junior tech challenge

The practical side of science and tech

Teacher's Guide

Intended for:
Intensive ESL Project, Elementary Cycle 3
Science and Technology Program, Elementary Cycle 2 & 3

S.O.S. Pirates!

2021–2022 EDITION

A program of

RÉSEAU TECHNOSCIENCE
Together for a new scientific generation

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INTRODUCTION

The Junior Tech Challenge: a unique learning situation!

Every year in Quebec, the Junior Tech Challenge allows all elementary school students to learn about science and technology in a creative and fun way. The Junior Tech Challenge is an original and hands-on classroom project that is also a learning and evaluation situation (LES). Six challenges are presented cyclically, one per year. Educational tools are offered to meet the challenge of the current year. With each new edition, the rules and educational tools are improved upon to ensure that they best meet teachers' needs. The pedagogical content can be adapted according to the intended pedagogical objectives. This document is intended to support professionals who teach the Intensive ESL Project or the Science and Technology Program (Elementary), or anyone who wishes to experience the Junior Tech Challenge with their students in English.

An adaptable challenge!

This year, we are proud to offer a new challenge that can be adapted to public health restrictions. The **S.O.S. Pirates!** challenge can be carried out at school in a team, with or without physical distancing, or at home individually if conditions require it. In addition, the challenge has been adapted for each cycle.

For Intensive ESL Teachers

Teachers of Intensive ESL can use this challenge to develop Competency 1 (To interact orally in English), while the students participate in engaging hands-on activities. The challenge can be experienced in the following ways: in the classroom only, at the school service center's annual science competition, or in the regional finals. Many teachers from the same school may participate, so only the best teams may be selected to join the finals.

The students will have the opportunity to:

- Develop Competency 1 (Interact orally in English) through challenging hands-on activities;
- Review and consolidate science knowledge in an English-language context;
- Participate in a school-wide competition or a regional event.

In addition, evaluation tools, a functional language guide, and suggestions for activities are provided in Appendix 3, of the Teacher's Guide.

Introduction (continued)

Teaching tools available

All documents that have been translated into English can be accessed on the **Réseau Technoscience website** :

- Presentation of Rules
- Teacher's Guide
- Student Handbook
- Slideshow (Google Slides, PPT and PDF formats)
- Assembly Techniques (Appendix 2)
- Junior Tech Certificate of Participation
- Carton de notation (French only)
- Tableau de pointage Excel (French only)
- Fiche de vérification des prototypes (French only)

Preparatory activities

The preparatory activities aim to help students acquire scientific concepts related to the challenge. They also help develop strategies that support students in the development of science-specific competencies.

Although the activities can be carried out independently, they can lose their meaning if they are not developed in a meaningful context in which students can reinvest their knowledge in an authentic production. The activities suggested in this LES allow students to become familiar with the design process required to build a floating prototype (watercraft,) and to allow the teacher to collect traces of the following skills in Science and Technology:

- Competency 1: To propose explanations for or solutions to scientific or technological problems.
- Competency 2: To make the most of scientific and technological tools, objects and procedures.
- Competency 3: To communicate in the languages used in science and technology.

All activities allow students to establish concrete links with scientific concepts anchored in the Progression of Learning Science and Technology and the Mathematics, Science and Technology program of Quebec.

FROM A LES FOR THE CLASSROOM TO THE REGIONAL FINALS

The **Junior Tech challenge** is an opportunity for students to experience a science and technology design in the classroom, and to experience something unique by participating in one of the many levels of competition-with the ultimate experience of participating at the Regional Finals!

Here are the different levels of finals:

Class Finals	These finals are organized in class to determine the most efficient prototypes.
School Finals	School Finals are organized per cycle to determine the representatives who will go to the school service center or school board finals. If there are no finals in the school service center or school board, they will go directly to the Regional Finals.
School Service Center Finals or School Board Finals	These finals are organized per cycle by the school service center or school board, or in collaboration with Réseau Technoscience. If your school service center or school board organizes finals, you will be invited to register your students to these before the Regional Finals.
Regional Finals	Regional Finals organized per cycle bring students together from their region. Réseau Technoscience organizes 11 regional finals which will take place in May, as part of l'Odyssée des sciences. Science fair projects from Expo-sciences and activities from the Débrouillards will also be presented. Consult the calendar for the date of your Regional Finals. To register teams, contact the Regional Coordinator of the Junior Tech Challenge. The contact information is available on the website.

Note: During the Regional Finals, the challenge can be presented in a different format to that presented in the school service center, or school board Finals. The students will be required to change their strategy to adapt to this new format. No advanced preparation is needed, but extra time will be given to students to make the necessary changes.

PROGRESSION OF LEARNING FOR SCIENCE AND TECHNOLOGY

Progression of Learning

This learning and evaluation situation is intended to help develop students' skills, particularly those associated with the technological design process. Many skills used during this process are described in the activities proposed in the Teacher's Guide. The details of the concepts targeted in each of the activities and the links with the Progression of Learning are presented below.

Knowledge activated in the LES

This learning situation activates the following knowledge from the Progression of Learning Science and Technology:

Material world

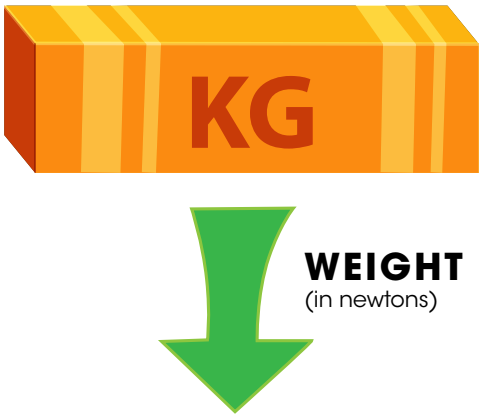
→	Student constructs knowledge with teacher guidance.	Elementary					
*	Student applies knowledge by the end of the school year.						
	Student reinvests knowledge.	Cycle 1		Cycle 2		Cycle 3	
A. Matter		**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
1. Properties and characteristics of matter							
a. Classifies objects according to their properties *(e.g. colour, shape, size, texture, smell)*		→	*				
c. Distinguishes between materials that are permeable to water and those that are not		→	*				
e. Describes the shape, colour and texture of an object or a substance				→	*		
h. Associates the buoyancy of a volume of liquid in an identical volume of a different liquid with the densities of these liquids (relative density)				→	*		
j. Describes various other physical properties of an object, a substance or a material *(e.g. elasticity, hardness, solubility)*						→	*

→	Student constructs knowledge with teacher guidance.	**Elementary**					
*	Student applies knowledge by the end of the school year.						
	Student reinvests knowledge.	Cycle 1		Cycle 2		Cycle 3	
C. Forces and motion		**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
6. Effects of a force on the direction of an object							
b. Identifies examples of a force *(e.g. pulling, pushing, throwing, squeezing, stretching)*				→	*		
c. Describes the effects of a force on an object *(e.g. Sets it in motion, changes its motion, stops it)*				→	*		
d. Describes the effects of a force on a material or structure				→	*		
7. Combined effects of several forces on an object							
a. Predicts the combined effect of several forces on an object at rest or an object moving in a straight line *(e.g. reinforcement, opposition)*						→	*
E. Techniques and instrumentation		**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
4. Design and manufacture of instruments, tools, machines, structures *(e.g. bridges, towers)*, devices *(e.g. water filtration device)*, models *(e.g. glider)* and simple circuits							
d. Draws and cuts parts out of various materials using appropriate tools				→	→	→	*
e. Uses appropriate assembling methods *(e.g. screws, glue, nails, tacks, nuts)*				→	→	→	*
F. Appropriate language		**1st**	**2nd**	**3rd**	**4th**	**5th**	**6th**
1. Terminology related to an understanding of the material world							
a. Appropriately uses terminology related to the material world		→	→	→	→	→	*
b. Distinguishes between the meaning of a term used in a scientific or technological context and its meaning in everyday language *(e.g. source, matter, body, energy, machine)*		→	→	→	→	→	*
2. Conventions and types of representations specific to the concepts studied							
a. Communicates using appropriate types of representations that reflect the rules and conventions of science and technology *(e.g. symbols, graphs, tables, drawings, sketches, norms and standardization)*				→	→	→	*

SCIENCE AND TECHNOLOGY CONCEPTS

"Science attempts to describe and explain the world. It looks for relationships that allow us to make predictions and determine the causes of natural phenomena. For its part, technology applies the discoveries of science, while contributing to its development by providing it with new tools or instruments as well as new challenges and topics for research." QEP, p. 160

The design of a watercraft allows students **to explore** the scientific concept of buoyancy, but they are not expected **to understand and master** all aspects of this concept. The following explanations are intended to provide teachers with some concepts that can help them guide students in their exploration.

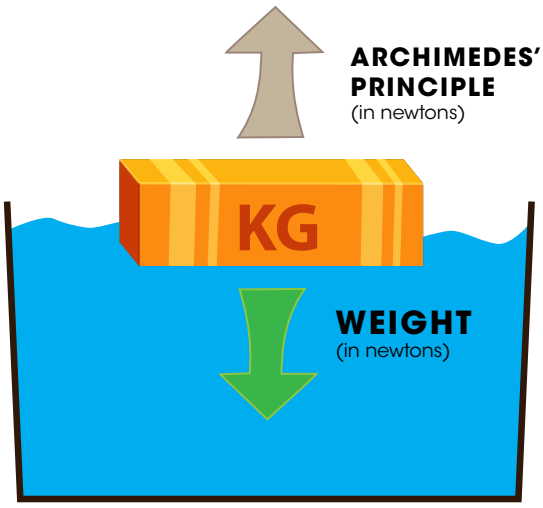


Every object has **a mass** (in kilograms) that represents its quantity of matter.

Every object also has **a weight** (in newtons) which is the force of gravity that pulls it down.

If the **mass** of an object increases, its **weight** also increases proportionally.

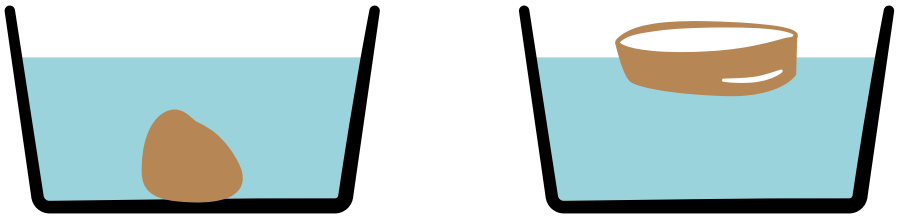
If an object is dropped in water, the buoyant (upward) force opposes the weight of the object (downward force). This is called the Archimedes' Principle. The magnitude of the force varies depending on the amount of water displaced by the object. An object will float on the surface of the water if its weight equals the weight of the displaced water.



Sink or float?

Situation # 1: The importance of the shape of an object

2 objects of equal masses, but different shapes



In activity 2, students will discover that if both clay forms have the same mass, but different shapes, the clay ball will sink and the clay boat will float.

Both objects have the same mass, therefore the same weight (or the same downward force). However, the shape of the boat allows for greater upward force exerted by the water, so it floats.

Sink or float?

Situation # 2 The importance of the mass of an object

2 objects of equal shape, but different mass

Two tennis balls sliced in two will have the same mass, and will both float. If mass is added to one of the half-balls, more (downward) force will be exerted since its weight has been increased. If the weight (downward force) becomes greater than the upward force, the half-ball will sink.

**Refer to videos on page 27 that demonstrate the concept of buoyancy.*
**Refer to Appendix 3 (Intensive ESL Extras) for extra activity on density and buoyancy.*

OVERVIEW

Description	Time	Pedagogical Resources
Preparation		
Setting the Stage The teacher presents the challenge to the students, but does not give them all the details. The rules will be presented at a later time.	15 minutes	• Student Handbook p. 2, 3 • Slideshow
Activity 1: What Do You Think? This task will elicit students' prior knowledge about their familiarity with the concept of buoyancy.	10 minutes	• Student Handbook p. 4
Activity 2: Buoyancy...Eureka! In this 3-part activity, students will explore the conditions that allow an object to float while carrying a load.	1 period	• Student Handbook p. 5-7
Activity 3: A Pirate Game In this 2-part activity, students will experiment with the concept of balance by strategically placing objects on a game board.	1 period	• Student Handbook p. 8-11 • Appendix 1
Complementary Activity: Assembly Techniques Using materials in line with the S.O.S. Pirates! Challenge, students will learn different assembly techniques that can be useful when building their prototype.	1 period	• Appendix 2 • Videos
The Competition		
Preparing to Meet the Challenge The teacher presents the rules of the competition to the students. Students work on building, testing and modifying their watercraft.	1 period or more	• Student Handbook p. 12-15 • Presentation of Rules
The students build the prototype.	2-3 periods	• Student Handbook p. 16 • Materials permitted for the construction of the watercraft (see Presentation of Rules).
Review and Reflect		
The teacher and the students review the design and the construction of the watercraft, and the strategies used to carry out the task.	20 minutes	• Student Handbook p. 17

SETTING THE STAGE

Pedagogical Intentions

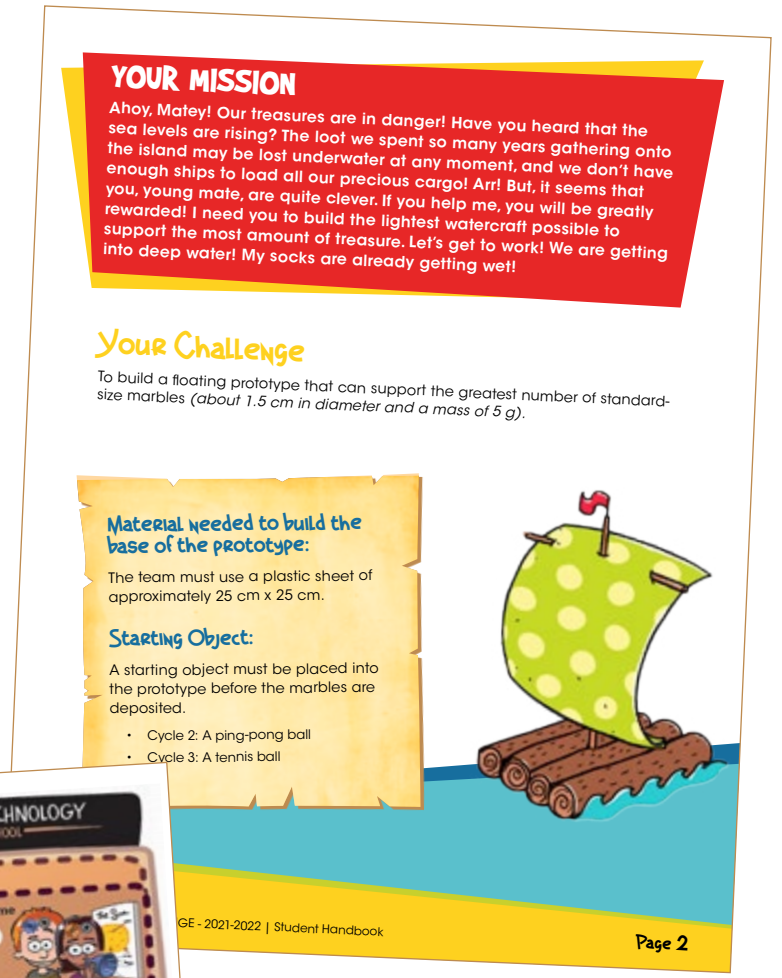
- Present the learning and evaluation situation and the challenge.
- Generate student interest.

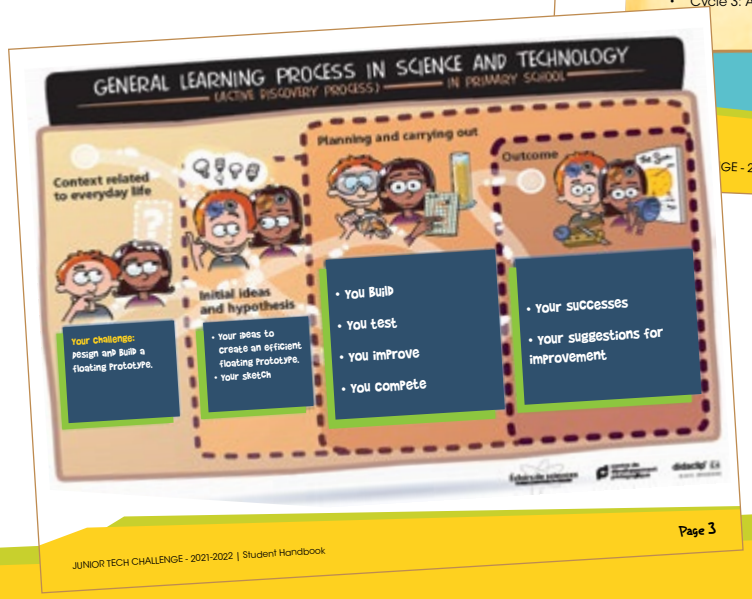
Materials

- Student Handbook p. 2, 3
- Slideshow

Procedure

1. Distribute the Student Handbook to generate interest.
2. Use the slideshow and the Student Handbook to present an overview of the challenge to the students.





ACTIVITY 1 – WHAT DO YOU THINK, MATEY?

Pedagogical Intentions

- To elicit prior knowledge about students' familiarity with the concept of buoyancy.
- For Intensive ESL students: To help develop ESL Competency 1.

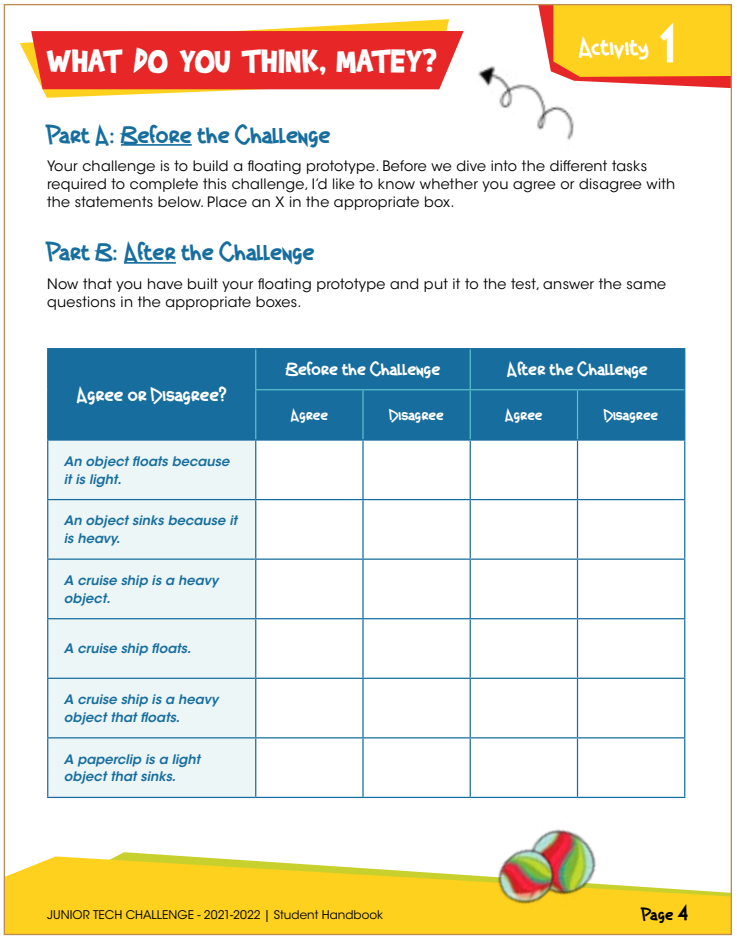
Material

- Student Handbook p. 4

Procedure

1. Invite students to complete the table on their own.
2. Invite students to share and discuss their answers with their teammates.*
3. Invite students to share and discuss their opinions with the class.
4. Explain that the students will return to the questionnaire at the end of the challenge to see if their ideas have changed.

**For Intensive ESL, Functional Language can be found in Appendix 3.*



WHAT DO YOU THINK, MATEY?

Activity 1

Part A: Before the Challenge

Your challenge is to build a floating prototype. Before we dive into the different tasks required to complete this challenge, I'd like to know whether you agree or disagree with the statements below. Place an X in the appropriate box.

Part B: After the Challenge

Now that you have built your floating prototype and put it to the test, answer the same questions in the appropriate boxes.

Agree or Disagree?	Before the Challenge		After the Challenge	
	Agree	Disagree	Agree	Disagree
An object floats because it is light.				
An object sinks because it is heavy.				
A cruise ship is a heavy object.				
A cruise ship floats.				
A cruise ship is a heavy object that floats.				
A paperclip is a light object that sinks.				

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ACTIVITY 2 – BUOYANCY...EUREKA!

Part A: A Clay Ball

Pedagogical Intentions

- To prompt students to form a hypothesis concerning the concept of buoyancy, and to verify their hypothesis scientifically.
- For Intensive ESL students: To help develop ESL Competency 1.

Materials

- Student Handbook p. 5
- One container for each team of 2
- Water to fill the container
- 1 ball of modeling clay for each team of 2
  Use oil-based clay, because water-based clay will gradually dissolve in the water.

Procedure

With the whole class

1. Present the question to the students: **What happens when we put a ball of modeling clay in a container of water?**
2. Ask the students to write down their hypothesis and justification on page 5 of their Student Handbook. Students may have different hypotheses and justifications.
3. Invite students to share their hypothesis with the class.

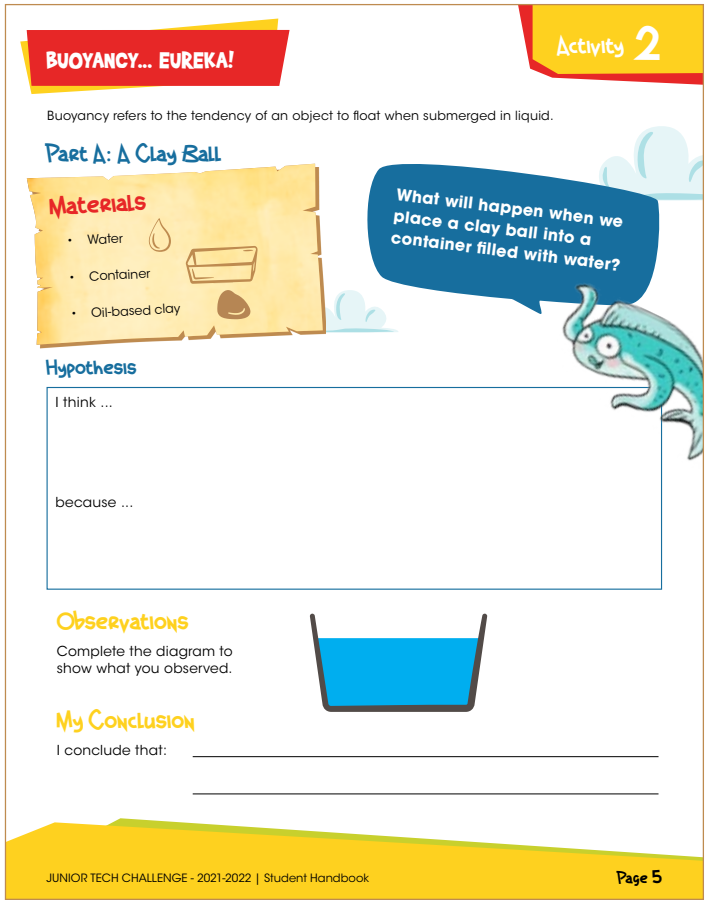
In teams of two*

4. Ask students to drop the ball of modeling clay in the water.
5. Ask students to discuss and record their observations by completing the drawing, and writing their conclusion on page 5 of their Student Handbook.

With the whole class

6. Students are encouraged to share and compare their observations with their peers.

**For Intensive ESL, Functional Language can be found in Appendix 3.*



Part B – A Clay Boat

Pedagogical Intentions

- To allow students to manipulate a ball of modeling clay into a shape that will allow it to float.
- For Intensive ESL students: To help develop ESL Competency 1.

Materials

- Student Handbook p. 6
- One container for each team of 2
- Water to fill the container
- 1 ball of modeling clay for each team of 2
  Use oil-based clay, because water-based clay will gradually dissolve in the water.

Procedure

With the whole class

1. Present the question to the students: **Will the clay float in the shape of a boat?**
2. Ask students to form a hypothesis and to justify it. Students may have different hypotheses and justifications.
3. Invite students to share their hypothesis with the class.

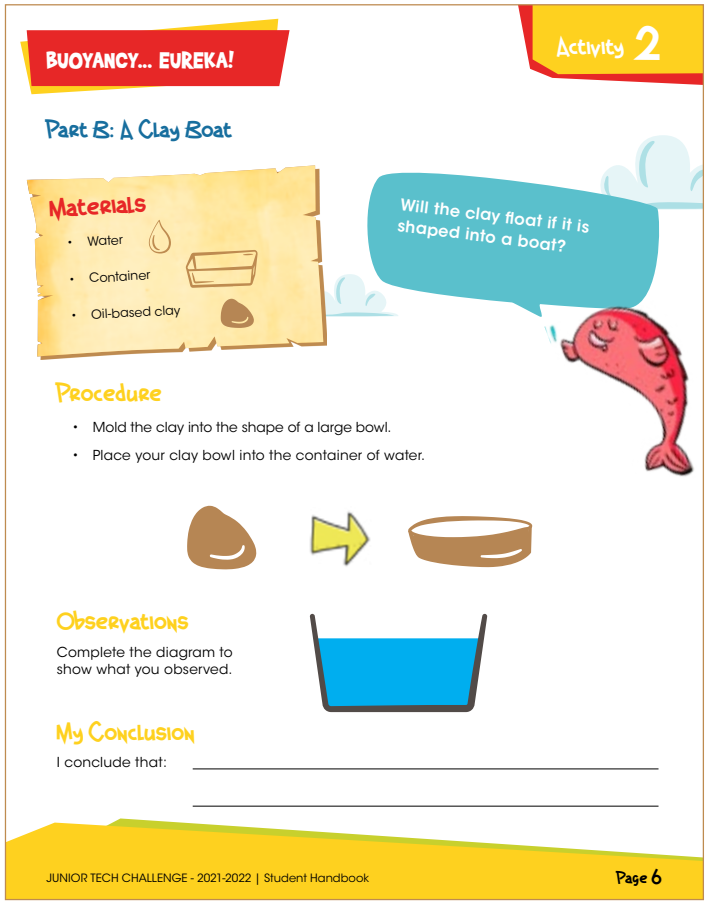
In teams of two*

4. Have the students shape a boat out of the modeling clay and place it in the container filled with water. If their boat sinks, ask them to find a solution (make a larger one).
5. Ask students to discuss and record their observations by completing the drawing, and writing their conclusion on page 6 of their Student Handbook.

With the whole class

6. Students are encouraged to share and compare their observations with their peers.

**For Intensive ESL, Functional Language can be found in Appendix 3.*



Part C - A Clay Bowl

Pedagogical Intentions

- To compare the carrying capacity of bowls of different sizes.
- For Intensive ESL students: To help develop ESL Competency 1.

Materials

- Student Handbook p. 7
- Glass marbles (approximately 1,5 cm in diameter with a mass of 5 g)
- One container for each team of 2
- Water to fill the container
- 1 ball of modeling clay for each team of 2
  Use oil-based clay, because water-based clay will gradually dissolve in the water.

Procedure

With the whole class

1. Present the question to the students: **Using the same amount of clay, which size bowl will hold the most marbles?**
2. Ask students to form a hypothesis and to justify it. Students may have different hypotheses and justifications.
3. Invite students to share their hypothesis with the class.

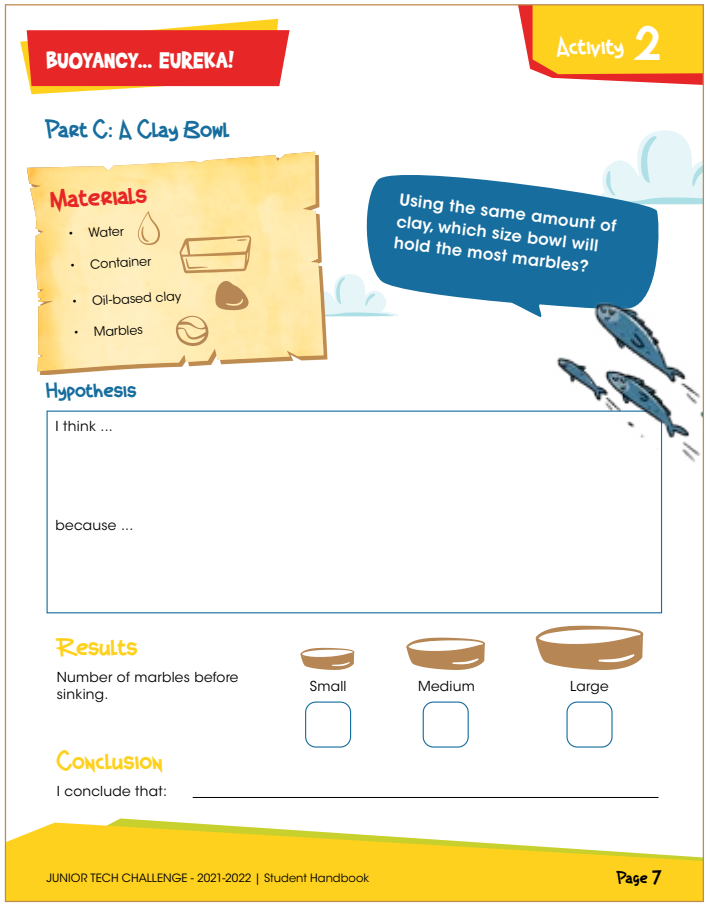
In teams of two*

4. Ask students to shape a bowl out of the modeling clay, place it in the container filled with water and add one marble at a time into the bowl. Students must count the number of marbles the bowl can hold before it sinks.
5. Ask students to discuss and note down their results on page 7 of their Student Handbook.
6. Repeat this procedure with a different sized bowl.
7. Ask students to record their conclusion on page 7 of their Student Handbook.

With the whole class

8. Students are encouraged to share and compare their observations with their peers.

**For Intensive ESL, Functional Language can be found in Appendix 3.*



ACTIVITY 3 – A PIRATE GAME

Pedagogical Intentions

- To activate prior knowledge about students' familiarity with the concept of balance.
- For Intensive ESL students: To help develop ESL Competency 1.

Materials

- Student Handbook p. 8 and 11

Procedure

1. Ask students to complete the table in Student Handbook page 8, on their own.
2. Ask students to discuss and share their answers with their teammates, and then with the class*.
3. Inform students they will be asked to answer the same questions, on page 11 of their Student Handbook, after they have completed the task, in order to see how their ideas have changed.

**For Intensive ESL, Functional Language can be found in Appendix 3.*

Activity 3 – A Pirate Game (continued)

Part A – Pirates Attack!

Pedagogical Intention

- To experiment with balance by placing a game board on a cup and positioning as many pieces of treasure on it as possible, without it tipping.
  The board is more likely to tip over when the treasures are placed farther away from the center. It's up to the students to discover this as they place the first few pieces on the board.

Materials

- Student Handbook p. 9
- 1 paper coffee cup (for each team of 2)
- 1 game board (for each team of 2)
  (The graph in Appendix 1 can be printed and glued on a thick piece of cardboard.)
- 30 treasures (game pieces) of the same size and weight-dice, metal nuts, etc. (for each team of 2)
  (The treasures must be a certain mass. To make sure the ones chosen have the correct mass, place the game board on the cup. Then, place a treasure on the edge of the board. It should tip over. If this is the case, place the same piece at the closest intersection to the center. The board shouldn't tip over. If the treasure meets these two criteria, they are the right mass.)

Procedure

In teams of two*

1. Ask students to balance the gameboard onto the paper cup.
2. Ask one student from each team to place a treasure at an intersection of the gameboard.
3. Ask the second team member to do the same. Each student will take turns placing treasures on the board.
4. Ask students to record how many treasures they were able to place on the gameboard before it tipped over.

With the whole class

5. Ask groups to describe what they learned about balance as they were placing the treasures on the game board.

**For Intensive ESL, Functional Language can be found in Appendix 3.*

Part B – The Pirate Treasure and the Secret Island

Pedagogical Intention

- To experiment with balance by placing a game board on a cup and strategically removing pieces of treasure from it, without it tipping.
  As students remove pieces, they will discover that the more treasure removed from the same side of the board, the more likely it is to tip over.

Materials

- Student Handbook p. 10
- 1 paper coffee cup (for each team of 2)
- 1 game board (for each team of 2)
  (The same game board from Part A can be used.)
- 30 treasures (game pieces) of the same size and mass-dice, metal nuts, etc. (for each team of 2)

Procedure

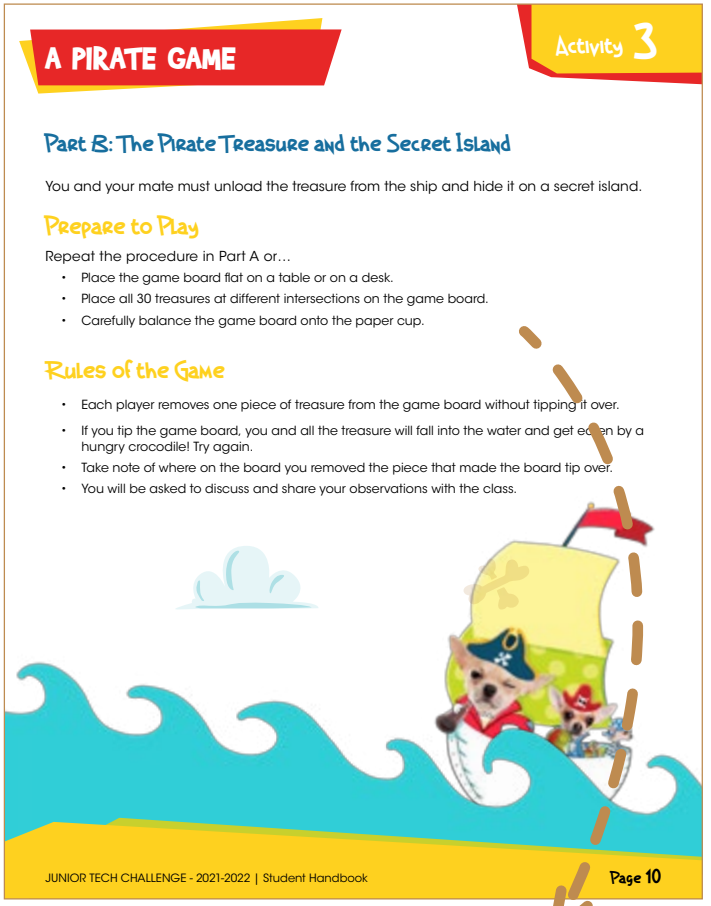
In teams of two*

1. Ask students to balance the game board onto the paper cup that is placed upside down.
2. Ask the students to take turns removing one piece of treasure from their game board.
3. Ask students to take note of where on the board they removed the treasure before the board tipped over.

With the whole class

4. Ask groups to describe what they learned about balance as they were removing the treasures from the game board.
5. Ask students to complete the table on page 11 of their Student Handbook.

**For Intensive ESL, Functional Language can be found in Appendix 3.*



COMPLEMENTARY ACTIVITY – ASSEMBLY TECHNIQUES

In the **S.O.S. Pirates! Challenge**, it will be necessary for students to attach certain materials together to build their prototype. Here are 14 suggested assembly techniques that students can use. For complete instruction sheets, see Appendix 2.

To view the video clips, click on the number corresponding to the technique.

Assembly and Bonding Techniques

Suggested Material

- wooden craft sticks
- paper clips
- pipe-cleaners
- string
- wooden skewers
- straws (paper straws preferably)
- oil-based clay
- metal washers (measuring approximately 2 cm in diameter)
- scissors
- container to hold water
- plastic sheet (Ziploc-type© freezer bag) approximately 25 cm x 25 cm

Green: Level of difficulty 1
Yellow: Level of difficulty 2
Pink: Level of difficulty 3

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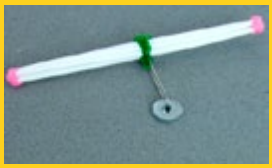
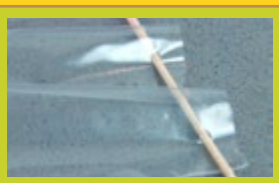
 6	 7	 8	 9	 10
 11	 12	 13	 14	

PREPARING TO MEET THE CHALLENGE – BATTEN DOWN THE HATCHES!

Pedagogical Intention

- To consolidate the learning acquired during the process of designing a watercraft.

Materials

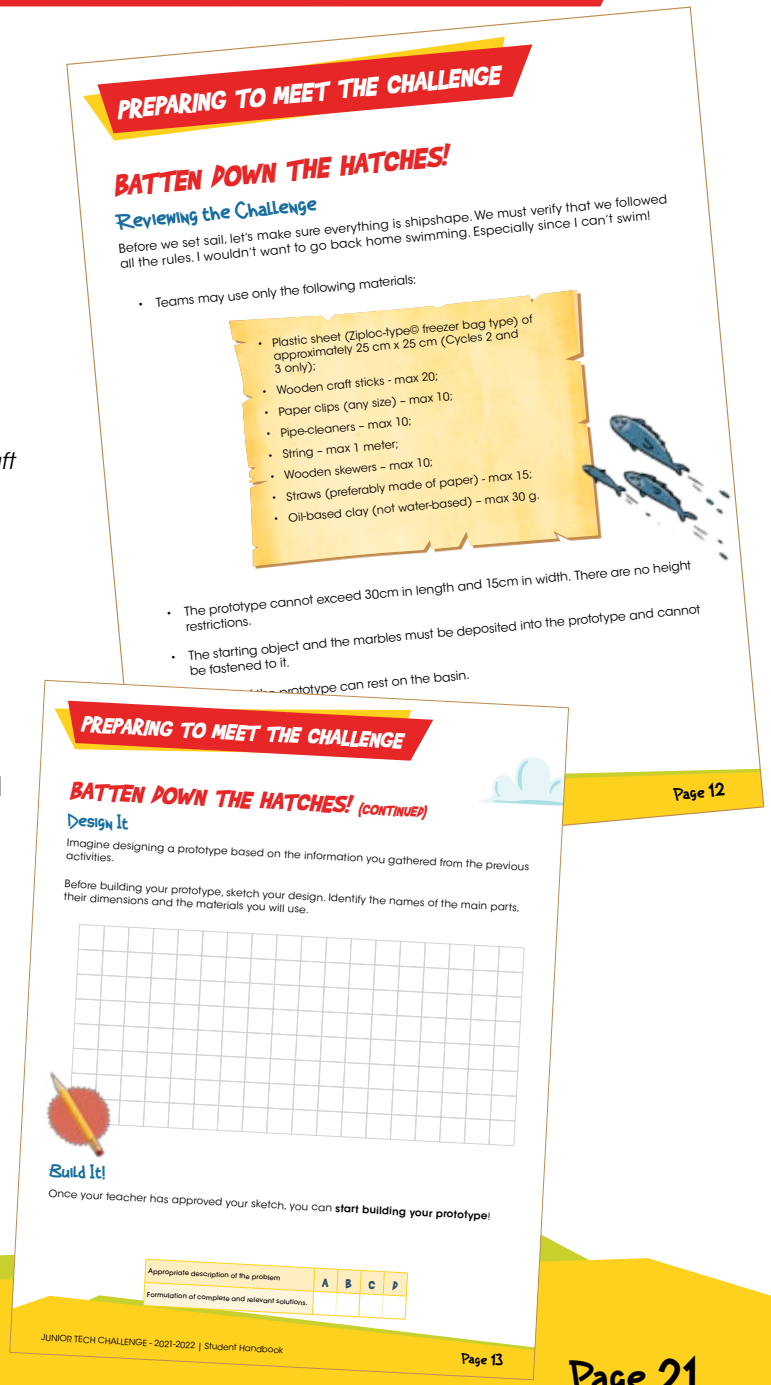
- Presentation of Rules
- Student Handbook p. 12, 13
- Slideshow
- Materials necessary to build the watercraft
- Transparent container with the minimum internal measurements of 52 cm x 36 cm x 16 cm
- Scale
  The watercrafts will be weighed before they are placed in the water. In case of a tie, the lighter watercraft will be declared the winner.

Setting the Scene

During the Finals of the Junior Tech Challenge, students will be asked to build a floating prototype that will support the largest amount of marbles possible.

Procedure

1. Use the presentation slides to review the rules of the challenge. They are also summarized on page 12 of the Student Handbook.
2. Use the Student Handbook to review the hypotheses discussed in the activities.
3. Use the following questions to review and discuss what was learned from completing the activities:
   - How will the shape of the watercraft affect buoyancy?
   - How will the placement of the marbles influence the performance of the watercraft?
4. Arrange students into teams of 1-3 students.
5. Before building their watercraft, each team must:
   - Select the material they will use.
   - Draw a sketch of their watercraft on page 13 of their Student Handbook.



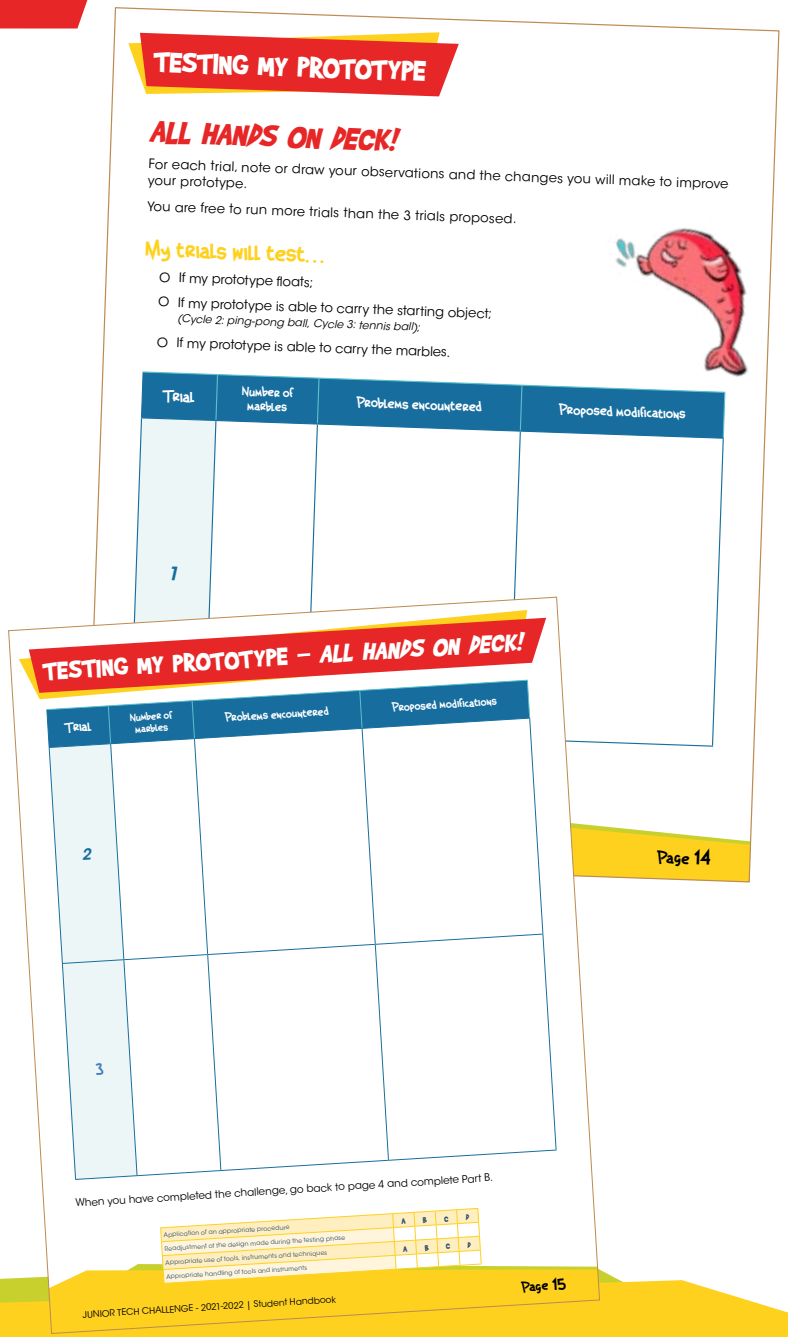
TESTING MY PROTOTYPE – ALL HANDS ON DECK!

Materials

- Student Handbook p. 14, 15

Procedure

1. Each team designs their prototype to prepare for testing.
2. Before the trials, students must be reminded to verify that …
   - the prototype floats;
   - the prototype could carry the starting object
   - (Cycle 2: a ping-pong ball, Cycle 3: a tennis ball);
   - the prototype could carry the marbles.
3. The prototype must be tested in the container filled with water. The students note the performance of their prototype, the problems they encountered, and the modifications they propose, in the table of Student Handbook page 14.
4. When the team is satisfied with the changes they made, they can test their prototype again. The students note the improved performance, the new problems encountered, and the proposed modifications, in the table of Student Handbook page 15.
   Note: Students can decide to increase or decrease their number of trials.
5. During the testing of the prototype, the teacher accompanies the students by questioning, encouraging and guiding them in their adjustments. The teacher also collects information on how students use the assembly techniques, and how they observe and solve problems. For Intensive ESL, the teacher continues to collect information on how the students use the functional language to communicate with their teammate(s).



THE COMPETITION – ADVENTURE AND TREASURE AWAIT US, MATEY!

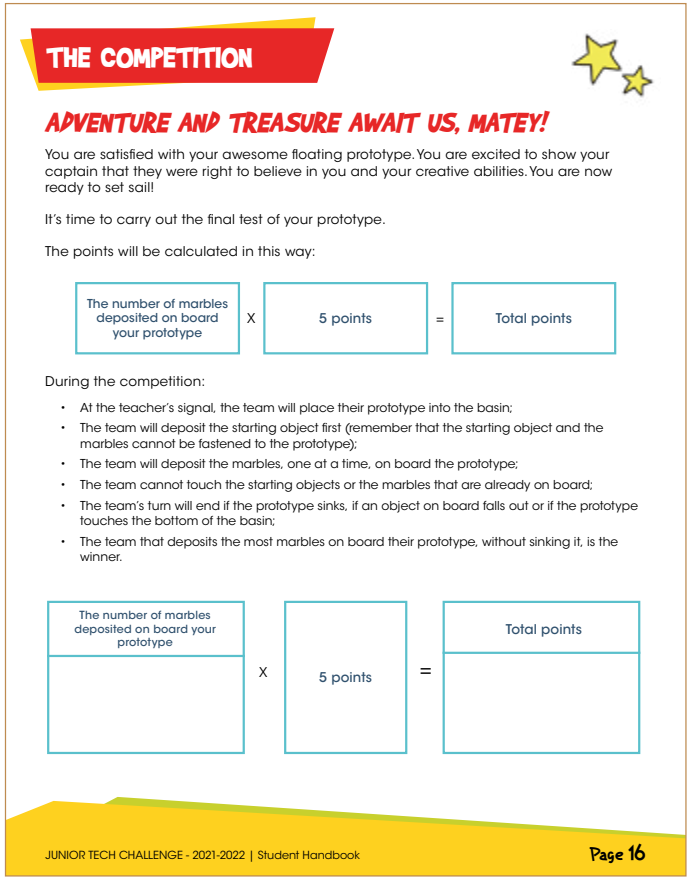
Materials

- Student Handbook p. 16

Procedure

You will find all the information on how to run the class competition on pages 4-8 of the Rules Handbook. Here are some details to guide you in the organization of your finals:

1. Ensure that all students of the same cycle complete the challenge under the same conditions.
2. Once the competition is over, students are asked to record their scores on page 16 of their Student Handbook.



THE COMPETITION

ADVENTURE AND TREASURE AWAIT US, MATEY!

You are satisfied with your awesome floating prototype. You are excited to show your captain that they were right to believe in you and your creative abilities. You are now ready to set sail!

It's time to carry out the final test of your prototype.

The points will be calculated in this way:

The number of marbles deposited on board your prototype	X	5 points	=	Total points

During the competition:

- At the teacher's signal, the team will place their prototype into the basin;
- The team will deposit the starting object first (remember that the starting object and the marbles cannot be fastened to the prototype);
- The team will deposit the marbles, one at a time, on board the prototype;
- The team cannot touch the starting objects or the marbles that are already on board;
- The team's turn will end if the prototype sinks, if an object on board falls out or if the prototype touches the bottom of the basin;
- The team that deposits the most marbles on board their prototype, without sinking it, is the winner.

The number of marbles deposited on board your prototype	X	5 points	=	Total points

JUNIOR TECH CHALLENGE - 2021-2022 | Student Handbook Page 16

REVIEW AND REFLECT – BACK TO PORT!

Pedagogical Intentions

- To consolidate learning.
- To review the design and construction of the watercraft, as well as the strategies used to complete the challenge.

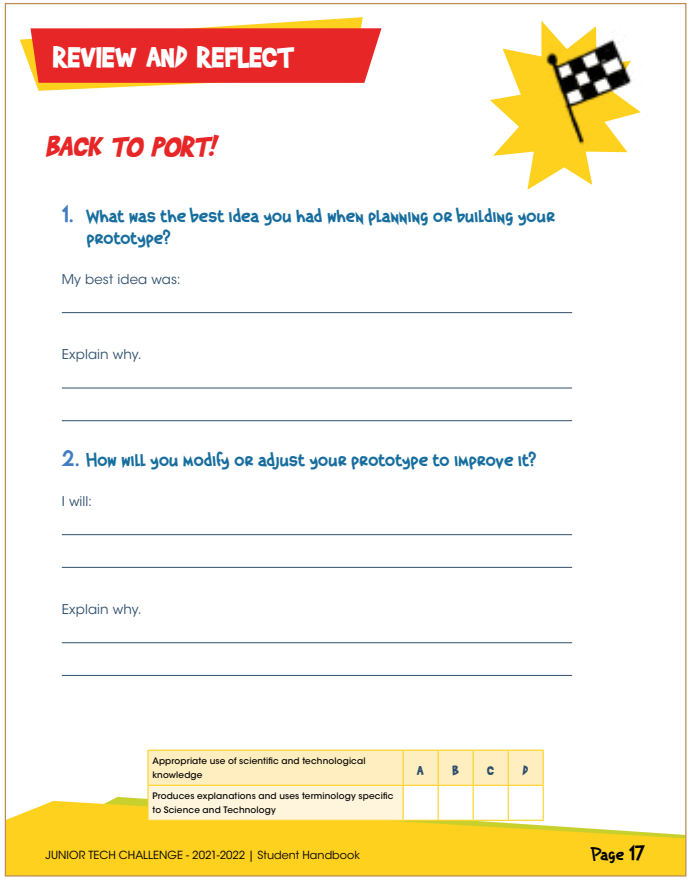
Materials

- Student Handbook p. 17

Procedure

Review as a group and invite students to complete page 17 of their Student Handbook on their own.

1. Ask students to present their prototype, their technical choices, the modifications they made during testing and their final result.
2. Compare the different properties of the prototypes:
   - ✔ Why were some more waterproof?
   - ✔ Why were some more stable when adding cargo?
   - ✔ How effective were the materials used to build the prototype?
3. Ask students about the strategies that they used. Were some more effective than others?
4. Have students analyze their performance using page 17 of the Student Handbook.
5. Invite students to return to page 4 of the Student Handbook and respond based on their observations.
6. Ask students to discuss what they learned from this project. (Think-Pair-Share)


REVIEW AND REFLECT

BACK TO PORT!

1. What was the best idea you had when planning or building your prototype?

My best idea was:

Explain why.

2. How will you modify or adjust your prototype to improve it?

I will:

Explain why.

	A	B	C	D
Appropriate use of scientific and technological knowledge				
Produces explanations and uses terminology specific to Science and Technology				

JUNIOR TECH CHALLENGE - 2021-2022 | Student Handbook Page 17

Frequently Asked Questions

The frequently asked questions are updated every week. Consult Foire aux questions regularly, and do not hesitate to send us your questions.

EVALUATION GRID–SCIENCE AND TECHNOLOGY

Evaluation Criteria	A	B – C – D
Appropriate description of the problem	**Formulation of complete and relevant solutions.** *(Student Handbook and observations made in class)* The student proposes relevant solutions of the design, orally or through the sketch drawn in the Student Handbook: • The shape of the prototype and the method of assembly must sustain its buoyancy; • Cycles 2 and 3: The ball must be integrated into the design of the prototype; • The prototype must maintain balance while the marbles are being added to it during the competition. *Note: We are not assessing the efficacy of the design. We want to check whether the student can identify the important elements of the design, and to propose possible solutions before its construction.*	B: The student proposes relevant solutions of the design, orally or through the sketch drawn in the Student Handbook by identifying the elements mentioned in A. Some omissions are observed. C: The student proposes relevant solutions of the design, orally or through the sketch drawn in the Student Handbook by identifying the elements mentioned in A. Many omissions are observed. D: The student does not propose any relevant solutions neither orally or in the Student Handbook.
Application of an appropriate procedure	**Readjustment of the design made during the testing phase.** *(Student Handbook and observations made in class)* During the testing phase, the student identifies three problems encountered, and offers a number of relevant solutions for each, either orally or written. Note: The solutions proposed do not necessarily have to be successful. Some trials may be successful. Either way, evaluate trials where a problem and a modification have been described.	B: During the testing phase, the student identifies two problems encountered, and offers a number of relevant solutions for each, either orally or written. C: During the testing phase, the student identifies one problem encountered, and offers a relevant solution, either orally or written. D: During the testing phase, the student does not identify any problems.

Evaluation Criteria	A	B – C – D
Appropriate use of instruments, tools or techniques	**Appropriate handling of tools and instruments.** *(Observations made in class with the manipulation of the prototype)* The student appropriately uses the techniques taught in class.	B-C: The student appropriately uses the techniques taught in class. Some awkwardness is observed.
		D: The student does not appropriately use the techniques taught in class.
Appropriate use of scientific and technological knowledge	**Produces explanations and uses terminology specific to Science and technology.** *(Student Handbook)* The student summarizes: • by describing their best idea AND a modification; • by using the terminology specific to Science and Technology.	B: The student summarizes by describing their best idea AND a modification. Some awkwardness is observed.
		C: The student summarizes by describing their best idea OR its modification, and by using the terminology specific to Science and Technology.
		D: The student simply presents their ideas without any explanation, or the explanation provided is not based on Science and Technology.

MEDIA RESOURCES (ENGLISH AND FRENCH)

French Resources

Brain Pop : vidéo Flottabilité *(abonnement nécessaire)*
https://fr.brainpop.com/sciencesdelaterre/mouvementetforces/flottabilite/

Édumédia : Vidéo Flotte ou coule *(abonnement nécessaire)*
https://junior.edumedia-sciences.com/fr/media/809-video-flotte-ou-coule

Édumédia : Animation Flotte ou coule *(abonnement nécessaire)*
https://junior.edumedia-sciences.com/fr/media/441-flotte-ou-coule

Édumédia : Vidéo Le sous-marin *(abonnement nécessaire)*
https://junior.edumedia-sciences.com/fr/media/822-video-le-sous-marin

Une minute de science, SVP! : la force de l'eau *(ONF)*
https://www.youtube.com/watch?v=QBeUjtUbbf4

Curionautes des sciences, Pourquoi les bateaux flottent?
https://www.youtube.com/watch?v=64wZWuGU4OA

C'est pas sorcier: La poussée d'Archimède
https://www.youtube.com/watch?v=Id_0UAsJtz0

C'est pas sorcier: Comment les paquebots flottent-ils?
https://www.youtube.com/watch?v=Xb5k2wVOaWI

English Resources

Bill Nye the Science Guy – S01 E05 Buoyancy
https://www.youtube.com/watch?v=-HZBusjP0uw

TED-Ed: how Taking a bath led to Archimedes' principle
https://www.youtube.com/watch?v=ijj58xD5fDI

***Science Please!:The Force of Water** *(NFB)*
https://www.nfb.ca/film/force_of_water/

Kids Want to Know: Buoyancy: What Makes Something Float?
https://www.youtube.com/watch?v=nMIXU97E-uQ

READING SUGGESTIONS

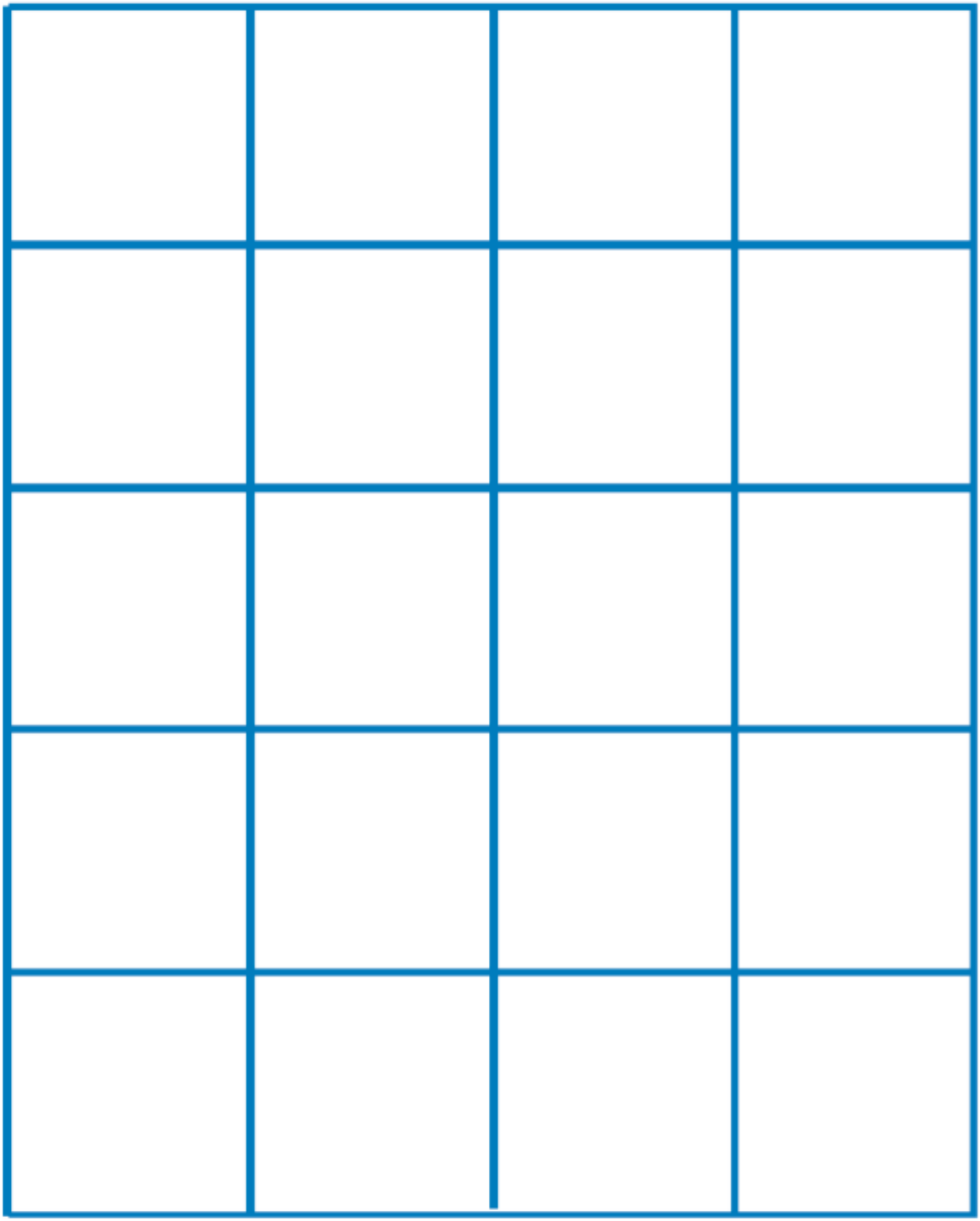
Some literature selections, chosen from Quebec Reading Connection, to continue the theme of pirates, boats and buoyancy!

Title	Book Type Genre	Cycle / Année	QRC link
Alpha, Bravo, Charlie: The Complete Book of Nautical Codes Gillingham, Sara	Non-fiction	ELA 3-6 ESL 4-6, Sec 1-2	QRC link
Whale Trails: Before and Now Cline-Ransome, Lesa Kars, G. Brian	Non-fiction	ELA 4-6 ESL 4-6, Sec 1-2	QRC link
Who Sank the Boat? Allen, Pamela	Picture Book	ELA K-1 ESL 1-2	QRC link
Everything Goes: By Sea Biggs, Brian	Non-fiction	ELA 1-4 ESL 2-6	QRC link
Pirate, Viking, & Scientist Chapman, Jared	Picture Book	ELA 2-5 ESL 3-5	QRC link
Edward and the Pirates McPhail, David	Picture Book	ELA K-3 ESL 3-6	QRC link
Small Saul Spires, Ashley	Picture Book	ELA 1-6 ESL 3-6	QRC link
Dare the Wind Fern, Tracey	Non-fiction Biography	ELA 2-5 ESL 5-6, Sec. 1	QRC link
A Blinding Light Lawson, Julie	Novel Historical	ELA 6, Sec. 1-3 ESL 6, Sec. 1-3	QRC link
Explore the Titanic Chrisp, Peter	Non-fiction	ELA 2-6, Sec. 1-2 ESL 5-6, Sec. 1-4	QRC link
Keeper of the Light Barkhouse, Janet	Picture Book	ELA 4-6 ESL 4-6, Sec. 1-3	QRC link

READING SUGGESTIONS

Title	Book Type Genre	Cycle / Année	QRC link
The Wreck of the Zephy Van Allsburg, Chris	Picture Book	ELA 3-6 ESL 4-6	QRC link
An Illustrated Timeline of Transportation Spengler, Kremena T.	Non-fiction	ELA 1-4 ESL 3-6, Sec. 1	QRC link
Dream Boats Bar-el, Dan	Picture Book	ELA 5-6 ESL 5-6, Sec. 1	QRC link
The Empress of Ireland - The Model	Non-Fiction 4-minute video	ELA 5-6, Sec. 1-5 ESL 5-6, Sec. 1-5	Youtube link
Canada's Titanic: The Sinking of the Empress of Ireland	Documentary with more mature content 12-minute video	ELA 5-6, Sec. 1-5 ESL 6, Sec. 1-5	Youtube link

APPENDIX 1 – GRAPH (A PIRATE GAME)



APPENDIX 2 – ASSEMBLY TECHNIQUE INSTRUCTION SHEETS

In this appendix, you will find complete instruction sheets for each of the assembly and bonding techniques. To view the video clips, click on the number corresponding to the technique.

Many thanks to Yan Villeneuve of the Centre de services scolaire des Mille-Îles for producing the videos, and to the following school service centers for sharing this document as well as the video clips:

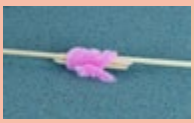
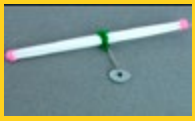
- Centre de services scolaire des Mille-Îles;
- Centre de services scolaire de Laval;
- Centre de services scolaire de la Rivière-du-Nord;
- Centre de services scolaire des Affluents;
- Centre de services scolaire des Laurentides;
- Centre de services scolaire des Samares;
- Centre de services scolaire des Hautes-Laurentides;
- Centre de services scolaire de la Pointe-de-l'Île.

Assembly and bonding techniques

Suggested Materials

- wooden craft sticks
- paper clips
- pipe-cleaners
- string
- wooden skewers
- straws (paper straws preferably)
- oil-based modeling clay
- metal washers (approximately 2 cm in diameter)
- scissors
- container
- plastic sheet (Ziploc-type© freezer bag) approximately 25 cm x 25 cm

Green: Level of difficulty 1
Yellow: Level of difficulty 2
Pink: Level of difficulty 3

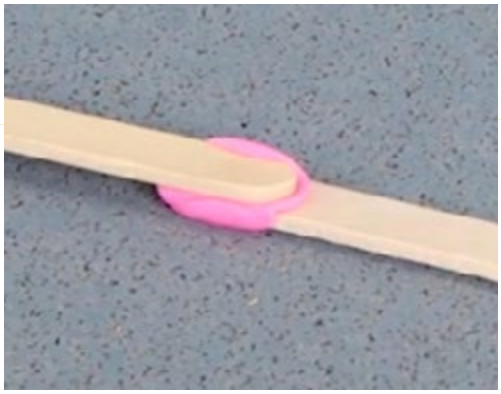
						
1	2	3	4	5	6	7
						
8	9	10	11	12	13	14

Appendix 2 – Assembly Technique Instruction Sheets (continued)

1

ASSEMBLE TWO WOODEN CRAFT STICKS USING CLAY

LEVEL OF DIFFICULTY: 1



SUMMARY :

To create a **linear bond**, place some clay between the ends of two wooden craft sticks and press them together.

MATERIALS

- 2 wooden craft sticks
- 1 small amount of oil-based clay

PROCEDURE

1. Shape the clay into a ball.
2. Flatten the ball of clay and place it on the end of one of the wooden craft sticks.
3. Place the end of the other wooden craft stick on the clay.
4. Press firmly on the stick to hold the two sticks together.
5. Remove the excess clay.

2

ASSEMBLE TWO WOODEN CRAFT STICKS USING A PIPE CLEANER

LEVEL OF DIFFICULTY: 1

SUMMARY :

To create a **linear bond**, wrap a section of pipe cleaner around the ends of two wooden craft sticks.

MATERIALS

- 2 wooden craft sticks
- 1 pipe-cleaner
- 1 pair of scissors

PROCEDURE

1. Cut the pipe cleaner into a section of about ten centimeters.
2. Join the ends of two wooden craft sticks, clamping the joint between your index finger and your thumb.
3. Insert one end of the pipe cleaner under your thumb to hold it over the joint.
4. Wrap the pipe cleaner completely around the joint, making sure not to prick your fingers.

3

ASSEMBLE TWO WOODEN CRAFT STICKS USING STRING, WITHOUT MAKING A KNOT

LEVEL OF DIFFICULTY: 3

SUMMARY :

To create a **linear bond**, wrap a section of string around the junction of two wooden craft sticks.

MATERIALS

- 2 wooden craft sticks
- Approximately 20 cm of string
- 1 pair of scissors

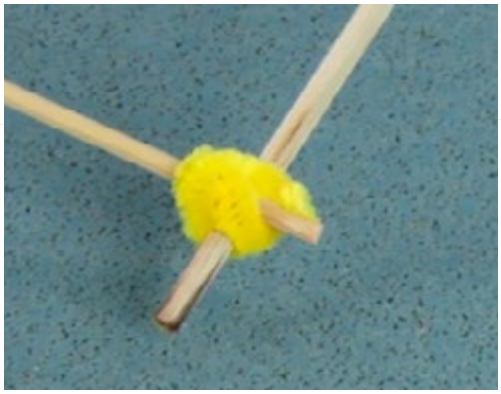
PROCEDURE

1. Join the ends of two wooden craft sticks together, squeezing them between your index finger and thumb.
2. To hold the string in place, insert one end of it under your thumb.
3. Wrap the string around the junction and make sure to maintain a constant tension. Wrap it around four or five times.
4. Maintain tension on the string, and insert it between the craft sticks.
5. Cut off any excess string ends.

4

ASSEMBLE TWO SKEWERS USING A PIPE CLEANER

LEVEL OF DIFFICULTY: 2



SUMMARY :

To create a **corner connection**, wrap the pipe cleaner around the junction of two skewers to form an X.

MATERIALS

- 2 wooden skewers
- 1 pipe-cleaner
- 1 pair of scissors

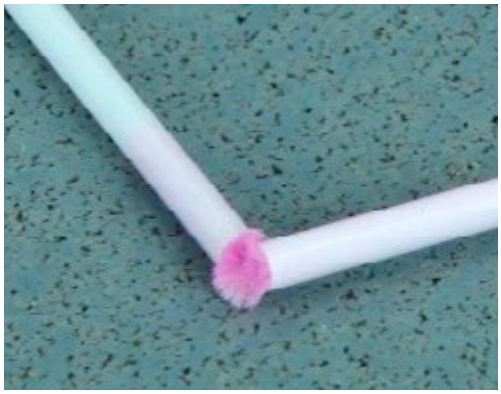
PROCEDURE

1. Join the ends of two skewers to form a right angle, squeezing the junction between your index finger and thumb.
2. To hold the pipe cleaner in place, insert one end under your thumb.
3. Wrap the pipe cleaner around the junction of the two sticks, twice.
4. Then change the direction so that it forms an X with the previous binding. Make two more turns.
5. Cut off the excess pipe cleaner.
6. The binding can be moved by sliding the two skewers within it.

5

ASSEMBLE TWO STRAWS USING A PIPE CLEANER

LEVEL OF DIFFICULTY: 1



SUMMARY :

To create a **corner connection**, insert a piece of pipe cleaner into two straws.

MATERIALS

- 1 straw (paper straw preferably)
- 1 pipe-cleaner
- 1 pair of scissors

PROCEDURE

1. You can cut a straw in half or use 2 full-size straws.
2. Cut the pipe cleaner into a section of about five centimeters.
3. Insert half the pipe cleaner into one of the straws.
4. To obtain a right angle, bend the part of the pipe cleaner that is protruding from the straw.
5. Insert it into the other straw.

Appendix 2 – Assembly Technique Instruction Sheets (continued)

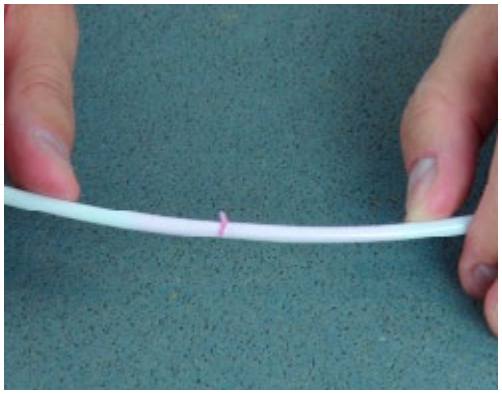
6

REINFORCE A STRAW

LEVEL OF DIFFICULTY: 1

SUMMARY :

To **reinforce a straw**, insert a piece of pipe cleaner and a piece of a brochette stick into the two halves of the straw.



MATERIALS

- 1 straw (paper straw preferably)
- 1 wooden skewer
- 1 pipe-cleaner
- 1 pair of scissors

PROCEDURE

1. Cut the straw in half.
2. Cut the pipe cleaner into a section measuring approximately five centimeters and insert it into the ends of both straws.
3. When the pipe cleaner is inserted into the straws, you will notice that the connection is weak when bent.
4. Remove the pipe cleaner from the straws.
5. **To strengthen this connection, you will need a 5 cm piece of skewer.** To cut the skewer, make a slight notch on the skewer where you want it to be cut.
6. Apply a bending motion at either side of the notch made on the skewer. This will break it into two sections.
7. Insert the piece of pipe cleaner and the piece of skewer together, halfway into one straw. Insert the other straw over the remaining pipe cleaner and skewer.

7

ASSEMBLE TWO WOODEN SKEWERS WITH A PIPE CLEANER, USING A WOODEN CRAFT STICK TO STRENGTHEN THE BINDING

LEVEL OF DIFFICULTY: 3

SUMMARY :

It is possible to join the ends of two skewers with a pipe cleaner, **provided you add a support made from a coffee stir stirrer.**

MATERIALS

- 2 wooden skewers
- 1 pipe-cleaner
- 1 pair of scissors
- 1 wooden craft stick

PROCEDURE

Create the support

1. Using one of the scissor blades, make a slight notch onto the wooden craft stick at about three centimeters from the end. Apply a bending motion at either side of the notch. This will make 2 sections. Use the 3 cm section.

Install the support

2. Place both ends of the skewer onto the support, holding the junction between your index finger and thumb.
3. To hold the pipe cleaner over the junction, insert one end of the pipe cleaner under your thumb.
4. Wrap the pipe cleaner around the junction, three or four times.
5. Wrap the two protruding ends of the pipe cleaner and secure them together.
6. Cut off the excess pipe cleaner.

8

ASSEMBLE TWO WOODEN SKEWERS USING STRING AND A SUPPORT

LEVEL OF DIFFICULTY: 3

SUMMARY :

It is possible to join the ends of two skewers with string, **provided you add a support made from a wooden craft stick**.

MATERIALS

- 2 wooden skewers
- 1 wooden craft stick
- string
- 1 pair of scissors

PROCEDURE

Create the support

1. Using one of the scissor blades, make a slight notch onto the wooden craft stick at about three centimeters from the end. Apply a bending motion at either side of the notch. This will make 2 sections. Use the 3 cm section.

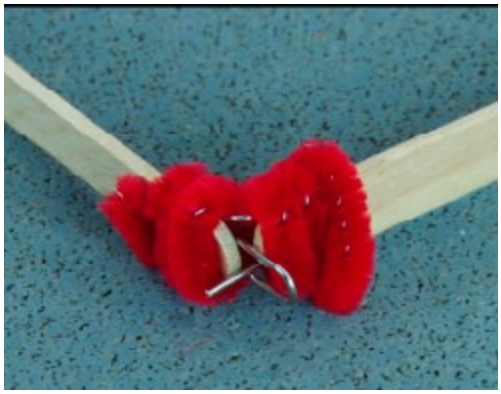
Install the support

2. Install both ends of the skewer onto the support, holding the junction between your index finger and thumb.
3. Insert one end of the string under your thumb to hold it over the junction.
4. Making sure to maintain constant tension, wrap the string around the junction three or four times.
5. Maintaining tension on the string, insert it between the skewer and the support so that it is clamped between them.
6. Cut off the excess string.

9

ASSEMBLE TWO WOODEN CRAFT STICKS INTO A PERPENDICULAR CONNECTION USING A PAPER CLIP

LEVEL OF DIFFICULTY: 2



SUMMARY :

To create a **perpendicular connection**, bend a paper clip at a right angle, then, using a pipe cleaner, attach a wooden craft stick to each end of the paper clip.

MATERIALS

- 2 wooden craft sticks
- 1 pipe-cleaner
- 1 paper clip
- 1 pair of scissors

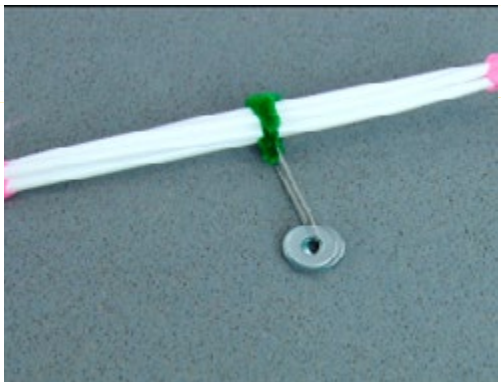
PROCEDURE

1. To make a corner, bend a paper clip to form a right angle.
2. Press the end of one of the craft sticks onto one of the corners of the paper clip, holding the junction between your index finger and thumb.
3. To hold it to the junction, insert the end of the pipe cleaner under your thumb.
4. Wrap the pipe cleaner around the junction, three or four times.
5. Repeat steps 2-4 using the second wooden craft stick.
6. Cut off the excess pipe cleaner.

10

MAKE A FLOAT WITH STRAWS

LEVEL OF DIFFICULTY: 2



SUMMARY :

To make a **float**, gather straws and attach them with a pipe cleaner, then fill the ends of the straws with clay. Attach a support and washers to it, to test its buoyancy.

MATERIALS NEEDED TO MAKE THE FLOAT

- 5 straws
- oil-based clay
- 1 pipe-cleaner
- 1 pair of scissors
- 1 paper clip

MATERIALS NEEDED TO CARRY OUT THE TESTS

- 1 container
- 10 cm of water to add to the container
- Approximately 10 metal washers *(approximately 2 cm in diameter)*

PROCEDURE

1. Build a float:

» Cut a 10-centimeter section of pipe cleaner.

» Gather the straws and tie them together at the center with the pipe cleaner. (Hold the straws together tightly and twist the pipe cleaner around them.)

» Adjust the straws to ensure that the ends are all even.

» Plug each end of the straws with a little modeling clay.

2. Attach the paper clip to test the buoyancy of the float:

» Open the end of the paper clip, just enough so that washers can easily slide onto it.

» Attach the paper clip to one of the ends of the pipe cleaners, and twist the two ends of the pipe cleaners together until it is securely attached. Fold the pipe cleaner ends around the straws.

» Insert three metal washers onto the paper clip.

3. Test the float:

» Place the float in a tub containing 10 cm of water. (Notice that when you put the float in water without the washers, it will float even if you try to make it sink by pressing down on it.)

» Perform the float test with three washers. (You should get the same result.)

» Perform more tests with more washers until the float sinks.

11

MAKE A RIGID PLATFORM WITH WOODEN CRAFT STICKS AND PIPE CLEANERS

LEVEL OF DIFFICULTY: 3

SUMMARY :

To make **a rigid platform**, assemble a series of wooden craft sticks together which are supported by 2 wooden craft sticks

MATERIALS

- wooden craft sticks
- pipe cleaners

PROCEDURE

First junction

1. Join the ends of two wooden craft sticks to form a right angle (or corner) by clamping the two between your index finger and thumb.
2. Insert one end of the pipe cleaner under your thumb to hold it in place.
3. Wrap the pipe cleaner around them, once or twice.
4. Change the direction to form an X.
5. Wrap them this way once or twice more.
6. Join a second wooden craft stick to the first one, by passing the pipe cleaner between the second and the first.
7. Attach a third wooden craft stick in the same way.

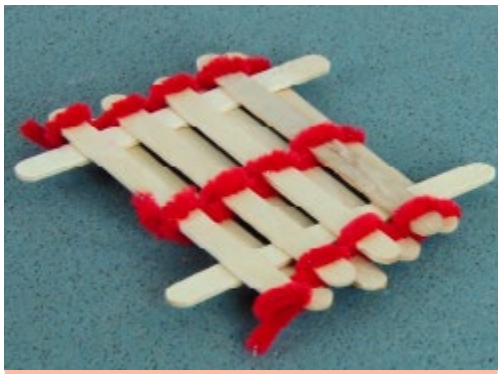
Second junction

8. Use steps 1-5 to make a new right angle connection by joining the end of another wooden craft stick to the other end of the first one. Attach the other end of the other 2 wooden craft sticks already in place, using step 6.
9. Continue to join the other wooden craft sticks in this way to finish the platform.

12

MAKE A FLEXIBLE PLATFORM WITH WOODEN CRAFT STICKS AND PIPE CLEANERS, THEN ADD CROSSBARS TO MAKE IT RIGID

LEVEL OF DIFFICULTY: 3



SUMMARY :

To make **a flexible platform**, assemble a series of wooden craft sticks in parallel.

To solidify the platform, slide two wooden craft sticks through the structure.

MATERIALS

- wooden craft sticks
- pipe-cleaners

PROCEDURE

To make a flexible platform

1. Wrap a pipe cleaner a few times around a wooden craft stick at about 1 cm from the end.
2. Repeat this procedure at the center and at the other side of the wooden craft stick so that there are 3 pipe cleaners attached to the wooden craft stick.
3. Place a second wooden craft stick on the pipe cleaners, parallel to the first wooden craft stick.
4. To attach the second wooden craft stick, wound each of the three pipe cleaners once around the wooden craft stick.
5. Repeat this procedure to add the other craft sticks until the flexible platform is finished.

To solidify the platform

6. Slide two wooden craft sticks, one-at-the-time, through the platform alternating them over and under.

13

ATTACH PLASTIC WRAP TO A WOODEN SKEWER USING PAPER CLIPS

LEVEL OF DIFFICULTY: 2

SUMMARY :

To **attach** a plastic sheet to a wooden skewer, clip paper clips over the wooden skewer wrapped in plastic sheet.

MATERIALS

- plastic sheet (Ziploc-type© freezer bag) approximately 30 cm x 30 cm
- 1 wooden skewer
- 5 paper clips

PROCEDURE

1. Place the skewer about 3 cm from the edge of the plastic sheet. Fold the plastic sheet over the skewer once.
2. Lift the stick and the plastic at the center, holding them between your index finger and thumb.
3. Attach a paper clip at the center.
4. Attach a second and third paper clip to both ends of the skewer.
5. More paper clips can be attached to strengthen the bond.

14

ATTACH A WOODEN SKEWER TO PLASTIC WRAP BY PIERCING HOLES INTO THE PLASTIC WRAP

LEVEL OF DIFFICULTY: 1

SUMMARY :

To **connect** a wooden skewer to a plastic sheet, pierce the plastic sheet several times with the skewer, and slide the skewer through the holes.

MATERIALS

- plastic sheet (Ziploc-type© freezer bag) approximately 30 cm x 30 cm
- 1 wooden skewer

PROCEDURE

1. Making sure not to prick your fingers, pierce one corner of the plastic sheet with the tip of the skewer.
2. Gently slide the skewer through the hole. Pierce the plastic sheet again about 3 cm from the first hole, following the edge of the plastic sheet.
3. Continue the process along the edge of the plastic sheet.
4. Slide the skewer through the holes.

APPENDIX 3 – INTENSIVE ESL EXTRAS

You will find:

1. Activity Suggestions
2. Reflection Questions
3. Functional Language
4. Captain's Log of Nautical Expressions (Idioms)
5. Buoyancy and Density
6. C1 - General Evaluation Tool
7. C3 - I Write Texts Checklist
8. C3 - Generic Evaluation Tool

1. Activity Suggestions

Competency 1: To interact orally in English

Use the evaluation tool to observe students as they are planning their design and performing the various tasks. Use the functional language posters as support, and ask students to add to it by brainstorming other possible phrases to practice.

Competency 3: To Write Texts

- Students can write a procedure (a step-by-step preparation) for the competition to make sure they will succeed at the challenge.
- Students can use graphic organizers to help them organize their writing.
- Refer to the: I Write Texts Checklist

2. Reflection Questions

It is important that students reflect on their experience at every step-after each new concept, as well as at the end of the challenge. The following are examples of a few reflection questions. Feel free to add more!

During

1. Consider these questions in a group discussion, just **after a new concept** has been presented and explored by the students:
    - Give examples of where in your life have you seen the concept(s) presented in this activity?
    - How does this concept connect to your life? to the world?
    - What did you learn from this activity?

Appendix 3 - Intensive ESL Extras (continued)

After

2. Consider these questions in a group discussion, **at the end of the challenge**:
   - What was your favourite part of the challenge?
   - What was the most difficult part of the challenge for you?
   - How did you "fail forward" during the design and construction of the challenge?
   - Name something you learned about teamwork while completing this challenge.

Journaling

- Ask students to record their daily experiences, in any form they choose (collaborative platform, personal journal, video, audio...) to reflect on their practices, and/or share with their classmates.
- Describe how knowledge of science concepts can be useful in everyday life.
- Give students the choice of answering ANY of the DURING or AFTER questions in their journal.

3. Functional Language

Do you agree or do you disagree?

» I agree with this statement because…
» I disagree with this statement because…

I think the ... will hold the most number of marbles.

I think the ... will hold the least number of marbles.

» biggest bowl
» smallest bowl
» medium-size bowl

I think that…
I don't think…

» it will sink
» It will float

…because it is

» heavy
» light
» big
» small

While making predictions

» I think that…
» I predict that…
» What do you think will happen?
» What do you predict will happen?

What do you think?

» I think… because…
» I don't think… because…

A Pirate Game

» Let's add one here.
» Let's remove this one …
» Be careful! Watch out!
» Oh no! Let's try again!

While making observations

» I think my prediction was accurate because….
» I think my prediction was inaccurate because…
» Were your predictions accurate?

Appendix 3 - Intensive ESL Extras (continued)

4. Captain's Log of Nautical Expressions (Idioms)

Idioms are expressions used to convey a message in a colourful way. There are many nautical expressions that were used in S.O.S. Pirates!. Your job is to find them in the text, guess their meaning, and then look them up to confirm your guess. Record your answers in the Captain's Log, and answer the questions below.

Captain's Log			
Page	**Nautical Expression**	**My guess**	**Actual meaning**
2	Ahoy Matey!		
2	Loot		
2	Cargo		
2, 9, 10	Mate/Matey		
2	In Deep Water		
4	Dive Into		
8	Keel Over		
8	Learn the Ropes		
12	Batten Down the Hatches		
12, 16	Set Sail		
12	Shipshape		
14	All Hands On Deck		
17	Back to Port		

Appendix 3 - Intensive ESL Extras (continued)

1. What made some expressions easier to guess than others?

_____

2. Which was your favourite expression?

_____

3. Which do you think you will use again? In which context?

_____

5. Buoyancy and Density

BUOYANCY is the ability of a body to float or to rise to the top when submerged in a liquid. Why do some objects sink while others float? The answer lies in the object's density.

DENSITY refers to how tightly packed the mass is in an object. Objects will float if they are less dense than water. Objects will sink if they are more dense than water.

With a partner

1. Brainstorm and make a list of objects in your home that float (that are less dense than water).

_____ _____ _____

_____ _____ _____

2. Brainstorm and make a list of objects in your home that sink (that are more dense than water).

_____ _____ _____

_____ _____ _____

6. C1 - General Evaluation Tool

C1 Rubric to be used while students are working in groups, designing and planning their prototype.

ELEMENTARY CYCLE THREE ESL GENERIC EVALUATION TOOL

Competency 1, *To interact orally in English*

Class : _____

Evaluation criteria : Participation in exchanges and Use of functional language				Student names		
	Participation in exchanges	**20**	Speaks throughout, contributing substantial content, AND uses techniques to create true interaction (e.g. asks partner questions, reacts to and builds on partner's ideas)			
		16	Speaks throughout, contributing substantial content.			
		12	Speaks throughout, contributing limited content.			
		8	Speaks sporadically.			
		4	Speaks rarely.			
	Use of vocabulary and useful expressions	**15**	Quickly accesses a variety of vocabulary and expressions.			
		12	Uses a variety of vocabulary and expressions.			
		9	Uses basic vocabulary and expressions.			
		5	Lacks vocabulary.			
	Comprehension of messages by an anglophone	**15**	Messages are easily understood despite errors, if any.			
		12	Messages are understood with **some** interpretation.			
		9	Messages are understood with **considerable** interpretation.			
		6	Some messages are not understood despite interpretation.			
		3	Messages are understood; however, they are brief, very simple and/or very few.			
			Total : /50			
			Challenges (see list below)			

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Special cases :

- If a student does not participate or does not speak in English, allot 0/50.
- If most or all messages cannot be understood, allot 0/50.

Challenges		
	1. Using English words 2. Pronouncing keywords clearly 3. Using a variety of words 4. Expressing more ideas 5. Elaborating on ideas (giving examples, details, etc.) 6. Expressing a personalized messages 7. Asking questions to maintain interaction, ask for details, ask for clarification, etc.	8. Building on what partner says 9. Reacting to what partner says 10. Initiating an exchange 11. Using vocabulary from available resources 12. Using a specific language convention : _____ 13. Using the strategy : _____ 14. _____

7. C3 - I Write Texts Checklist

CHECKLIST

To write texts

I Write Texts

1. I prepare to write.

- I think of the instructions.
- I take out the resources I need
  (my books, my dictionary, my bank of expressions . . .)
- I look at the model.
- I write down ideas in English.
- I put them in order.

2. I write a draft.

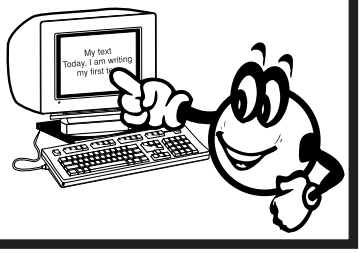
- I look at the model again.
- I follow the instructions.
- I use my ideas.
- I write short sentences in English. (Subject / Verb / Object)
- I use the vocabulary and expressions I know.
- If I have a problem:
  - ➤ I ask for help, I use my bank of words . . .

3. I revise my text.

- Did I follow the instructions?
- Did I follow the model?
- Are my ideas original?
- I check the spelling, the word order and punctuation with the resources I have.
- I ask a friend to revise my text.
- I correct my text.

4. I write my final text.

- Is it OK?
- Is it neat?
- Is it easy to read?



8. C3 - Generic Evaluation Tool

Elementary Cycle Three Generic[1] Evaluation Tool for Competency 3, *To write texts*

Name of student: _____ **Class:** _____

Evaluation criteria: Characteristics of the written text and Application of targeted language conventions

For marks and feedback purposes

› *Comprehension of the text by an anglophone*

- 10 The text is easily understood despite errors, if any.
- 8 The text is understood with **some** interpretation.
- 6 The text is understood with **considerable** interpretation. One or two sentences may not be understood.
- 4 Parts of the text are not understood despite interpretation.

› *Introduction or introductory sentence*

- 1 Effective
- 0 Ineffective
- 0 Missing

› *Body of the text*

- 3 Effective
- 2 Mostly effective
- 1 Mostly ineffective
- 0 Ineffective

› *Conclusion or closing*

- 1 Effective
- 0 Ineffective
- 0 Missing

› *Adaptation of the text to purpose and audience (task)*

- 5 Entirely
- 3 Mostly
- 1 Somewhat
- 0 Not at all

Total mark for Competency 3 /20

For feedback purposes

+ = good job | – = to work on

Content	Form
+ – clarity	+ – articles
+ – detail	+ – capitalization and/or punctuation
+ – flow	+ – prepositions
+ – paragraphing	+ – pronouns / possessive adjectives / possessive forms
+ – pertinence	+ – sentence structure (e.g. word order)
+ – other: _____	+ – singular/plural
	+ – spelling
	+ – verbs (e.g. tense, agreement)
	+ – vocabulary
	+ – other: _____

+ appropriate + catchy + original + useful + other: _____	– does not make sense – inappropriate or not pertinent to the task or context – incomplete – unclear – other: _____
+ accurate + complete (all necessary information) + easy to follow + pertinent + well developed + well organized + other: _____	– essential information missing – inaccuracies – insufficient detail or development – lack of logic – lack of organization – poor paragraphing – repetition – some content that does not make sense, is confusing or is not understood – some content that is inappropriate or not pertinent to the task – task requirements missing – other: _____
+ appropriate + original + useful + other: _____	– does not make sense – inappropriate or not pertinent to the task or context – incomplete – repetitive – unclear – other: _____
+ well-selected content + well-adapted content + well-selected language + other: _____	– some inappropriate content – some poorly adapted content – some inappropriate language – other: _____

Main challenges

Special cases

If you are unable to fairly evaluate the text using the tool, select one of the following descriptors and allot 6/20.

- Most or all of the text cannot be understood, despite interpretation.
- The text is incomplete or too short.
- The text is off task.

[1] If this evaluation tool is used along with a Competency 2 tool, do not evaluate "Body of the text" or "Adaptation of the text to purpose and audience," in order to avoid an overlap in evaluation, as these two elements will be addressed in the Competency 2 tool.

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Using the Evaluation Tool

This generic evaluation tool is suitable for most writing tasks. It may be used with Elementary 5 or 6 students. You may adjust the level of difficulty through task choice, design, requirements and expectations.

This tool was designed for two purposes:

1) to allow teachers to collect marks on students' writing skills for the report card
2) to help teachers support student learning by providing specific feedback

The left-hand column is used to assess the texts and provide marks. In the right-hand column, you may provide specific feedback that will allow students to have a better idea of what they are doing well (+ sign) and what they still need to work on (– sign), and enable you to base your assessment on observable elements.

For each section of the evaluation tool, first determine which descriptor best represents the student's text, and circle the corresponding mark. Next, in the right-hand column, circle the elements that were particularly strong and those that were the most problematic. The goal is to identify which elements stood out and which should be tended to, not to catch each mistake or weakness. Finally, add up the marks in the left-hand column to obtain the final result for the task.

Notes on the Descriptors

› *Comprehension of the text by an anglophone*

You must read the text in its entirety as if you were an anglophone with little or no knowledge of French or the task.

Easily understood – You do not have to infer to understand the text.

Despite errors, if any – Errors, if any, do not affect the comprehension of the text.

Some interpretation – You must infer to understand parts of the text but most of the text requires no interpretation.

Considerable interpretation – You must make a substantial effort to understand several parts, or a significant portion of, the text.

Parts of the text are not understood despite interpretation – Even though you try to infer meaning, part of the text remains unclear.

› *Introduction or introductory sentence*

Depending on the form of text that students are required to write, the introduction may simply consist of an introductory sentence (e.g. *I'm writing to propose a new activity for the school* or *Once upon a time there lived a little girl*).

Do not use this section (and adjust the total marks) if:

- the text does not call for any introduction or introductory sentence (e.g. poster)
- students merely reproduce an introduction from a model provided to them

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› *Body of the text*

No matter what form of text students are required to write, the body of the text must meet certain requirements: the content must be relevant to the task and sufficiently developed; ideas must be clear and grouped in a logical manner so the reader can easily follow them; information must be accurate, etc. To determine the degree of effectiveness, refer to the task and the set requirements. Refer to the sidebar if the task involves Competency 2.

Note about integrated tasks

If the task that students carry out involves Competency 2, *To reinvest understanding of written and oral texts*, two sections of the tool will not be used in order to avoid an overlap in evaluation: "Body of the text" and "Purpose and audience." These sections will be addressed in the Competency 2 tool.

› *Conclusion or closing*

Depending on the form of text that students are required to write, the conclusion may simply consist of a brief sentence that appropriately brings the text to a close (e.g. *I hope this information will be useful* or *They lived happily ever after*).

Do not use this section (and adjust the total marks) if:

- the text does not call for any conclusion or closing (e.g. poster)
- students merely reproduce a conclusion or a closing from a model provided to them

› *Adaptation of the text to purpose and audience*

All texts are written for a purpose and a target audience. The purpose can be basic (e.g. to remind someone of an upcoming event) or more complex (e.g. to convince someone to do something). The target audience can be a single person, a group or the public at large.

You can determine whether or not a text was written in light of the purpose and audience by asking yourself a few questions. For example:

- Does the text accomplish what it was supposed to accomplish? For example, if the student was meant to explain a concept, was the concept explained well so that the reader will easily understand?
- Is the language used appropriate to the purpose and audience? For example, are words too technical for the target audience? Is slang used in a formal text?
- Is necessary background provided (if applicable)? For example, does the audience need to know certain facts about the topic to understand the text?
- Is there too much irrelevant or extraneous information, thus confusing the reader?
- Is information detailed enough for the audience to understand? For example, if a decision is presented in the text, is it explained? Are opinions supported?
- Is the information too specialized or technical for the reader, hindering his or her comprehension?
- Is the information organized in a way that the reader can easily follow and understand?