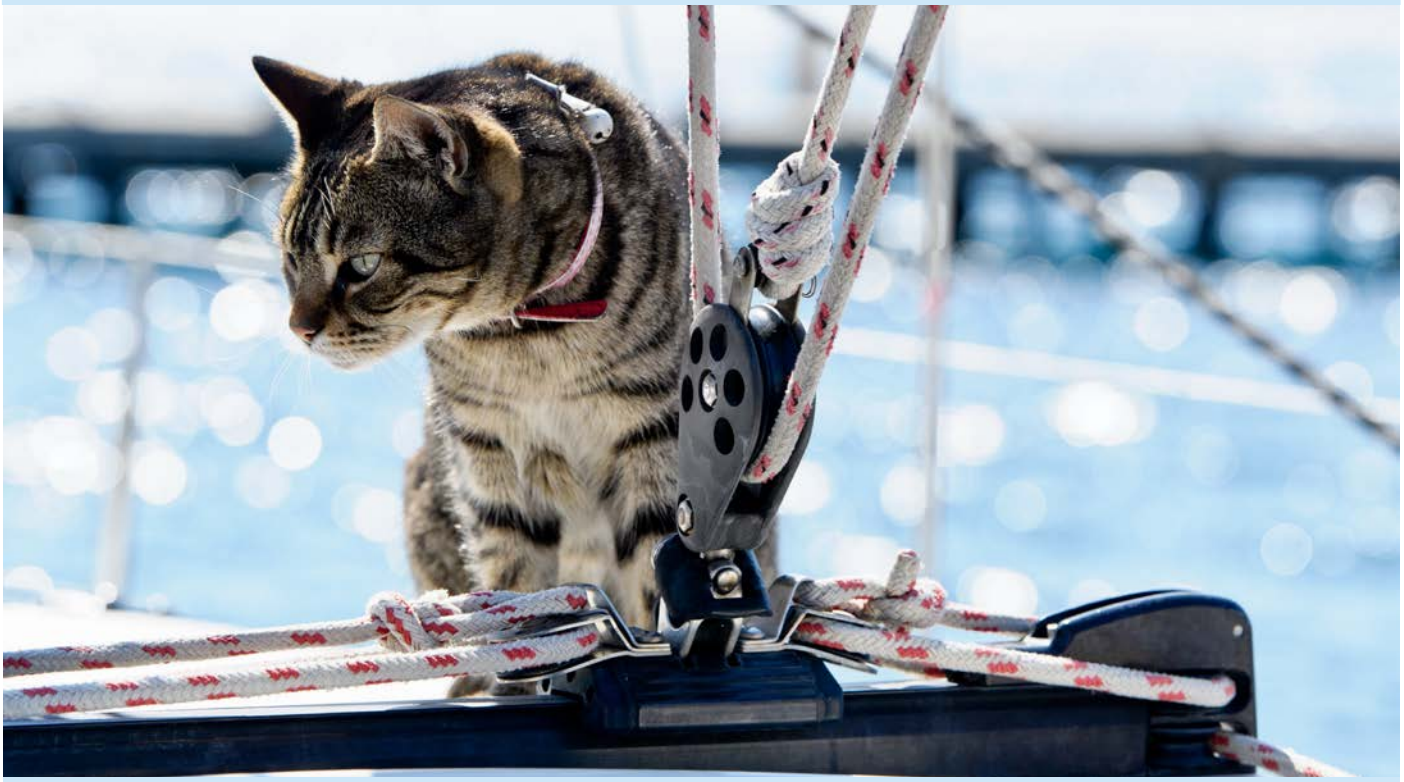
Algorithm Relay Race

The True Tale of Colins – The Stowaway Cat



Instructional Booklet

- CCSS & ISTE Alignment
- Materials List
- Introductory Lessons
- Game Instructions
- Printables

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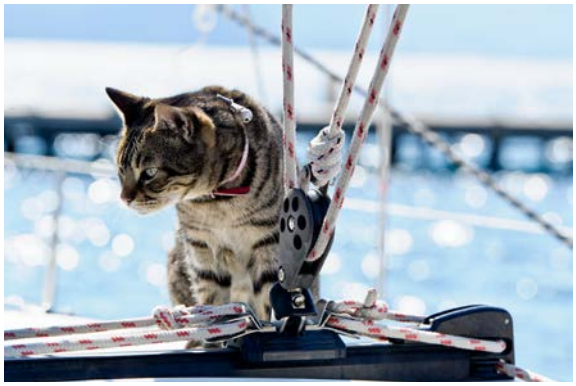
Game Description

A more detailed description including step-by-step instructions for facilitation and a list of materials can be found on page 2.



Common Core State Standards

SL.6-8.1 Engage effectively in a range of collaborative discussions with diverse partners on grades 6-8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

SL.6-8.6 Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

International Society for Technology in Education: Computer Science Standards

1.B.II Design and test algorithms and programming solutions to problems in different contexts (textual, numeric, graphic, etc.) using advanced data structures.

1.B.III Analyze algorithms by considering complexity, efficiency, aesthetics, and correctness.

The Algorithm Relay Race is an educational game intended to teach players about algorithms, including what they are and the importance of writing them in a clear, concise manner.

In a famous true tale, a friendly calico cat named Colins ends up on a long sea voyage. The stops in the relay race are locations and key events in Colins' great adventure. The story unfolds as kids play. The "final destination" is a surprise ending, and a tearful return of the cat to its owner—a dock worker in New Zealand, where Colins becomes famous and is now memorialized with a stone.

The players work in teams to complete four tasks that will help them find a lost cat. These tasks all require the teams to split into pairs to write algorithms which their other teammates will later perform.

This game can be played over two days or played on one day depending upon the length of time available to the teacher.

Materials

Counts for materials are intended for a class of 20. Add additional materials as appropriate. Printable materials can be found in the Appendix (page 15).

- Engagement Survey
- Pre-Game Assessment
- Post-Game Assessment

- Instructional Booklet/Facilitation Guide
- Key Concepts Presentation Slide
- Discussion Questions & Possible Points

- Loaf of Bread
- Jar of Peanut Butter (or Similar Product)
- Jar of Jelly or Jam
- Butter Knife
- Paper Towels

- Picture of Colins
- 20 Gift Bags (Size Depends on Materials)
- 5 sets of Materials for Clue Bag 1
- 5 sets of Materials for Clue Bag 2
- 5 sets of Materials for Clue Bag 3
- 5 sets of Materials for Clue Bag 4

Concept Introduction

Prior to game play, introduce the concept of algorithms.

For Researchers Only:
Before the introduction, administer the **pre-game assessment**.

> *We will be playing a game called the 'Algorithm Relay Race'. Before we begin the game today, we need to have you complete* ***the pre-game assessment****. Think of it as a "mini-game" similar to what you might do in a computer game to test your skills before you start the regular game. Please, read the questions carefully, and answer as well as you can. If you really do not know, then just choose "I do not know" as your answer."*

Introduce Key Instructional Concept:

Use oral prompts to facilitate discussion.

Before we begin the game, does anyone know what an algorithm is?

Allow participants time to share their ideas. After participants share their thoughts, show them the definition. This can be projected using the Key Concept Presentation Slide, or it can be written on a board or chart paper to be revealed when ready:

An algorithm is a series of very clear and precise directions for how to complete a task or solve a problem step by step.

In computer science, algorithms are used to tell computers what to do. Since computers do exactly what you tell them, algorithms have to be very detailed and not leave out any important steps. In this game, you'll be writing algorithms for other people to follow, and it also will be important that you are as clear and specific as possible so that the person completing the task does it correctly.

Demonstration

Demonstrate developing and writing an algorithm using an everyday activity.

Materials:
- Package of sliced bread
- Jar of peanut butter (or similar school safe product)
- Jar of jelly or jam
- A butter knife
- Paper towels

Instruction:
Use the oral prompts to lead the demonstration and generate discussion.

Let's see if we can write an algorithm about how to make a peanut butter and jelly sandwich:

Ask students to volunteer simple steps. Don't ask them to clarify or be more specific. The goal of this activity is to show the importance of clarity, so the initial algorithm should be as vague and confusing as possible. Below is an example of an initial algorithm. Write the suggestions from the students on whiteboard/chart paper. Try to create an algorithm as similar to the following as possible:

- Take out 2 slices of bread
- Put peanut butter on one slice
- Put jelly on the other slice
- Put them together and eat

Now let's see if we can make the sandwich using the algorithm.

Using the bread and jars of peanut butter and jelly follow the algorithm students have produced. Do not open the jars, and do not include the knife yet. You can place the unopened jars directly on top of the bread. The result should be funny.

How can this be improved?

Ask students to offer corrections to the algorithm on the whiteboard/chart paper.

Continued on page 5.

Demonstration

Continued from page 4.

Instruction:
Use the oral prompts to lead the demonstration and generate discussion.

Edit the algorithm based on their suggestions. Ask questions of students to get more detailed steps until you have an algorithm that more closely resembles the following:

- Open the bread, and take out 2 slices of bread, and separate them.
- Open the peanut butter
- Use a butter knife to spread some peanut butter on one slice of bread
- Open the jelly
- Use a butter knife to spread some jelly on the other slice of bread
- Put the two slices of bread together with the jelly facing the peanut butter.
- Pick up the sandwich and eat

So, do you see how this algorithm is much clearer and more precise than what we had before? When you are writing your algorithms in the game, be sure to write them clearly, and with enough detail to be accurately followed, just as we did this one.

Optional:
Depending upon time, test the revised algorithm using the bread, peanut butter, and jelly. After the second demonstration, there might be additional revisions that could be made to the algorithm. Discuss these with students as time allows.

Game Set Up

Players & Teams

1. Divide students into teams of four.

2. Divide each team of four into two pairs. (Note: If the class or group does not divide evenly into groups of four, extra students can be added to other groups, or pairs can function as independent teams.

3. Place each pair from a team of four in a location where they cannot see their other teammates as they work.

4. Give one pair from the team of four Clue Bag #1 and give the other pair from the team of four Clue Bag #2.

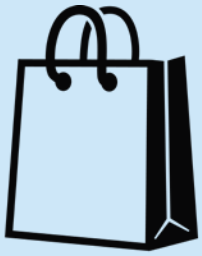
5. After teams have completed the tasks for Clue Bag #1 and Clue Bag #2, distribute Clue Bag #3 and Clue Bag #4 in the same manner as Clue Bag #1 and Clue Bag #2.

Game Set Up

Clue Bag Materials

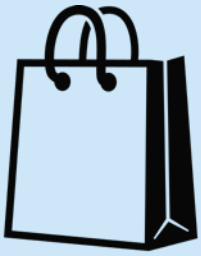
Note: Example images are provided in the Appendix. These are examples only. You should find, purchase, and/or create your own materials for Clue Bags, 1, 3, & 4. Materials for Clue Bag 2 are printable and are included in the Appendix. Instruction cards for ALL Clue Bags are included in the Appendix.

1



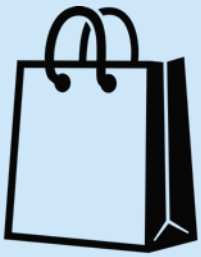
- Clue Bag 1 Instruction Card
- Photo of Correctly Arranged Items
- Cat Food or Water Dish
- Two Cat Toys
- Pencil
- Blank Index Card

2



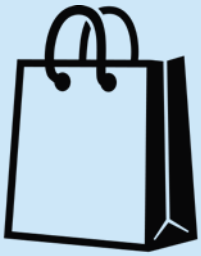
- Clue Bag 2 Instruction Card
- Blank Grid Map
- Marked Grid Map
- Pencil
- Blank Index Card

3



- Clue Bag 3 Instruction Card
- Photo of Correctly Arranged Items
- Plastic Crate/Box
- Three Cat Toys/Decorative Items
- Pencil
- Blank Index Card

4



- Clue Bag 4 Instruction Card
- Clue Card
- Photo of Cat's Location
- Photo of Clue's Location
- Pencil
- Two Blank Index Cards

Game Facilitation

Explain the general purpose and basic mechanics of the Algorithm Relay Race game.

Materials – Game Introduction:
- Picture of Colins
- Discussion Questions & Possible Points Sheet
- 5 Clue Bag 1
- 5 Clue Bag 2
- 5 Clue Bag 3
- 5 Clue Bag 4

Note:
This game contains two phases of game play and may need to be played over several sessions.

Introductory Story Script:

*Have any of you ever had a pet? It's easy to get very attached to them. This game has a very interesting story about a pet cat. This is a true story about Colins, a cat from New Zealand. Colins lived at **Port Taranaki,** an important international trade center. Here's a picture of Colins.*

Show students a picture of Colins.

As you can see, she's a very pretty calico cat. She belonged to James Gordon MacPherson, a dock worker. He rescued Colins as a kitten, after someone had dumped her in a garbage pail on the docks. Now, after nine years, she has disappeared! Colins is a popular and much-loved mascot among the dock workers and everyone misses her. Her food bowl has been untouched for several days and a lot of people are getting worried.

Since this is a port, Colins might have wandered onto a ship that sailed away. Messages and photos are sent out all over New Zealand and the surrounding area: Be on the lookout for Colins!

Meanwhile, volunteers are forming teams to help find the missing cat. They will start by trying to lure her back with her favorite food and toys, and by mapping the routes of ships that might have taken Colins away by accident. You are joining the volunteers to participate in the search!

Continued on page 9.

Game Facilitation

Continued from page 8.

Game Purpose & Mechanics:

Ok, now let's start playing the game! You will form teams with four members, and each team will have two pairs working together on two different parts of the mission to find Colins the cat. One pair from each team will get Clue Bag #1, and the other pair from each group will get Clue Bag #2. Each bag contains directions telling you what to do. Each pair from each team will work on their task at the same time.

Game Play - Level 1:
The teams will have 10 minutes to follow the instructions and write their algorithms. If some pairs finish early, tell them to practice following their own algorithm. When both pairs in a team are finished, collect their pictures.

Next, the pair with Clue Bag 1 gives their bag to the second pair. The first pair cannot give them any help, but should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing. Teams that finish early can watch the other teams. When all teams are done, transition from Clue Bag. 1 to Clue Bag 2. Keep a record of which team did the best at each task.

Transition Script – Clue Bag 1 to Clue Bag 2:

The cat lures from Clue Bag #1 were set out very well, but they did not attract Colins. Since Colins has not been found yet, we need to continue looking for her. But now we've received some news from our contacts at another port! There has been a sighting of a cat on board a ship that was headed for Indonesia. But the ship makes frequent stops at islands along the way, and we'll have to check each one to make sure Colins did not get off the ship there. The second pair already has marked out a route to many islands in the area, just in case. The first pair will need to follow their route to check the islands. But these are dangerous seas with many places a ship might run aground. It will be necessary to steer the boat carefully and follow the directions EXACTLY to stay in the deep sea channel.

Continued on page 10.

Game Facilitation

Continued from page 9.

Game Play - Level 1:
The pairs that wrote the algorithm for Clue Bag 2 will give the bag to the other pair from their team. The first pair will complete the task using the algorithm that was written by the second pair, and is now in the bag.

The first pair **cannot** give them any help, but should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing. When finished, teams should get approval from the teacher or facilitator. When all teams are done, move on to the concluding discussion and wrap up.

Finishing Game – Level 1:
The team to complete both Clue Bag 1 and Clue Bag 2 **first** wins this level! If different teams finish first, declare a tie. Once all teams finish, wrap up game play with the oral prompt below.

We will continue the search for Colins, in hopes of reuniting the owner James MacPherson with his beloved cat Colins. Your team will have another chance to compete and win. You will be writing more algorithms, so let's talk about what you learned today about how to write accurate algorithms.

Discussion:
Discuss students' learning about how write algorithms. To facilitate this discussion, use the Discussion Questions and Possible Points found in the Appendix.

Note:
If there is not enough time to complete Level 2 of the game in the same session, the game designers recommend halting game play here and continuing on another day.

Continued on Page 11.

Game Facilitation

Continued from page 10.

Review Instructional Concept:
Discuss with students how to write algorithms in general and write algorithms for maps.
Get students' input. Use the following oral prompts to wrap up the discussion.

So, an algorithm is a series of very clear and precise directions telling us how to complete a task step by step. To write algorithms for a map you have to mention proper directions like east, west, north, and south. You have to write how many steps your group should take in each direction.

Review Story – Level 1:

We left off the game at the map of the islands. It was confirmed that Colins wandered on to a Korean tanker and that she was being well-fed and taken care of by the sailors. We found the ship's location on the map and learned that its destination was Korea. As the game continues, we will be writing more algorithms. We will be playing the third and fourth levels of this game today. When writing algorithms, it is very important to be as clear and specific as possible so that the task can be completed correctly and accurately just like we did with the first clues.

Transition Script – Level 2:

INTERNATIONAL RESCUE TEAMS ALERTED!
Even though we know Colins is safe and being cared for, if the Korean tanker ship happens to reach Korea with Colins still on board, she will be quarantined for 6 months (ask students if they understand what quarantined means). The cat's owner and the dock workers who care for Colins don't want to be without their pet for 6 months. So, it is suggested that a ship-to-ship transfer be arranged in the middle of the ocean before the Korean tanker docks in Korea. In case this transfer can be arranged, Colins is going to need a crate to travel in safely. Ok, now let's get started playing the game!

Continued on Page 12.

Game Facilitation

Continued from page 11.

Game Play – Level 2:
One pair from each team will be given Clue Bag 3 and the other pair from each team will be given Clue Bag 4. All pairs will be writing algorithms at the same time using the instructions enclosed in the Clue Bag each pair will be given. You will have 20 minutes to write your algorithms. At the end of the 20 minutes, give the pictures to the teacher or facilitator. Mention to students that their teammates won't be able to see the picture, so the directions need to be clear and complete.

The pairs that wrote the algorithm for Clue Bag 3 will give the bag to the other pair from their team. The second pair will complete the task using the algorithm that was written by the second pair and is now in the bag.

The first pair **cannot** give them any help, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing. When finished, teams should get approval from the teacher or facilitator.

Once approved by the teacher or facilitator, the team can move to Clue Bag 4. The pairs that wrote the algorithm for Clue Bag 4 will give the bag to the other pair from their team. The first pair will complete the task using the algorithm that was written by the second pair, and is now in the bag.

The second pair **cannot** give them any help, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing. When finished, teams should get approval from the teacher or facilitator.

Finishing the Game – Level 2:
Once the team receives approval from the teacher or facilitator, they must race back to their original location. The first team to return to their original location with all oftheir materials is the winner of the level! Depending on facilitator preferences, you can declare this team the winner of the game as well.

Game Conclusion

Debrief about game experience.

Materials – Game Conclusion:
- Engagement Survey
- Post-Game Assessment

Concluding Game Play Script:

It was decided that a ship-to-ship transfer was too dangerous and costly to the ships who had deliveries to make. Colins had now arrived at the South Korean Port of Yeosu, and was heading for quarantine. Luckily the news about Colins the cat was so heavily covered in newspapers and TV stations around the world that word got back to Korean Airlines who agreed to fly MacPherson, the cat's owner, to Korea and back home with his beloved cat for free! They even flew first class. MacPherson thanked the Korean sailors for caring for his cat and bringing her back safely to him and Colins became an honorary ambassador to the Korean Port. Colins lived the rest of her days happily on the docks receiving free cat food every day of her life.

Researchers Only:
After awarding prizes, administer the **engagement survey**:

Now, we will do the Engagement survey which is very short.

After the engagement survey, administer the **post-game assessment**:

Now, we're going to do the assessment again. Please, do the best you can, but remember this is just for us to see how you're doing with the games. Of course, if you don't know, you can still mark that you don't know. Make sure you all write your ID numbers on the front page.

Discussion:
With any remaining time, discuss algorithms, and other potential applications of this computational thinking skill.

Rules & Instructions

Read the rules and instructions to each group. Demonstrate mechanics as necessary.

Objective:
Write a series of clear algorithms for your team to follow in order to find and rescue Colins.

Playing the Game – Level 1:
All pairs will be writing algorithms at the same time using the instructions and picture enclosed in the Clue Bag each pair will be given. You will have 10 minutes to write your algorithms. At the end of the 10 minutes, give the pictures and the map with the shipping lane to teacher or facilitator.

Clue Bag #1:
After the 10 minutes are up, the pairs that wrote the algorithm for Clue Bag #1 will give the bag to the other pair from their team. Remember when you write your algorithm, that the other pair in your team will not be able to see the picture when they try to follow the steps of your algorithm. The second pair of each team must perform a task using the algorithms written by the first pair. The first pair **cannot give them any help**, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues or confusion with the algorithm, the pair that wrote it must fix it before continuing, so take your pencils with you.

Moving to the Next Round:
Your team can only move onto following the algorithm for Clue Bag #2 if the teacher or facilitator deems the algorithm for Clue Bag #1 to be clear enough. This will be determined by how closely the end result of the algorithm resembles the picture from Clue Bag #1.

Clue Bag #2:
The pairs that wrote the algorithm for Clue Bag #2 will give the bag to the other pair from their team. The first pair will complete the task using the algorithm that was written by the second pair, and is now in the bag. The second pair **cannot give them any help**, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing.

Moving to the Next Round:
The next phase of game play will begin when all teams have followed their teams algorithms successfully.

Continued on page 14.

Rules & Instructions

Continued from page 14.

Playing the Game – Level 2:
One pair from each team will be given Clue Bag #3 and the other pair from each team will be given Clue Bag #4. All pairs will be writing algorithms at the same time using the instructions enclosed in the Clue Bag each pair will be been given. You will have 10 minutes to write your algorithms. At the end of the 10 minutes, give the pictures to teacher or facilitator. Mention to students that their teammates won't be able to see the picture, so the directions need to be clear and complete.

Clue Bag #3:
When everyone is finished writing (approx. 10 min), the pairs that wrote algorithms for Clue Bag #3, will give their completed algorithm and the materials in Clue Bag #3 (except for the picture) to their teammates. Their teammates will precisely follow the algorithm to construct the cat crate. The first pair **cannot give them any help**, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues or confusion with the algorithm, the pair that wrote it must fix it before continuing, so take your pencils with you.

Moving to the Next Round:
Your team can only move onto following the algorithm for Clue Bag #4 if your teammates are able to precisely follow the algorithm in a manner the teacher or facilitator deems to be precise enough. This will be determined by how closely the end result of the algorithm resembles the picture from Clue Bag #3.

Clue Bag #4
The pairs that wrote the algorithm for Clue Bag #4 will give the bag to the other pair from their team. The first pair will complete the task using the algorithm that was written by the second pair, and is now in the bag. The second pair **cannot give them any help**, but they should watch carefully so they can correct any part of the algorithm that might be unclear. If there are any issues with the algorithm, the pair that wrote it must fix it before continuing.

Winning:
The first team that is done with both Clue Bag 3 and Clue Bag 4, and gets all the items back to its table first, wins the game!

Finishing Early:
If a pair finishes earlier than their teammates, they should practice following their algorithm to test for challenging or unclear steps.

Appendix

The following materials help to facilitate research, demonstrations, and game play. The research materials are not necessary for classroom use.

For Researchers Only:
- Pre-Game Assessment
- Post-Game Assessment
- Engagement Survey

For Introduction:
- Key Concept Instruction Slides
- Picture of Colins
- Discussion Questions

For Game Play:
- Instruction Cards – Clue Bag 1
- Instruction Cards – Clue Bag 2
- Instruction Cards – Clue Bag 3
- Instruction Cards – Clue Bag 4
- Example of Items for Clue Bag 1
- Blank Map for Clue Bag 2
- Map with Shipping Lanes for Clue Bag 2
- Example of Items for Clue Bag 3

Pre-Game Assessment

Participant Name and/or Identification Number: _____

Background Information (for facilitators)
This is one of three game design documents created for the NSF-AISL Pathways funded project, AISL Pathways: The Role of Story in Games to Teach Computer Science Concepts to Middle School Girls (http://nuweb1.neu.edu/gramshouse/storyteach-project-description/). Each game is intended to introduce participants to one computer science concept, drawn from the Computer Science Principles framework developed by the College Board (see http://apcsprinciples.org/). Each game has three versions: (a) the basic game, which consists of puzzles or problem-solving activities within a game format, (b) game with context, which consists of the same kind of problem-solving activities situated in a fictional setting, that gives meaning to the activities , and (c) game with story, which embeds these activities in a more fully developed narrative, with a plot and resolution.

Assessment Instructions
Please complete each question to the best of your ability. If you do not know the answer, select "I don't know" as the answer.

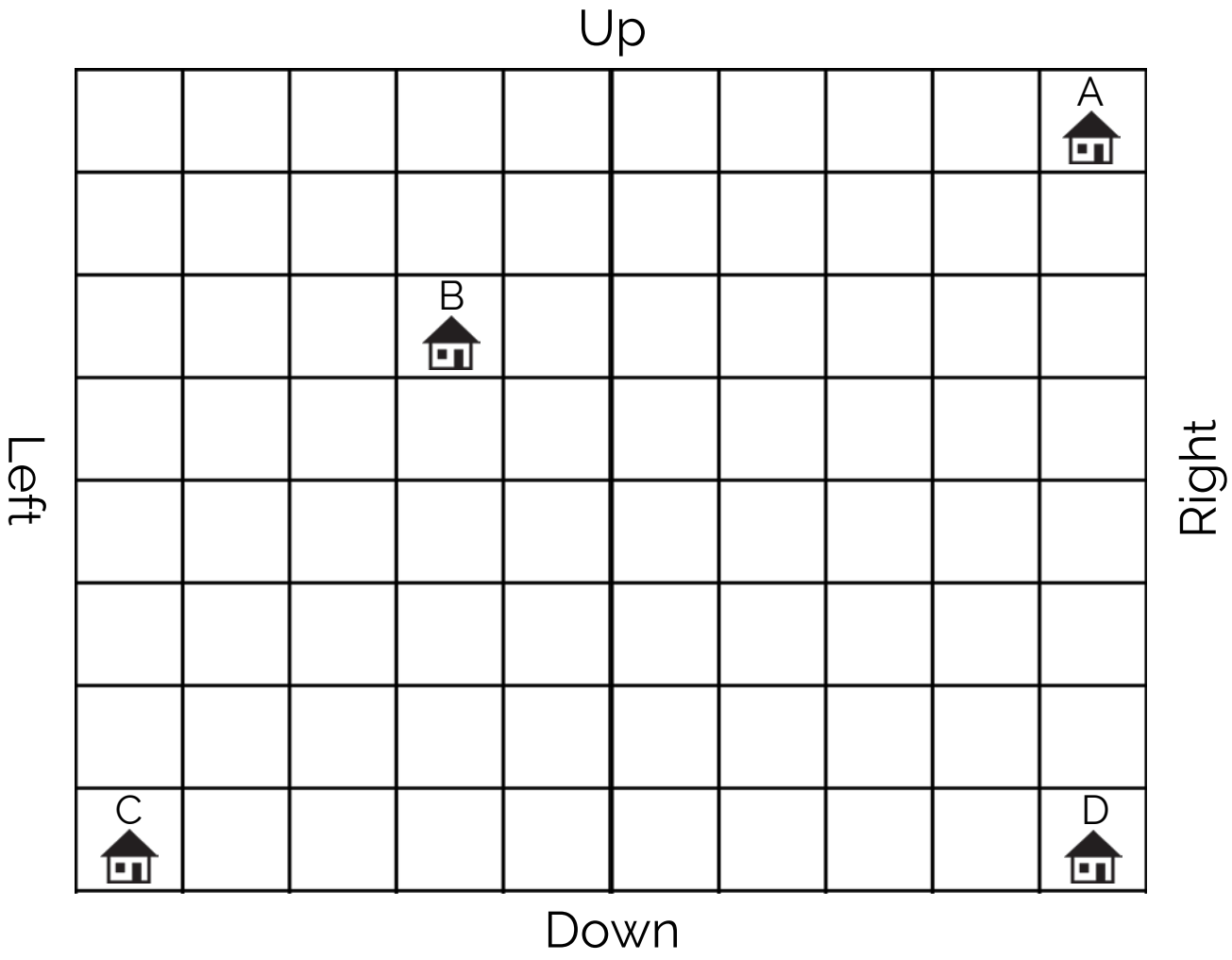
1. Algorithms are
   a. A set of instructions to perform a task
   b. Clear steps
   c. Able to produce desired results
   d. All of the above
   e. I do not know

2. Different algorithms can produce the same results.
   a. True
   b. False
   c. I do not know

3. How would you rewrite the following algorithm to improve the steps that explain about riding your bicycle to school? You may change the current steps and add new steps. If you are very unsure you can just say I do not know.

Current Algorithm	**Your Algorithm**
Take your bike out of the garage	_____
Put your backpack on	_____
Put your helmet on	_____
Ride your bike to school	_____
	_____
	_____
	_____
	_____

4. Given this algorithm, which starts at House A, goes past House B, and ends at House C, fill in the blanks, and keep in mind the direction you are facing. If you are very unsure, you can just say I do not know.
    a. Starting at House A, go left 6 blocks.
    b. Next, turn_____and walk 2 blocks to reach house B.
    c. Next turn_____and continue for___blocks.
    d. Finally, turn____and walk____blocks to reach your destination at House C.



Post-Game Assessment

Participant Name and/or Identification Number: _____

Background Information (for facilitators)
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Assessment Instructions
Please complete each question to the best of your ability. If you do not know the answer, select "I don't know" as the answer.

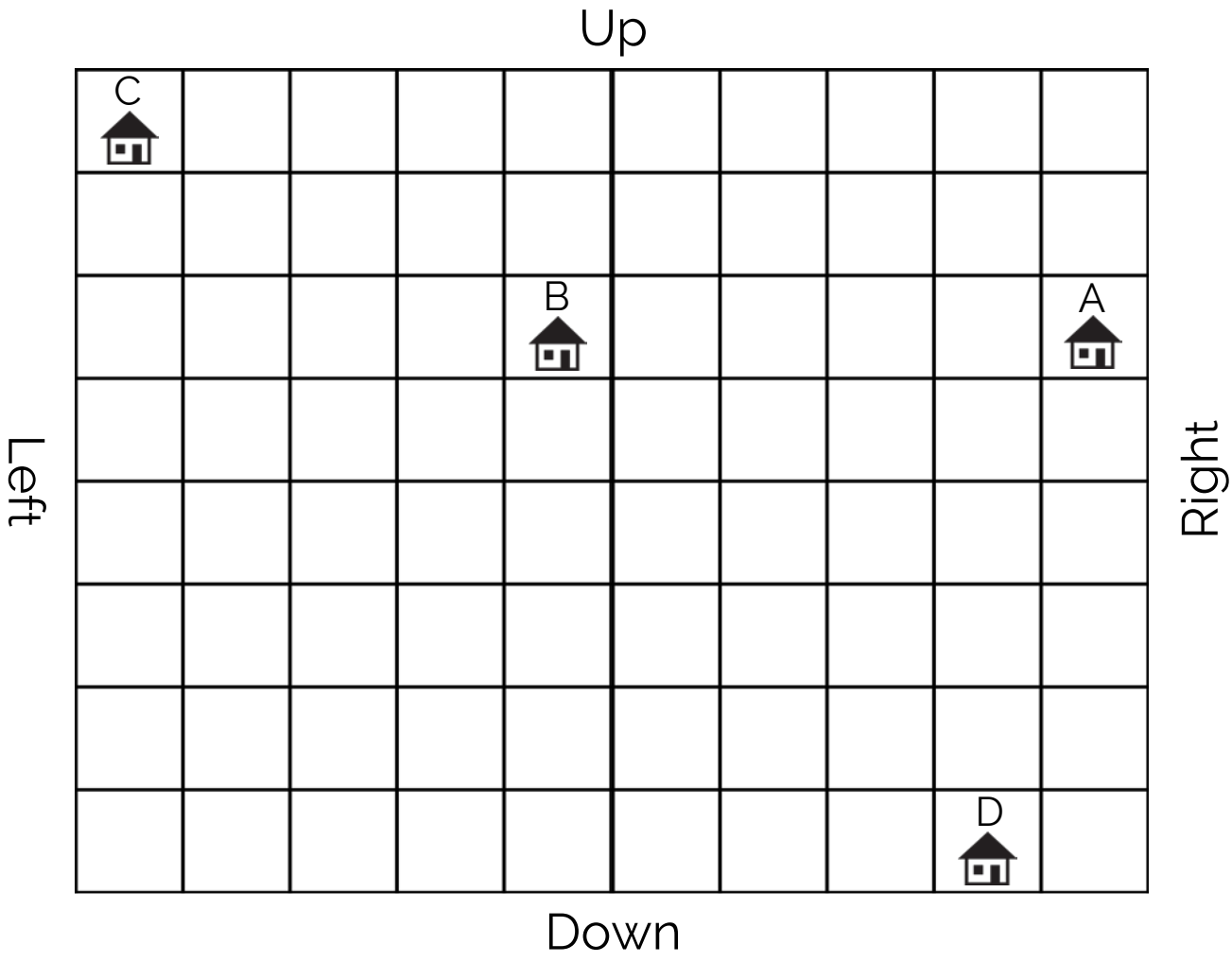
1. Algorithms are
   a. A set of instructions to perform a task
   b. Clear steps
   c. Able to produce desired results
   d. All of the above
   e. I do not know

2. Different algorithms can produce the same results.
   a. True
   b. False
   c. I do not know

3. How would you rewrite the following algorithm to improve the steps that explain about riding your bicycle to school? You may change the current steps and add new steps. If you are very unsure you can just say I do not know.

Current Algorithm	**Your Algorithm**
Take your bike out of the garage	_____
Put your backpack on	_____
Put your helmet on	_____
Ride your bike to school	_____
	_____
	_____
	_____
	_____

4. Given this algorithm, which starts at House A, goes past House B, and ends at House C, fill in the blanks, and keep in mind the direction you are facing. If you are very unsure, you can just say I do not know.
    a. Starting at House A, go left 5 blocks.
    b. Next, turn _____ and walk 2 blocks to reach house B.
    c. Next turn _____ and continue for _____ blocks.
    d. Finally, turn _____and walk _____ blocks to reach your destination at House C.



Engagement Survey

Participant Name and/or Identification Number: _____

Background Information For facilitators)
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Survey Instructions
Please, complete each question as honestly as possible. Please, don't leave any questions blank.

1. Did you enjoy what you were doing?
   a. Very Much
   b. Mostly
   c. Somewhat
   d. A Little
   e. Not at All

2. Did you find the activity interesting?
   a. Very Much
   b. Mostly
   c. Somewhat
   d. A Little
   e. Not at All

3. How well were you concentrating?
   a. Very Much
   b. Mostly
   c. Somewhat
   d. A Little
   e. Not at All

4. What was the activity you were doing?

An algorithm is a series of very clear and precise directions for how to complete a task or solve a problem step by step.

YATCH

Discussion Questions

1. What did you think about first when you began to write your algorithms?

   Possible points to address:
   - breaking down the task into different steps
   - what the other person should do first, second, etc.
   - how the different parts or places on the map were related to each other
   - all are related to sequence/steps

2. What (features of the task) made it easier to write the algorithm?

   Possible points to address:
   - using directions like east/west or north/south
   - the grid
   - using a clock as a reference point, etc.

3. What (features of the task) made it harder to write the algorithm?
   Possible points to address:
   - not having a grid for the cat dish
   - having different alternatives – for example, the ship could travel different ways on the map

4. Did any of your algorithms need to be revised? Tell us what your original steps were and what changes you made to make them better. What did you leave out the first time and why?

5. We often follow algorithms when we do things in daily life, like making a peanut butter and jelly sandwich. Can you think of other algorithms you use for tasks, say like washing dishes or making your bed? What would you need to be sure to tell someone else if you were writing out the steps for these tasks?

Instructions: Clue Bag 1

Instructions: Clue Bag 1

Instructions: Clue Bag 1

Instructions: Clue Bag 1

Instructions: Clue Bag 2

Instructions: Clue Bag 1

Instructions: Clue Bag 2

Instructions: Clue Bag 2

Instructions: Clue Bag 3

Instructions: Clue Bag 2

Instructions: Clue Bag 3

Instructions: Clue Bag 2

Instructions: Clue Bag 3

Instructions: Clue Bag 3

Instructions: Clue Bag 4

Instructions: Clue Bag 3

Instructions: Clue Bag 4

Instructions: Clue Bag 4

Instructions: Clue Bag 4

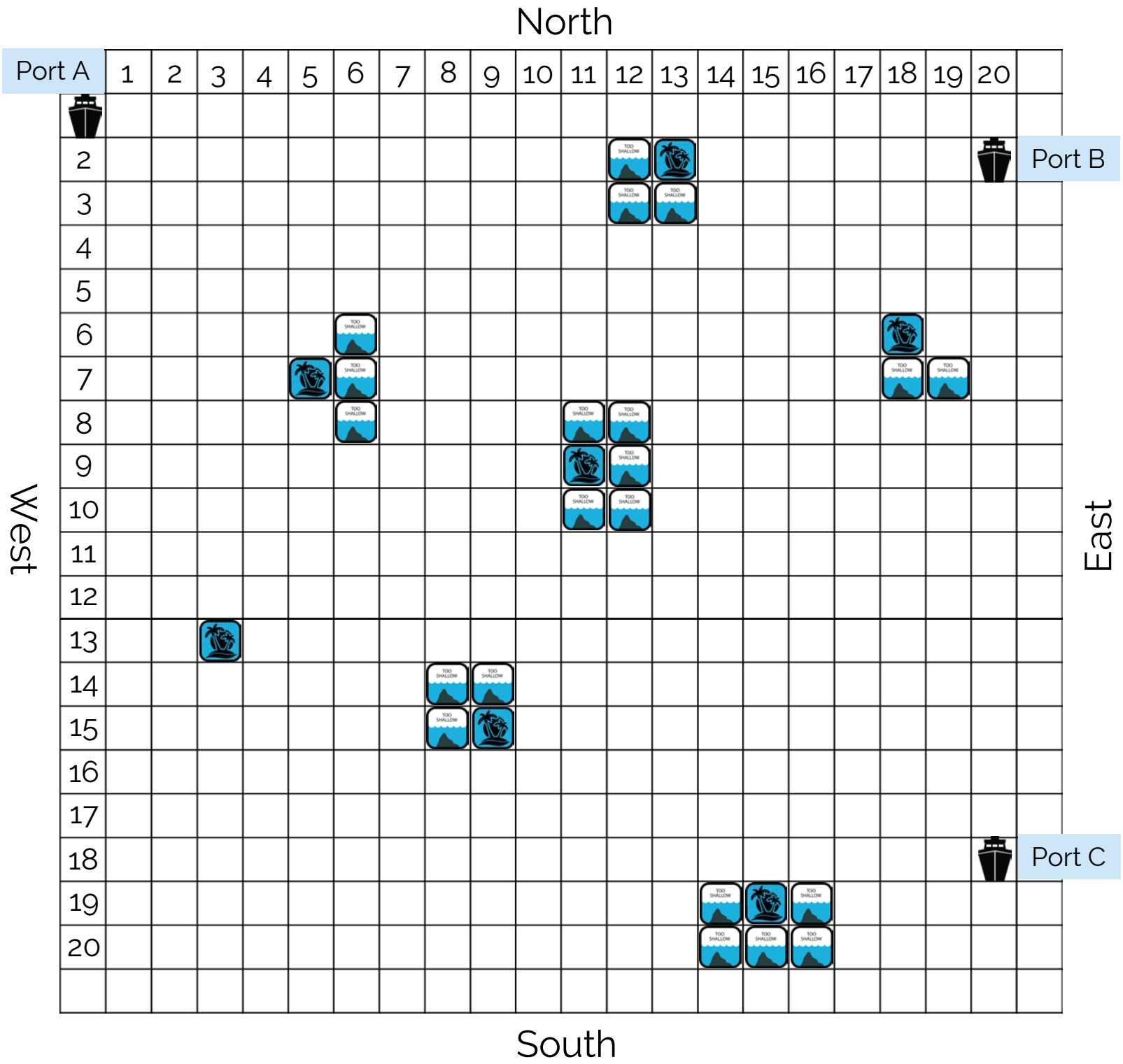
Instructions: Clue Bag 4

Example of Items for Clue Bag 1

Required Materials:
Each Clue Bag 1 requires three items including a cat food or water dish and two cat toys. The items should be the same for each bag.

Item Arrangement:
Layout the three items in a pattern. Arrange the items in a way that the items provide reference points for each other. For example, in the picture below, the tip of the toy mouse's tail lines up with the right side of the pink ball, and the bottom edge of the pink ball lines up with the bottom edge of the water dish. Arranging the items in a similar way will help the players write and follow the algorithms.

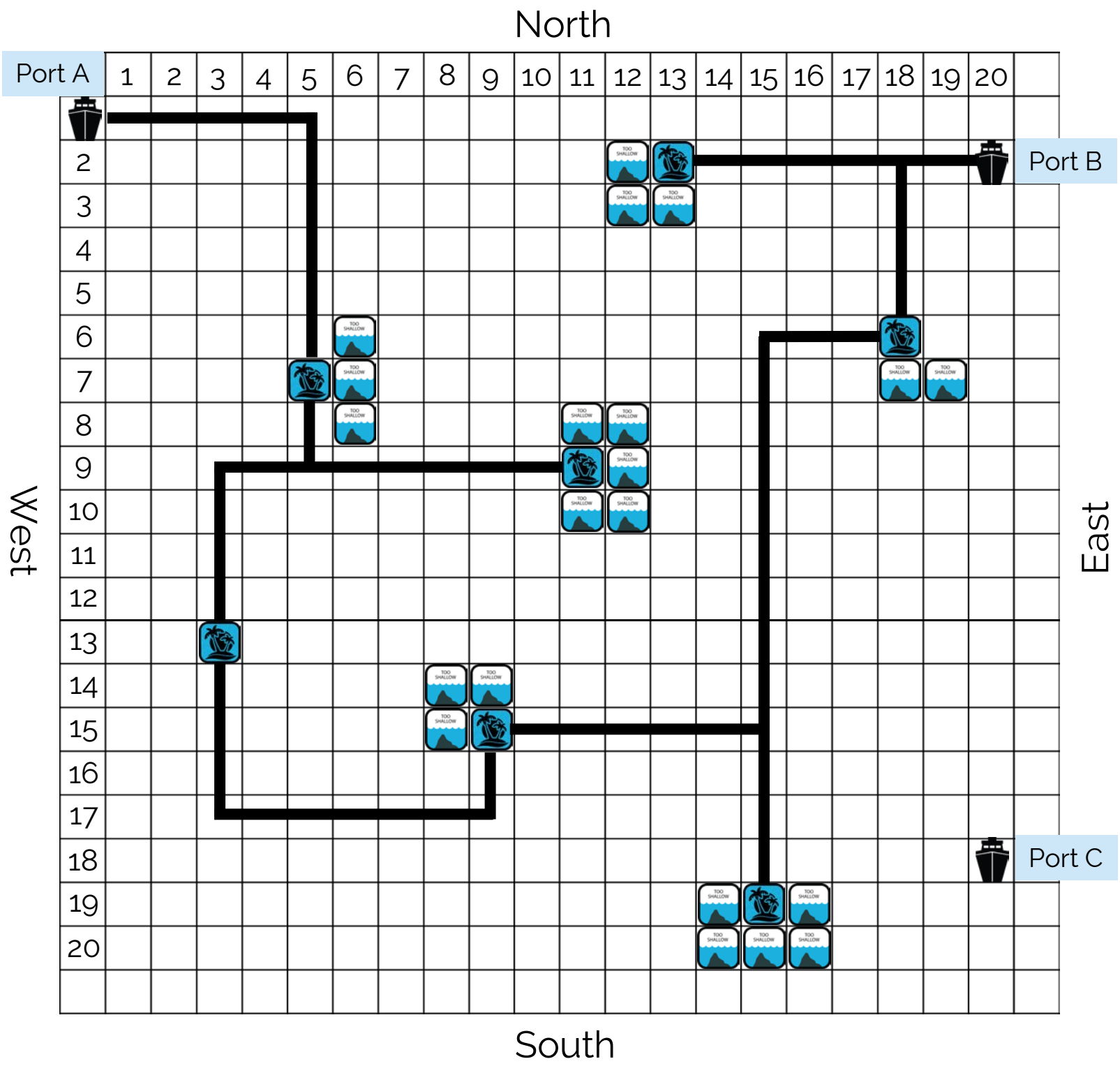
Photograph Items:
Once the items are arranged, take a photograph of the arrangement. Include this photograph in each Clue Bag 1. Players will use this photograph as a reference when writing the algorithm for Clue Bag 1. Make sure to collect these photos once the algorithms have been written. These should not be left in the Clue Bags when the second pair on the team attempt to follow the algorithm written by their teammates.



Map Key

- Island (You may stop here.)
- Sandy High Ground/Rocky Shore (This area is too shallow for ships and boats.)
- Port on Larger Island
- Safe Shipping Lane

You must stop at each Island to check for the ship that Colins the cat is on.



Map Key

- Island (You may stop here.)
- Sandy High Ground/Rocky Shore (This area is too shallow for ships and boats.)
- Port on Larger Island
- Safe Shipping Lane

You must stop at each Island to check for the ship that Colins the cat is on.

Example of Items for Clue Bag 3

Required Materials:
Each Clue Bag 3 requires four items including a crate or box of some kind and three decorative items or toys that can be arranged in or on the crate.. The items should be the same for each bag.

Item Arrangement:
Lay out the three items in a pattern. Arrange the items in a way that the items provide reference points for each other. For example, in the picture below, the stick for the dangling mouse toy has been threaded through the far right hole in the crate while the flower decoration hangs from the center top hole. Arranging the items in a similar way will help the players write and follow the algorithms.

Photograph Items:
Once the items are arranged, take a photograph of the arrangement. Include this photograph in each Clue Bag 3. Players will use this photograph as a reference when writing the algorithm for Clue Bag 3. Make sure to collect these photos once the algorithms have been written. These should not be left in the Clue Bags when the second pair on the team attempt to follow the algorithm written by their teammates.

ABOUT THIS GUIDE

This game and facilitator's guide were developed as part of the project, The Role of Story in Games to Teach Computer Science Concepts to Middle School Girls, funded by the National Science Foundation through the Advancing Informal Science Learning program.

COMPUTER SCIENCE CONCEPTS. We designed three games that each introduce core computer science concepts, drawn from the College Board's Advanced Placement (AP) Computer Science Principles curriculum framework. These concepts included Algorithms, Image Representation, and Data Search/Sort.

STORY VERSIONS. A project goal was to investigate the role of story in promoting girls' engagement with and learning from educational games, and we created three versions of each game: Abstract, Story Context, and Story. In our field tests of the games, we did not find significant differences in girls' engagement with or learning from different versions of each game. However, teachers noted that the story versions of the games offered more opportunities to integrate computer science concepts with content from other subject areas, such as geography or world history. We encourage you to review the different versions of each game and choose the version that best meets your own educational goals. The story content and story versions of the games do require additional materials, preparation, and time for the activities.

All of the facilitator guides, which include game materials such as cards, are available as pdf files from our project website at: https://web.northeastern.edu/gramshouse/storyteach-project-description/storyteach-game-documents/.

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