USDA NIFA

United States Department of Agriculture | National Institute of Food and Agriculture | https://nifa.usda.gov/program/4-h-positive-youth-development

National Aeronautics and Space Administration

EXPEDITIONARY SKILLS FOR LIFE

A FEDERAL PARTNERSHIP FOR STEM EDUCATION

LESSON PLAN: TEAMWORK ACTIVITY 2.11

ROCKET POWER CHALLENGE III

LESSON DETAILS

AGE/GRADE LEVEL
Middle School

LEARNER OUTCOMES
Youth will identify ways to effectively communicate with members of a team, recognize there are many different solutions to solving problems, and define teamwork and team roles.

SUCCESS INDICATORS
Youth will act cooperatively, keep calm in interpersonal conflicts, and actively work to ensure a positive team attitude.

LIFE SKILLS
Critical thinking and innovation, collaboration, social skills

NATIONAL STANDARDS
CCSS.ELA-Literacy.CCRA.SL.1
Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

21st Century Learning and Innovation Skills: Learning and innovation skills increasingly are being recognized as the skills that separate students who are prepared for increasingly complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.

PREP TIME
15 minutes for room set up

ACTIVITY TIME
60 minutes

MATERIALS LIST
- 1 lb. box of dry spaghetti
- 10 oz. small marshmallows
- 20 oz. gum drops
- Yard stick or tape measure
- Countdown clock or other timing device
- One set of paper role labels for each team (Team Leader, Builder 1, Builder 2, Timekeeper/Supply Manager)

More supplies may be needed depending upon the size of the group

HANDOUTS
Learner Assessment Questions

SUGGESTED SPACE
Indoors, one table or other flat surface for each team

SUGGESTED GROUP SIZE
4 youth per team, any number of teams can be involved

REFERENCES
The Importance of Recognizing Roles in a Team
http://smallbusiness.chron.com/importance-recognizing-roles-team-31499.html

The Biggest Mistake You (Probably) Make with Teams
https://hbr.org/2012/04/the-biggest-mistake-you-probab

INTRODUCTION

Teams are groups of individuals working together toward common goals. A team role is the way we behave, contribute and interact with others.

The difference between team failure and success depends on the behavior of team members. Recognizing various team roles allows you to match the skills needed to reach the goal with the appropriate team member who has those skills.

Teams tend to work better together if the members recognize their individual roles. A team's ability to work together improves when the roles of individual team members are clearly defined and well understood.

Consider a team of doctors and nurses working in a hospital emergency room. Before the next ambulance arrives they have no idea what task is ahead. Will the patient require surgery, heart resuscitation, medications? The condition of the next patient is unknown; the tasks that will be required of the team, ambigu- ous. But at no time while the team waits, do they negotiate roles: "Who would like to admin- ister the anesthesia? Who will set out the instruments? Who will make key decisions?" Each role is clear. As a result, when the patient arrives, the team is able to move quickly into action.

It's one thing to join a team, but quite another to perform as a team member. To put it simply, teams don't work without teamwork, and for teamwork to take place, every team member must play their role.

continued next page >>

ROCKET POWER CHALLENGE III, CONTINUED

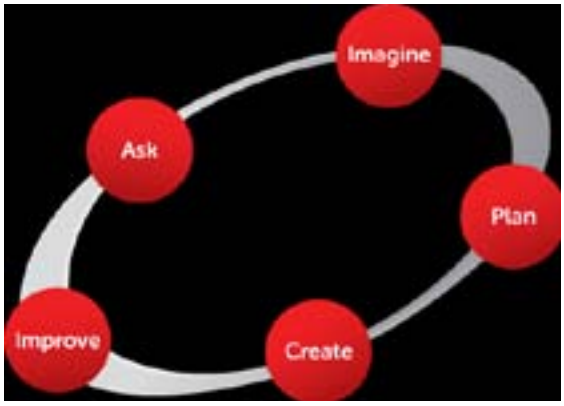
>> continued from previous page

ACTIVITY INSTRUCTIONS

INTRODUCTION ACTIVITY (10 MINUTES)

Ask and discuss with youth:

1. Review: Why do people work on teams? What is the purpose of a team? What makes a good/bad team member?
2. Give examples of roles people have in the working world and family life. What do roles have to do with teamwork?
3. What do teamwork and roles have to do with NASA?
4. Review the Engineering Design Process introduced in Challenge I.



ACTIVTY: TEAM ROLES (15 MINUTES)

Explain to youth they will participate in an engineering activity that will expand on the roles used in Challenge Lesson II. The building challenge will be to build a rocket and a rocket launch pad. In addition, they will experience multiple roles instead of only one.

The roles will be:

- Team Leader - Gives team instructions, does not build
- Builder 1 - Builds rocket model, listens to leader
- Builder 2 - Builds rocket model, listens to leader
- Supply Manager/Timekeeper - prepares supplies, updates team on time, assists building when asked by Team Leader

Explain that the youth will be working on a team to complete a task.

1. Assign youth into teams of 4 with each team at their own table or other level surface.
2. Hand out supplies. Give each team 12 pieces of spaghetti, 10 marshmallows and 10 gumdrops. Tell the youth not to touch or eat the supplies.
3. Review the team roles. Explain that each team member will get to spend about 3 minutes in each of the roles and then rotate clockwise to the next role labeled on the table.
4. Tell the youth they will have to work together and build a model of a rocket and a launch pad.
5. The goal is to make an improved rocket from their Challenge II Lesson that is freestanding and as tall as possible. The rocket launch pad should support the rocket and must touch the rocket.
6. Have the youth briefly discuss and make a plan for what their rocket and launch pad may look like and how to use the supplies. The Team Leader leads this and asks for help from the team.
7. Every 3 minutes have the students move clockwise to change roles. Have role name badges at the spots on the tables for easy role switching.
8. Allow the teams to begin to build. Remind them of the 12 minute timeline. Display a countdown clock for the Timekeepers to watch. As time ticks down, do not remind the youth of the amount of time remaining; let the Timekeeper for each group keep track.
9. Approximately half way through, call-for a temporary pause. Allow 30 seconds for team leaders only to survey the other teams' building projects to gather ideas that might assist their team with their own construction. Allow teams to continue and finish up after this break.
10. Once time runs out, have teams stop and back away from their tables/models.
11. Allow each Team Leader to showcase their final model design. Use the yardstick to measure final rocket model height. Use class applause to celebrate all of the teams' efforts!

continued next page >>

ROCKET POWER CHALLENGE III, CONTINUED

>> continued from previous page

DISCUSSION QUESTIONS (10 MINUTES)

1. How could your team have been more effective in the building process? How do roles affect this?
2. What does it mean to be an engineer? What skills are required by engineers to complete tasks?
3. How did the Engineering Cycle help your team? If you did not use it, how could it have helped?
4. Is strong communication important to a team? Why or why not? What are some ways to communicate effectively with others to solve a problem?
5. How did the results of your rocket differ from the first trial? How did the assigning of roles affect this?

Discuss the importance of roles in the activity and how it relates to the importance of roles in the working world and family life.

DEBRIEF ACTIVITY: SUNBURST (10 MINUTES)

MATERIALS LIST

- 1 triangular piece of paper (make three triangles out of an 8½"x11" piece of yellow paper, lengthwise) for each youth
- 1 marker per youth
- roll of masking tape
- 1 center section (a half circle made out of a full-sized poster board)

DIrections:

1. Give each youth a marker and a triangular piece of paper.
2. Have each youth write a reflection on the paper (i.e. what you have learned from this experience/program, what the experience/program has meant to you, what you enjoyed most from this experience/program). Participants may color the triangles too.
3. Write the name of the program on the half circle and tape it on the wall about waist high so youth can reach to attach the higher triangles. Make sure there is enough space overall so youth can tape their triangles along the rounded part of the center section.
4. When everyone is done, have each youth tape up their triangle (stagger each row between the existing triangles) along the center section so the triangles look like rays of the sun.

Discussion:

Look over what youth wrote on the triangles and share some aloud. Conclude with some reflections on the group's experience. Leave the "sunburst" up for everyone to see and read the various responses.

APPLIED CHALLENGE: RELAY RACE (15 MINUTES)

MATERIALS LIST

- 1 ball
- timing device
- 1 cone

Directions:

1. Designate a starting point. Place a cone 50 yards from the starting line. Ask the group to stand in a single file line at the starting point. Give the first one in line the ball.
2. On your signal, the youth will run one at a time to the cone and back.
3. Once they have all returned to the starting point they will form a standing circle. The group goal is to pass the ball as quickly as possible around the circle. Every person has to touch the ball, but only one person can touch the ball at a time.
4. After everyone in the group has touched the ball they should sit down to show they are done.
5. Let them do this activity one time and then ask them to assign each other roles in the race according to their strengths. Do the activity one more time and see if they are faster.

Discussion:

- What helped your group work well together? (Sharing ideas, listening, encouraging each other, etc.)
- What made working together more difficult? (Lots of different perspectives, lack of communication, etc.)
- How does this activity relate to your daily lives? How can you use these ideas to help you?

continued next page >>

ROCKET POWER CHALLENGE III, CONTINUED

>> continued from previous page

Instructor says: "Sometimes working with a lot of different people can be a challenge because we each have different points of view and different ways of communicating. When we listen to each other and share ideas, we can use all of the unique ideas and individual talents to solve problems and work through difficult situations."

FUN FACTS

The International Space Station orbits the earth every 90 minutes at the speed of 17,150 miles per hour (5 miles per second). That means that the crew experiences sunrise and sunset 16 times a day.

DID YOU KNOW

Astronaut Ellison Onizuka, a 4-H alumnus from Hawaii, helped to create a 4-H TV/video curriculum called "Blue Sky Below My Feet--Adventures in Space Technology" in 1985. The series had three 30-minute video programs about forces and gravity, space clothes and space food. Onizuka was one of the astronauts who died in the tragic destruction of the Challenger space shuttle.

INSTRUCTOR'S NOTES

EXPEDITIONARY SKILLS FOR LIFE

ACTIVITY 2.11: LEARNER ASSESSMENT

These questions are about things you learned during this activity. Please check the circle that best describes you.

Q1 I understand the importance of listening to the ideas of all team members before taking action.

- ○ Not at all like me
- ○ A little like me
- ○ Somewhat like me
- ○ A lot like me

Q2 I understand the importance of planning before taking action.

- ○ Not at all like me
- ○ A little like me
- ○ Somewhat like me
- ○ A lot like me

Q3 I understand the importance of analyzing the results of my work.

- ○ Not at all like me
- ○ A little like me
- ○ Somewhat like me
- ○ A lot like me

EXPEDITIONARY SKILLS FOR LIFE

ACTIVITY 2.11: LEARNER ASSESSMENT

These questions are about things you learned during this activity. Please check the circle that best describes you.

Q1 I understand the importance of listening to the ideas of all team members before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q2 I understand the importance of planning before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q3 I understand the importance of analyzing the results of my work.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

EXPEDITIONARY SKILLS FOR LIFE

ACTIVITY 2.11: LEARNER ASSESSMENT

These questions are about things you learned during this activity. Please check the circle that best describes you.

Q1 I understand the importance of listening to the ideas of all team members before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q2 I understand the importance of planning before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q3 I understand the importance of analyzing the results of my work.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

EXPEDITIONARY SKILLS FOR LIFE

ACTIVITY 2.11: LEARNER ASSESSMENT

These questions are about things you learned during this activity. Please check the circle that best describes you.

Q1 I understand the importance of listening to the ideas of all team members before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q2 I understand the importance of planning before taking action.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me

Q3 I understand the importance of analyzing the results of my work.

○ Not at all like me
○ A little like me
○ Somewhat like me
○ A lot like me