# Welcome!

GEMS-Net Summer Institute
June 26, 2019
Block Island, RI

THE UNIVERSITY OF RHODE ISLAND

**GEMS-Net**
Guiding Education in Math and Science Network

9:30-9:45  Coffee and Conversation: Gather in the Library for a brief welcome

9:45 - 12:15  Computational Thinking: Explore lessons and opportunities to make computational thinking explicit throughout our science courses and grade levels

12:15-1:00 Lunch

1:00-3:30 Block Island Field Experience: Join BI Science teacher Shannon Cotter-Marsella and her colleagues to explore some of the sites where BI students collaborate with The Nature Conservancy on environmental education

3:30 Arrive at the ferry terminal

3:45 Wind Farm Tour

4:45 Arrive back in town...official end of institute

5:15 Ferry departure or stick around town for dinner/socializing/happy hour!  (last ferry departs 7:45)

# TODAY'S AGENDA

# What is Computational Thinking?

**Computational Thinking (CT)** is a problem solving process that includes a number of characteristics and dispositions. CT is essential to the development of computer applications, but it can also be used to support problem solving across all disciplines, including the humanities, math, and science. Students who learn CT across the curriculum can begin to see a relationship between academic subjects, as well as between life inside and outside of the classroom. (Google Computational Thinking for Educators)



Computational Thinking for Educators

What is Computational Thinking?

# Problem of Practice

## FOSS Science Lesson

Students plant a miniature lawn in a cup of soil—rye grass seeds and alfalfa seeds. They draw, compare, and record the growth of the two plants over time.

## CODE.ORG Lesson

In this lesson, students will relate the concept of algorithms back to everyday real-life activities by planting an actual seed.

# Useful CT Resources

★ [Barefoot.org](Barefoot.org)

★ [Barefoot Computational Thinking](Barefoot Computational Thinking)

★ [CS K-12 Framework](CS K-12 Framework) - Pages 67 - 71

★ [CS K-12 Framework Computational Thinking](CS K-12 Framework Computational Thinking)

★ [Computational Thinking for Educators](Computational Thinking for Educators)

★ [ISTE Computational Thinking Competencies](ISTE Computational Thinking Competencies)

★ [RICS Standards](RICS Standards)

| Station 1 Towers | Station 2 Heart Model | Station 3 Mirrors |
|---|---|---|
| Grade 2 - Solids and Liquids | Grade 5 - Living Systems | Grade 8 - Waves |
| Inv. 1.4 - Construct with Solids | Inv. 3.2 - Circulatory Systems | Inv. 3.1 - Mirrors |
| FQ: What are the properties of successful towers? | FQ: How do humans transport nutrients to all their cells? | FQ: What happens when light waves interact with matter? |
| At this station, you will use the materials provided to construct a successful tower that can withstand a gentle fan (gently fan with a file folder). | At this station, you will use the materials provided to construct a model heart. Three different levels of support or "hints" are available to you if needed. | At this station, you will use the materials provided to get a laser light beam to bounce off four mirrors and return to the original laser source. |
| bit.ly/towersCT | bit.ly/heartmodelCT | bit.ly/mirrorCT |

Remember: The goal is not to successfully complete the activity rather it is to think about which computational concepts and approaches are evident throughout. At the end of each station, you and your group will have time to record which CT concepts/approaches you saw on the ipad/padlet provided.

# The Computational Thinkers

## concepts

**Logic**
Predicting & analysing

**Evaluation**
Making judgements

**Algorithms**
Making steps & rules

**Patterns**
Spotting & using similarities

**Decomposition**
Breaking down into parts

**Abstraction**
Removing unnecessary detail

## approaches

**Tinkering**
Changing things to
see what happens

**Creating**
Designing & making

**Debugging**
Finding & fixing errors

**Persevering**
Keeping going

**Collaborating**
Working together

We're all computational
thinkers here!

When you think about it, whether we're parents, pupils
or teachers – we're all natural computer scientists,
capable of computational thinking.

Our brains, like computers, process, debug and make
simple algorithms every day!

CAS
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