks or measuring tapes for judging cup distance
- 1 chair (style can NOT be guaranteed and engineers may not stand or sit on the chair)

*Note: Each team will receive two (2) sections (*approximately* 1.8 meters long x 1" diameter) of foam pipe **insulation** that has been cut lengthwise down the middle (this will be cut prior to engineers receiving the pipe insulation). Pipe insulation can be found in the plumbing section of Home Depot, Lowes, or home improvement-type stores. It is used to insulate the pipes around the hot water heater.



Time Limit:

Engineers will have 20 minutes to construct and test their roller coaster based on blueprint.

Procedure:

The roller coaster will be constructed from the two (2) half sections of 1" diameter pipe insulation that were previously cut lengthwise down the middle. No cutting or tearing of insulation will be allowed during the competition. Engineers will not be allowed to be part of the roller coaster structure (they cannot hold it up or attach it to themselves). ALL MATERIALS MUST BE USED! The coaster must contain at least: one loop, one hill, and two tunnels (see definitions). The coaster may only be attached to a chair and/or the floor. **A blueprint with specifications of the roller coaster must be made on an 8 1/2" x 11" copy paper (or graph paper) and brought to the competition.** All building materials will be provided**.** You will not be allowed any extra materials like scissors or pencils to alter the 3 cups. After the marble travels down the roller coaster through a loop, two tunnels and a hill, it will hit an unaltered cup, which is to be positioned within a five (5) cm radius of the coaster's end.
Engineers may NOT stand on chairs during construction or testing (any time). The marble will be placed on the foam within two (2) centimeters of the starting edge. It will be held in place by one finger of one teammate, and then released when the finger is raised. No extra force may be added to the release.

Scoring & Judging Notes:

After the marble travels down the roller coaster through a loop, two tunnels and a hill, it will hit an unaltered cup, which may be positioned within a 5 cm radius of the coaster's end. The distance will be measured from the center of the end of the coaster directly to the closest point on the cup at its resting location. The cup that travels the greatest distance will be the winner. If the roller coaster does not meet the regulations (**one loop, one hill, and two tunnels) and follow the blueprint,** no score will be recorded. Each team will have 2 tries with the score being the GREATER DISTANCE of the 2 trials. If repairs are necessary, a 30 second repair time may be granted at the judges' discretion. If the unaltered cup hits an object, the engineering team will have the option to re-do the trial.

Definitions:

Hill: A section of foam including first an incline then a decline.

Loop: A section of foam that allows the marble to travel 360°.

Tunnel: An enclosed section through which the marble travels.

Next Generation Sunshine State Standards:

Big Idea 10: Forms of Energy - SC.5.P.10.2

This engineering design challenge allows students to demonstrate their understanding that energy has the ability to cause motion or create change.

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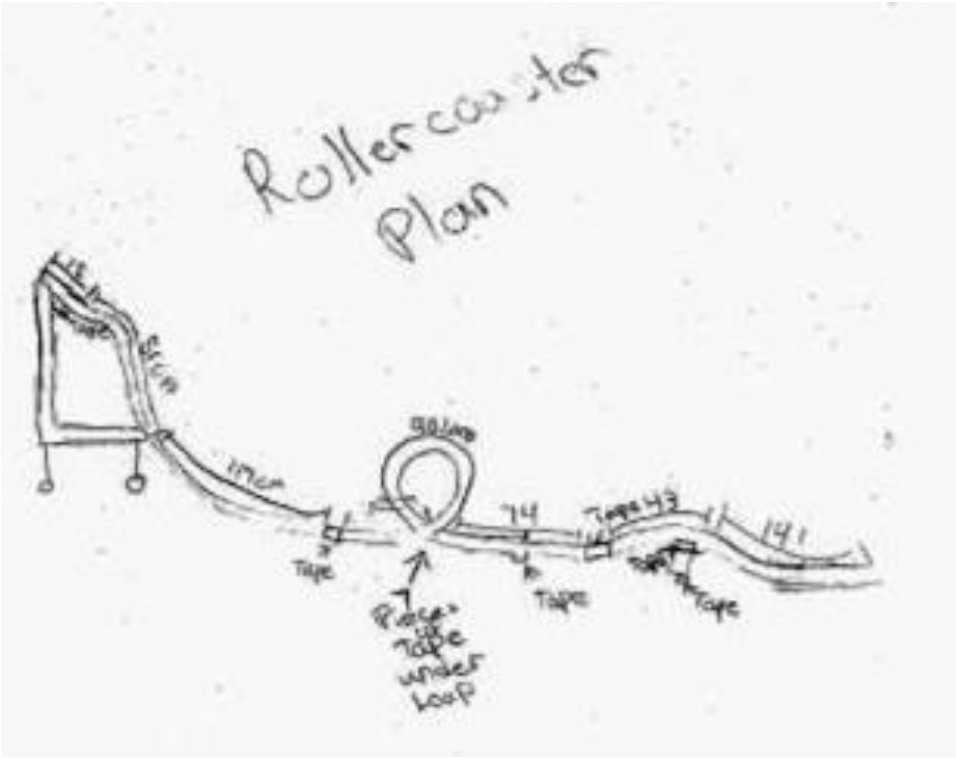
Sample Blueprint



Rockin' Roller Coasters

Dear Apprentice Engineers,

As ride engineers for the most popular theme park in the world, we are counting on you! Attendance at the park has decreased and your team has been assigned the task of designing a roller coaster that will attract visitors. We need you to design and test a prototype of your rollercoaster. We have surveyed our guests and determined what they are looking for in an exciting ride. Those requirements can be found below. Because we have assigned this task to several teams, we have some very specific materials that must be used so we can compare your designs. See the materials list that also appears below.

Best of Luck,

Al B. Flying, President

Materials for Building:

- 2 pieces of pipe insulation
- 300 cm tape
- 4 paper cups, (8 oz.-12 oz.)
- 1 chair
- 1 marble

Ride Design Requirements:

- The coaster must include at least one hill.
- The coaster must include at least one loop.
- The coaster must include at least two tunnels.

Rules:

- All materials must be used (you will only use three cups in your prototype, the fourth cup will be used to measure the effectiveness of your design and must remain unchanged).
- The coaster may be attached to 1 chair provided (safety: engineers may not stand or sit on the chair).
- The coaster may be attached to the floor.
- The coaster may NOT be attached to anything/anyone else (walls, team members, etc.).
- You may not rip or tear the insulation as it will be re-used for additional prototypes.
- The engineers must create a blueprint of their prototype on an 8 ½" x 11" piece of paper.
- Engineers must bring their blueprint to the challenge and follow their design.

Procedure:

- You may choose to practice prior to the day of the event by gathering your own materials, designing your coaster and testing it.
- You will not be allowed any extra materials like scissors or pencils to alter the 3 cups.
- On the day of the event, you will be given 20 minutes to build your roller coaster based on the blueprint or drawing you created.
- The fourth cup must be placed within a 5 cm radius of the end of the coaster.
- The marble will be released by one team member at the start of the coaster by raising the retaining finger.
- After the marble travels down the coaster, it will hit an unaltered cup.
- After 20 minutes, you will no longer be able to adjust or work on your rollercoaster.

Scoring:

After the marble travels down the roller coaster through a loop, two tunnels and a hill, it will hit an unaltered cup, which may be positioned within a 5 cm radius of the coaster's end. The distance will be measured from the center of the end of the coaster directly to the closest point on the cup at its resting location. The cup that travels the greatest distance willbe the winner. Each team will have two trials with the team's score being the GREATER DISTANCE of the two trials.