STEM Family Night Planning Guide

vivifystem.com/blog/2016/3/15/3wvfy1w7ucnhrpgh5yphoyc8h9dw19

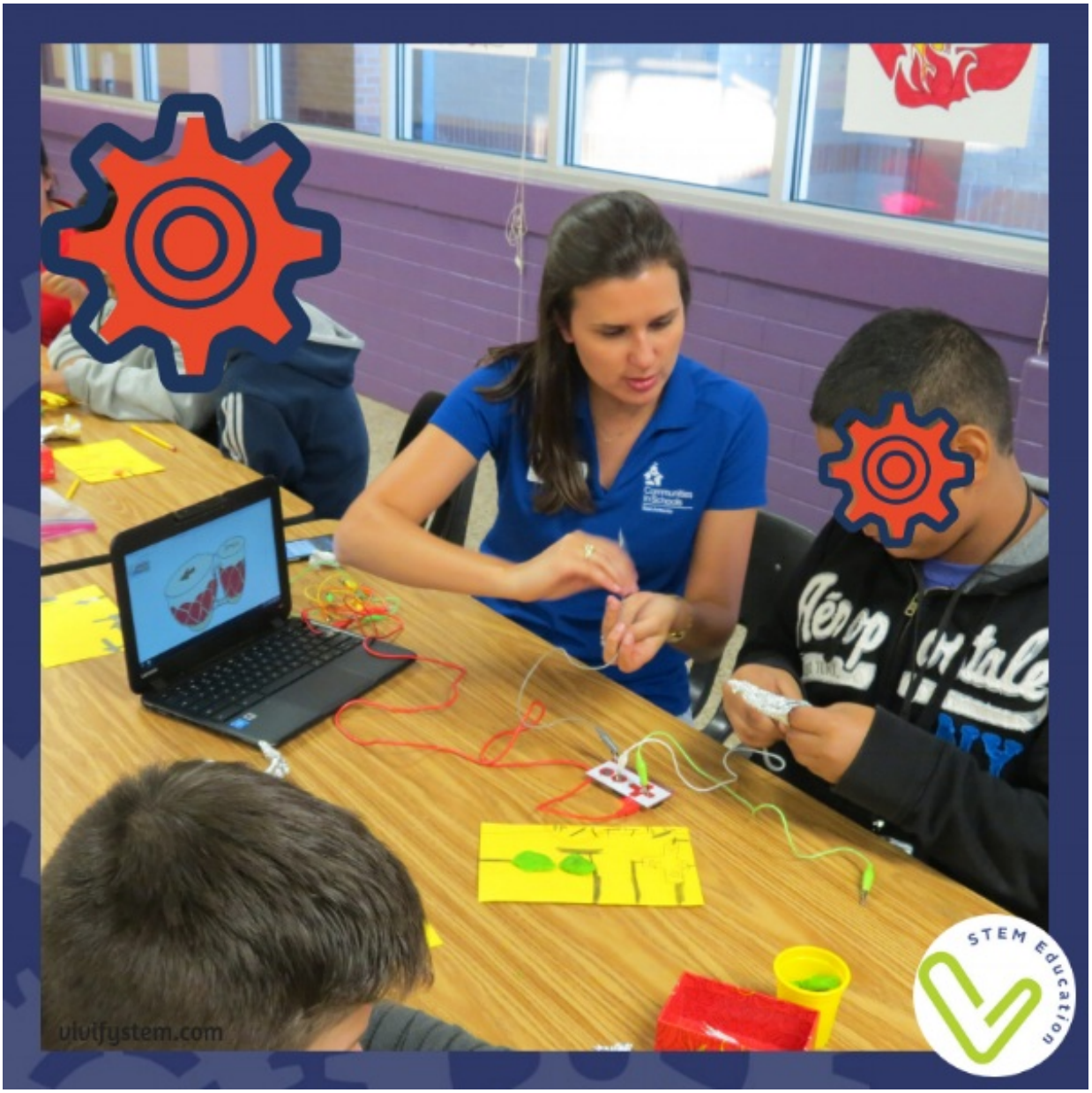
Vivify STEM

STEM Family Nights are awesome! They generate excitement for STEM in your school and community by allowing students, teachers, and families to explore STEM together in a fun way. I planned my first STEM Night back in November 2016, and after a huge hit, we planned many more. As of the 2017-18 school year, I have supported over 50 STEM Family Nights that have reached 7,866 participants across San Antonio! We work with each elementary and middle school campus to create a family night that best fits the school culture. We get the whole school involved from administrators, teachers, coaches, student organizations, and parents to put on a meaningful night of STEM exploration. Want to plan your own night? Read on to learn how!

Step 1: Get Support

A STEM Family Night can be a big undertaking and requires support from school administration and teachers. Reaching out to math and science departments is important for recruiting teacher volunteers and advertising to students, but other departments should also be included. Here are some more ideas for additional support:

- Local engineering companies for sponsors, volunteers, or providing raffle prizes
- Local universities with science and engineering departments that can provide STEM students to support activities
- Parent volunteers to help prepare activities, fundraising, and support event logistics
- High school STEM clubs such as robotics that can bring demonstrations or volunteer at a station



Local STEM professionals can volunteer to support students in hands-on STEM stations.

Step 2: Choose Activities

Choose activities in advance to allow for teachers to sign-up for stations, use in marketing, and plan logistics. I recommend 6 - 10 stations that can be spread throughout the cafeteria or gym depending on expected participation.

Recommended for stations:

- Quick, hands-on activity that can be completed in under 10 minutes
- Accessible to all ages
- Opportunity to design and build

- Requires only a short list of readily available materials
- Wide-range of topics covered to cater to a range of student interests

NOT Recommended for stations:

- Talks or presentations - you may want to have a kick-off talk, but keep it short
- Displays from companies that don't include a hands-on component
- Overly time-consuming or extensive activities with multiple steps
- Same type of activity for all stations

A local scientist from Southwest Research Institute presents a demo of his research in space exploration.

For our STEM night, we had a mix of engineering design challenges, science experiments, math activities, programming and robotics games, and team-building challenges. Below is the list of our selection of STEM stations, but you can get the full guide here.

STEM Stations

STEM Family Night

	14 Stations	Description	Key Topics	Min # Volunteers
Level 1	Build A Boat	Build a boat out of aluminum foil to hold as much weight as possible.	Buoyancy, Gravity, Density, Surface Area	2
	Space Docking	Work as a team to transfer your astronauts to the ISS.	Forces	1
	Hoop Glider	Build and fly a glider made from a straw with hoops.	Drag, Variable, Forces of flight	2
	STEM Mural	Create a visual representation of a STEM theme	Varies based on theme	1
	Tallest Tower	Build the tallest tower using provided tape and index cards.	Forces, Center of gravity, Balance	2
Level 2	Code A Game	Learn the basics of block coding by creating a new game.	Programming, Debugging	1
	Heart Rate Math	Measure change in heart rate during exercise.	Percentage increase, Beats per minute	4
	Paper Football	Find your field goal percentage accuracy.	Fraction, Percentage accuracy	2
	Straw Rockets	Design and build a straw rocket to complete a mission.	Variable, Newton's 3rd Law	2
	Landing Device	Build a lander to keep object inside cup when dropping.	Shock absorption, Center of gravity, Drag	3
	Catapults	Use the stored elastic energy of rubber bands to make a catapult.	Kinetic energy, Potential energy	3
Level 3	Bird Feeder	Students design and build a bird feeder.	Environment, Ecosystem	3
	Slime	Make a non-Newtonian fluid.	Chemical change, Non-Newtonian fluid	3
	Blobs in a Bottle	Create colorful blobs with oil and water.	Density, Physical property	3

Step 3: Logistics

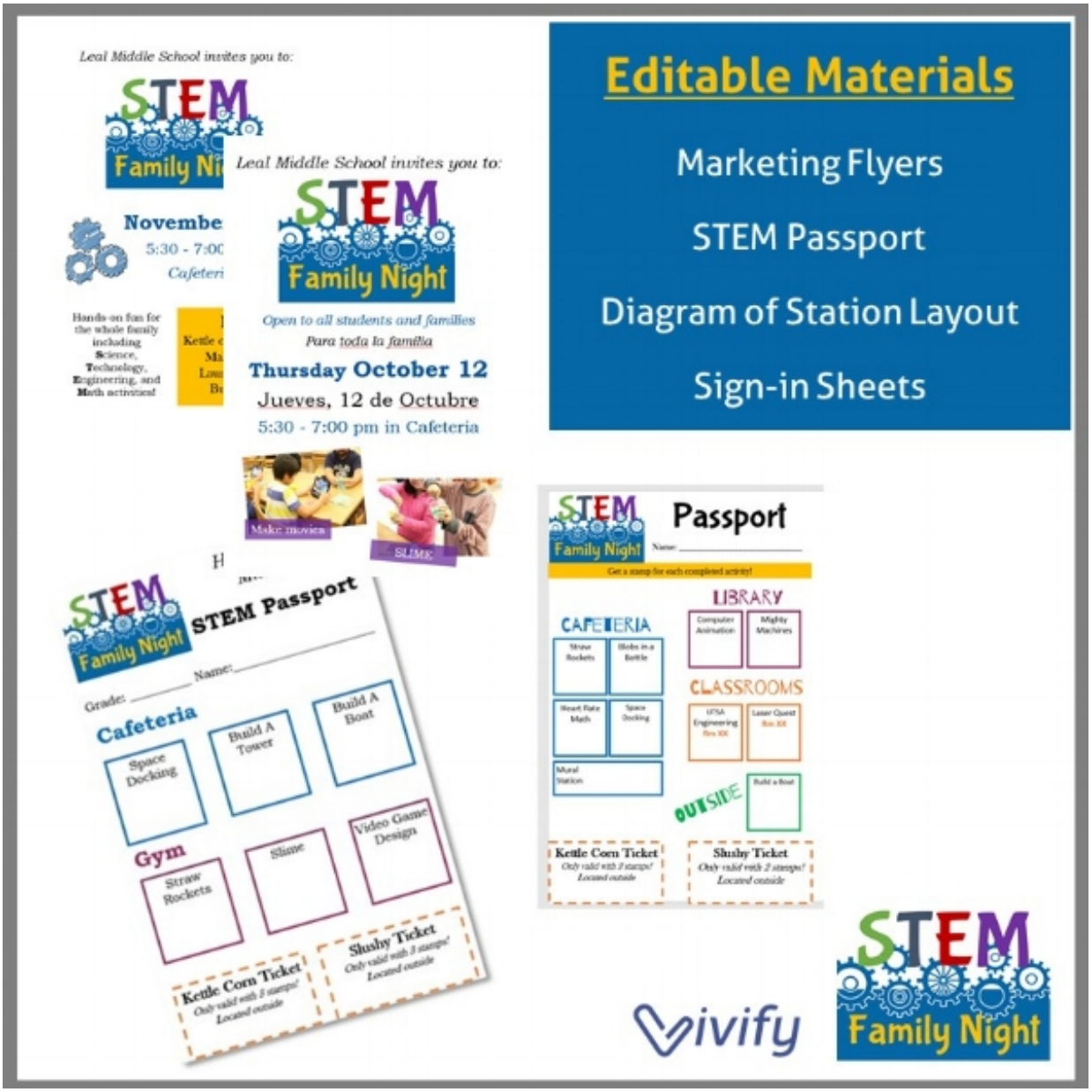
STEM Family Nights will vary depending on school culture and family engagement. In general, a STEM Night should not exceed more than 2 hours. Consider the following:

- **Is transportation an issue for students?** It was for us, so we started immediately after school.
- **Will food be provided?** We had a carnival style theme with a food truck serving kettle corn and slushies. It was a huge hit!
- **Do families need to RSVP?** We made it an open, come and go event for families.
- **How will you promote the event?** We made announcements, posted fliers, called parents, and sent emails. However, the biggest draw was promotion by teachers, especially promises of extra credit.

For space, we considered various options at each school. We decided to spread the stations across the cafeteria plus a few classrooms or library. Below is the Straw Rockets station in the cafeteria. The signs were targets for the students to aim at with their rockets.

Straw rockets station in cafeteria

I highly recommend the use of a STEM Passport for your night. Participants receive the passport at the start of the night and get stamps for each completed activity. Passports can be redeemed for a treat or later for extra credit. Plus, the passport can act as a map or menu of the available activities. Our STEM Family Night Planning Guide includes an editable version of this passport.



Final Thoughts

- Provide extra seating for elderly or young children
- Make a diagram of activities and present to administration and custodial staff
- Create a welcome area with sign-in sheets and STEM Passports
- Create signs and a tri-fold for each station with additional information

- Refreshments: Students can be rewarded with a food ticket upon completing a set number of activities. 2 stamps = food ticket
- Raffle prizes: Raffle tickets can be another incentive for participation

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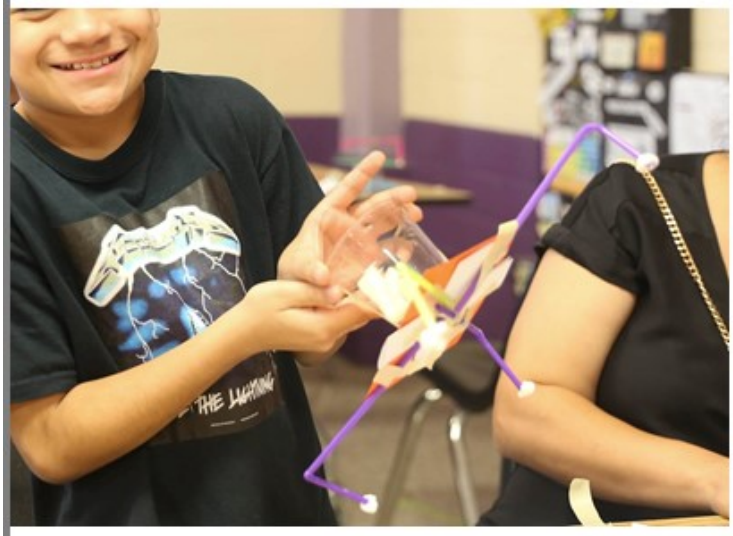
Vivify’s STEM Family Night Planning Guide

For more information, you can purchase Vivify's all-inclusive planning guide that includes all of our activities, a planning checklist, a complete budget and materials list, editable marketing materials, STEM resource handouts, and more! Now includes a Spanish version of handouts and signs! Check out a preview below.

STEM Family Night

Planning Guide



STEM Family Night

14 hands-on STEM Stations
for elementary & middle school

VIVIFYSTEM.COM Vivify STEM EDUCATION

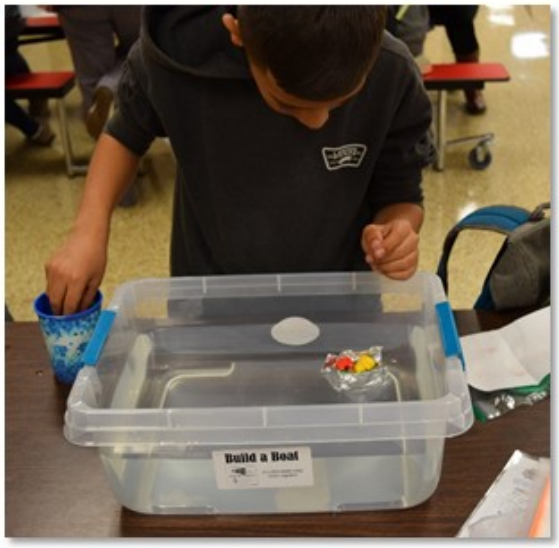
Level 1

Build A Boat

STEM Family Night

Build a boat out of aluminum foil to hold as much weight as possible.

STEM Connection	Key Words
Marine engineer Naval architect	Gravity Buoyancy Density Surface Area



Materials

- ❑ **2** rulers (measure foil)
- ❑ **2** scissors (cut foil)
- ❑ **1** 75 sq ft roll aluminum foil
- ❑ **3 – 4** containers with water
- ❑ **50** weights per container (ex: pennies, washers, plastic bears)
- ❑ **3 – 4** cups to hold weights
- ❑ **2** rolls paper towels

Station Set-up

1. Make 6 in x 6 in sheets of foil by cutting one foot of aluminum foil and dividing into fourths.
2. Fill bins with water and divide materials into 3 – 4 testing areas.

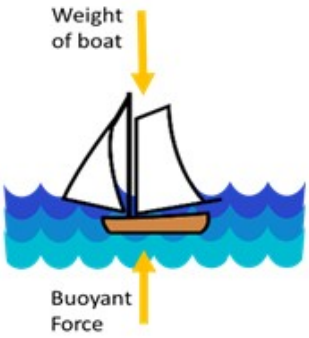
Activity Instructions

1. Determine a location that is suitable for getting wet!
2. Provide each student with a 6 in x 6 in sheet of aluminum foil.
3. Ask participants to build a boat with the sheet of foil to float as many weights as possible.
4. Float the boat in a tub of water and add weights one at a time into the boat until it sinks. Ask student to think about how they can improve their boat design to hold more weights.
5. Ask family members to compete and see who can build the boat to hold the most weight!
6. Consider creating a leaders board with a record of the most weights held by a boat.

Build A Boat

Background

What are the forces on a boat that keeps it from **sinking**? **Gravity** is pulling it downward, determined by the weight of the boat. **Buoyancy** is pushing it upward. The buoyancy force is created by the weight of the water displaced by the boat. How does the **buoyancy** change with a larger **surface area**? As the surface area decreases, the same **weight** is distributed over less area creating higher **density**.



Marine engineers design the mechanical systems of different ships, from aircraft carriers to sailboats. **Naval architects** work on the basic design of ships such as the overall shape and stability of the hulls.

Build A Boat

How much weight can your boat hold before sinking?

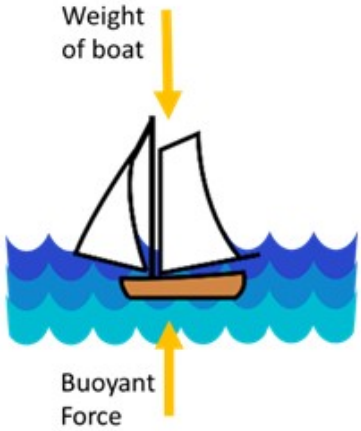
Build a Boat

How much weight can your boat hold before sinking?

1. Use the sheet of aluminum foil to build a boat that can hold as much weight as possible.
2. Put the boat in the water. Add weights, one at a time, until the boat sinks.
3. Compete with your family members to see who can build a boat that can support the most weight!

What are the forces on a boat?

Gravity is pulling the boat downward, determined by the weight of the boat. **Buoyancy** is pushing it upward. The buoyancy force is created by the weight of the water displaced by the boat. As the surface area of the boat decreases, the same weight is distributed over less area creating higher **density.**



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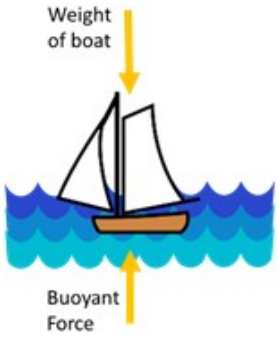

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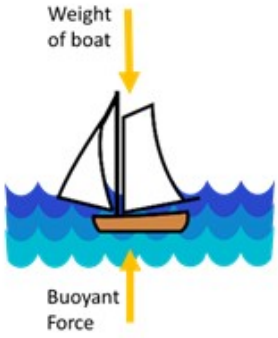

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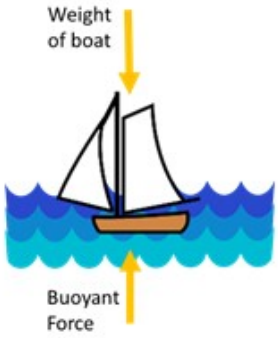

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Best of luck on your STEM Family Night!