

2nd Graders Being Creative with an Open-Ended Coding Robot Geometrical Math Task



Lauren Nix

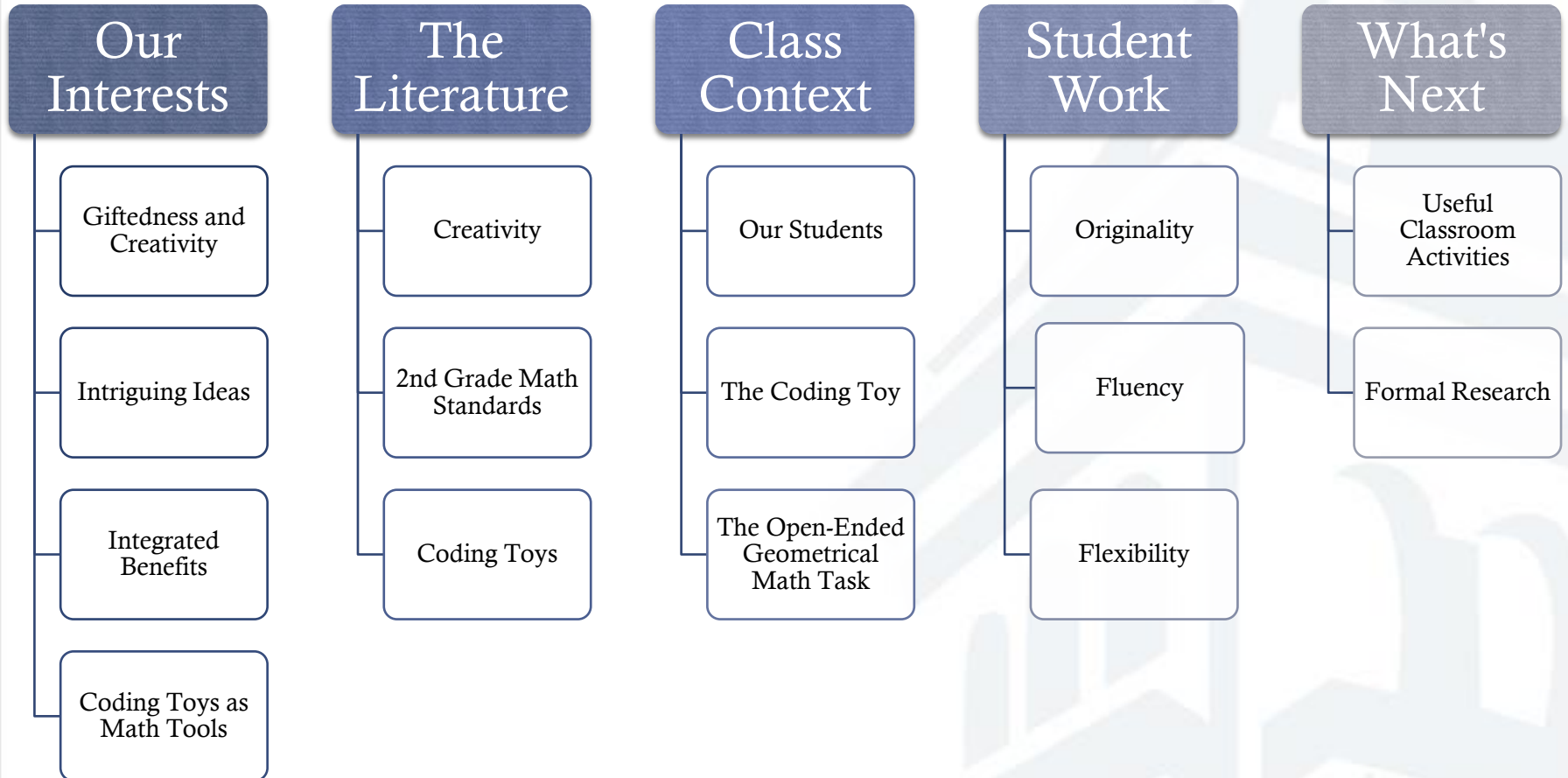
Student Research Symposium

Utah State University

April 12, 2022

Faculty Mentor: Joseph S. Kozlowski, PhD

Overview



Our Interests



Our Interests and Connection to the Topic

- ∞ Relationship between giftedness and creativity – Lauren
- ∞ Intriguing things young children come up with – Lauren
- ∞ Coding toys support rich math experiences - Dr. Koz

The Literature



Positioning in the Literature

- Mathematical creativity indicators: originality, fluency, and flexibility (Torrance, 1974; Silver, 1997).
- Second-graders should:
 - recognize and draw shapes with given number of angles and sides.
 - identify triangles, quadrilaterals, pentagons, hexagons, and cubes (CCSSM, 2010).
- Children playing with coding toys engage in spatial skills, number, measurement, comparison, and geometry (Shumway et al., 2021; Kozlowski, 2022).

Class Context



Our Students!

- **25 Students**
- **Edith Bowen Laboratory School**
- **2nd-Grade Classroom**
- **7-8-years-old**



Botley the Coding Robot

Botley 2.0 by Learning Resources



Screen-free coding remote



Students use 6 movement options on the remote to program Botley



The Open-Ended Geometrical Math Task

Challenge
(Launch)

Collaborative
Problem Solving
(Explore)

Peer
Presentation
(Discuss)

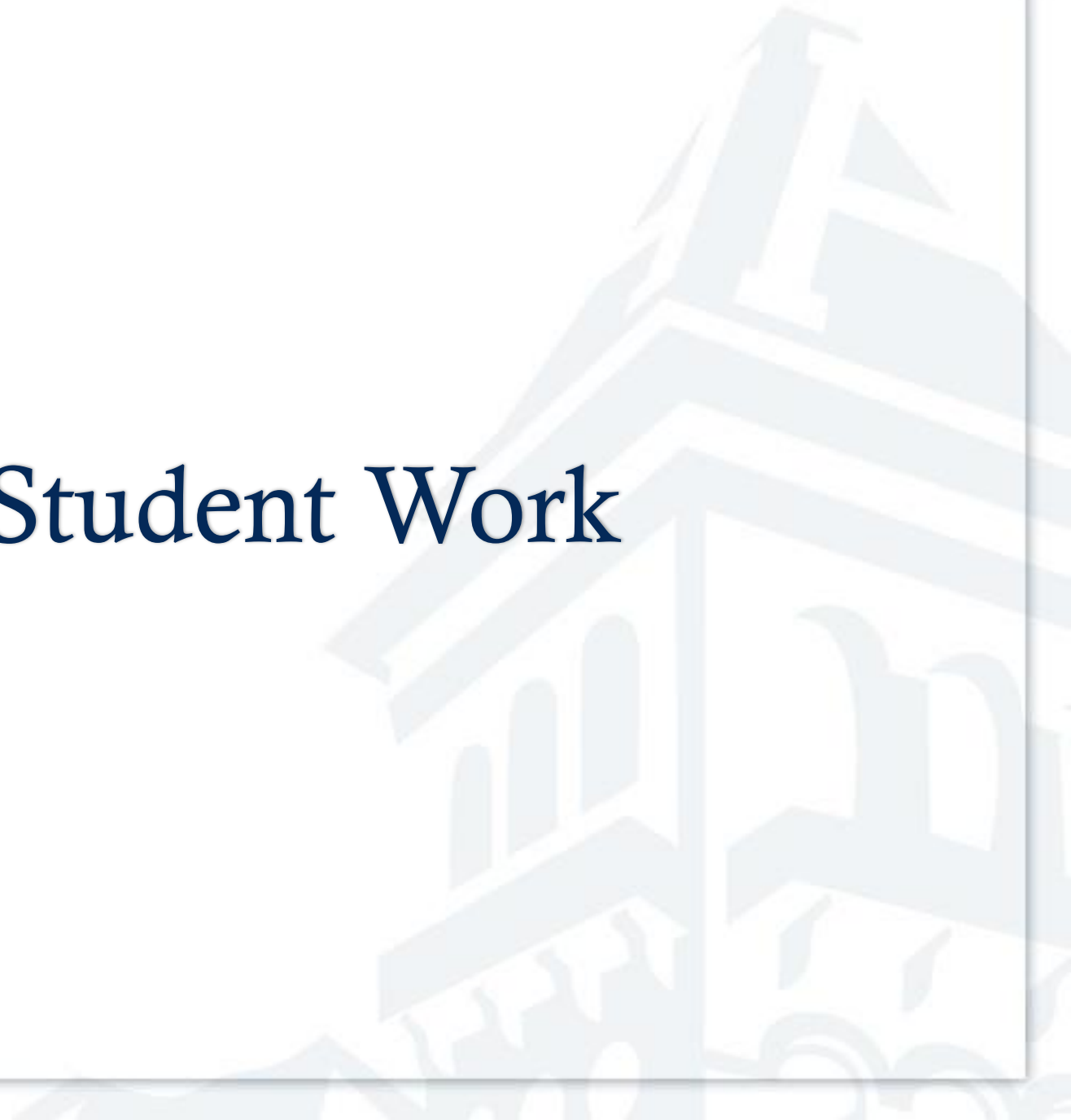
Teacher: What is a shape??

Students: They have sides!
You can see them! They are closed up! They're like a circle and square!

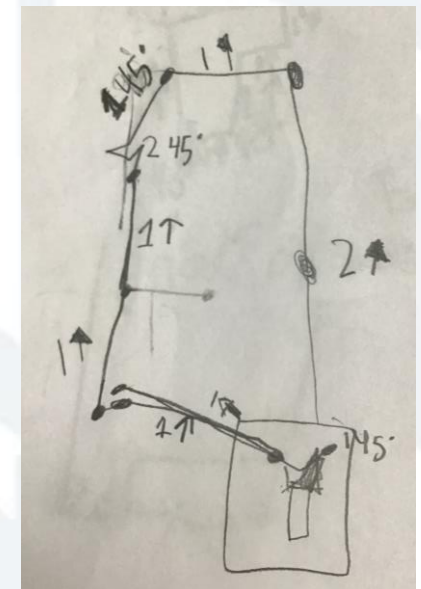
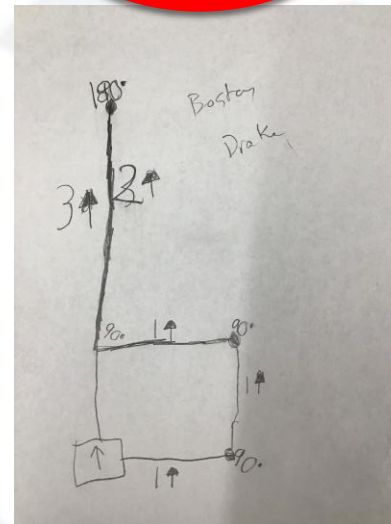
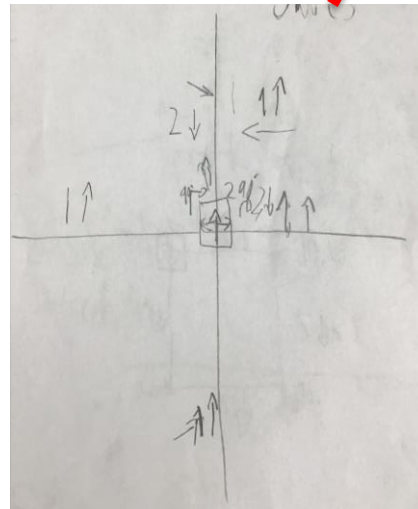
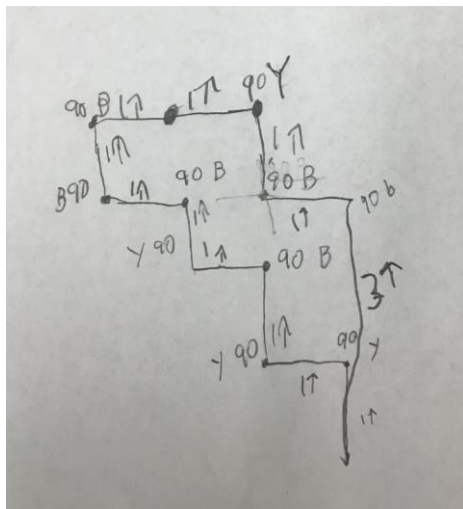
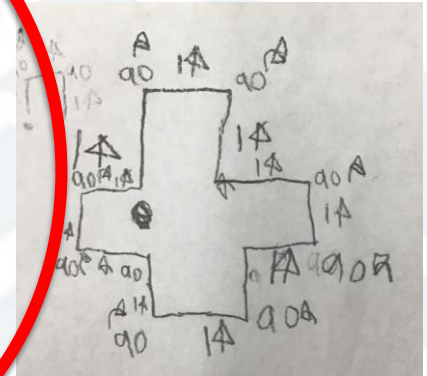
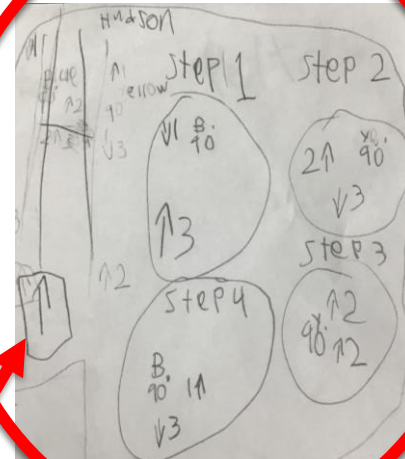
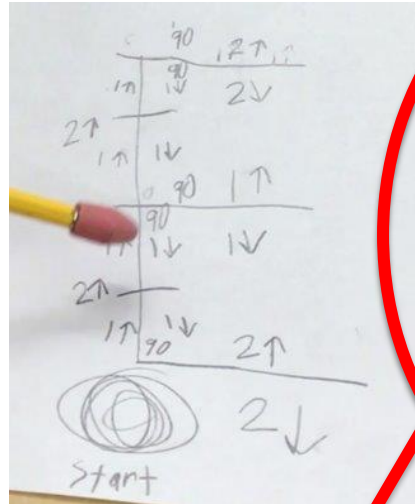
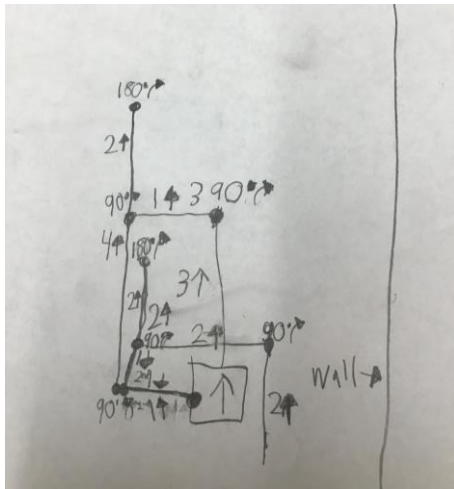
Teacher: Well, I want you to try making what you think are shapes today by having Botley start and end in the same position, then recording the shape it made!



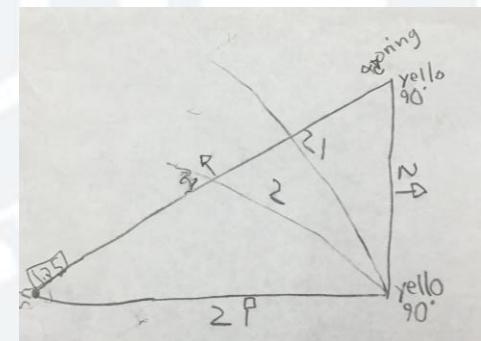
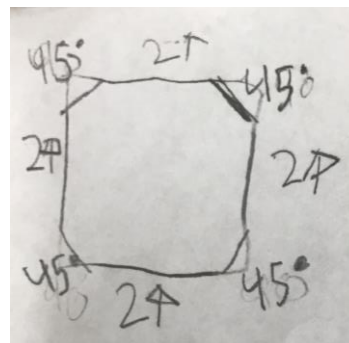
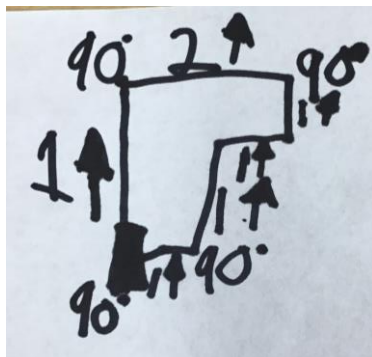
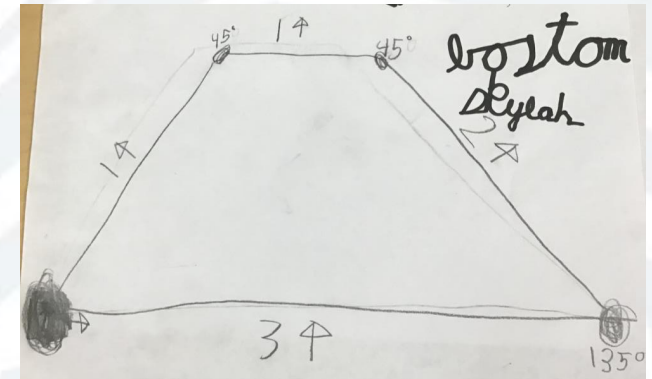
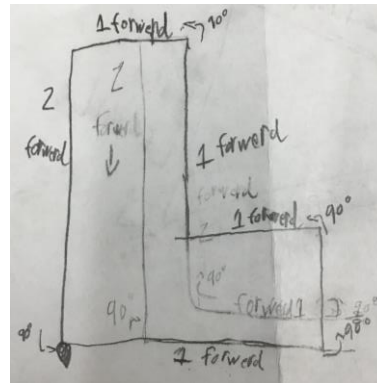
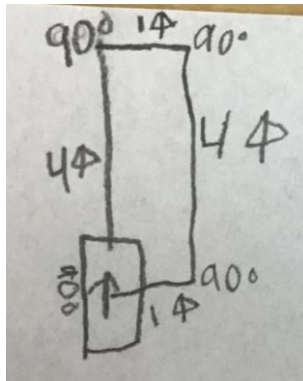
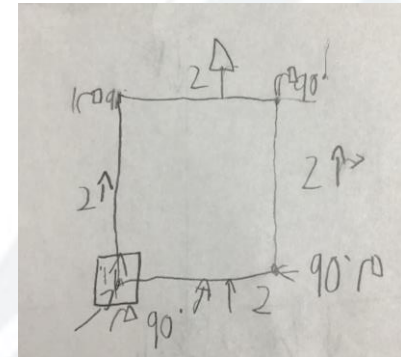
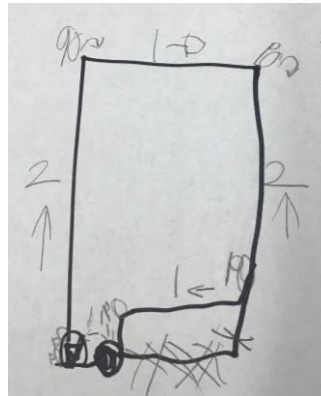
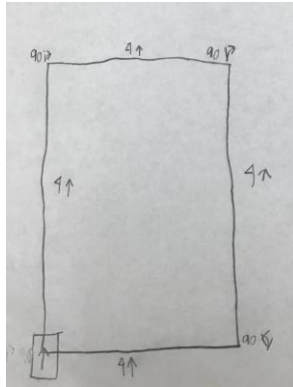
Student Work



Original and Novel Shapes

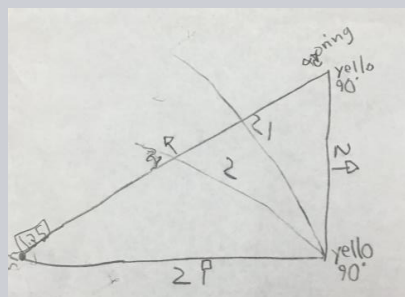


Fluency: A Variety of Similar Shapes

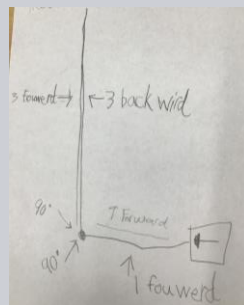


Flexibility: Different Categories of Shapes

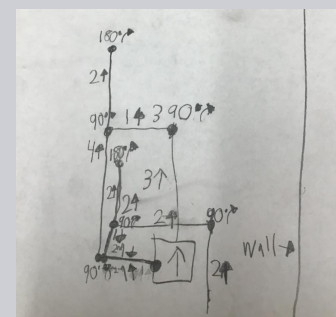
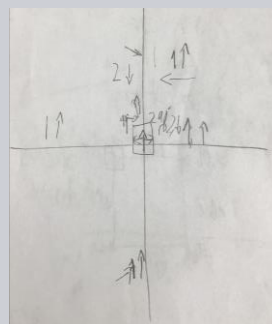
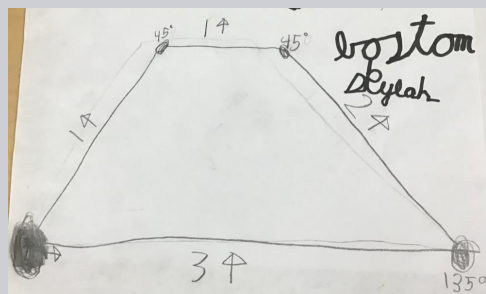
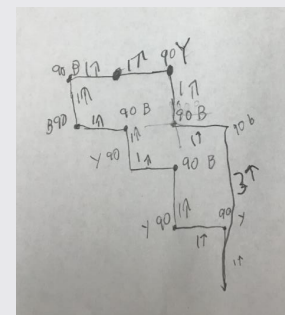
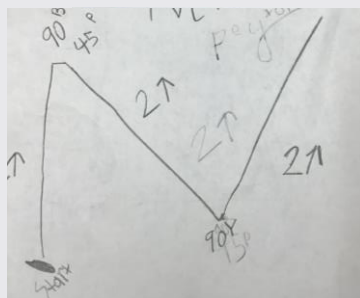
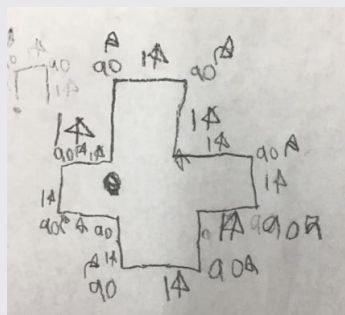
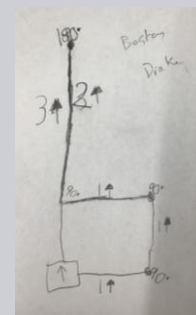
Closed Shapes



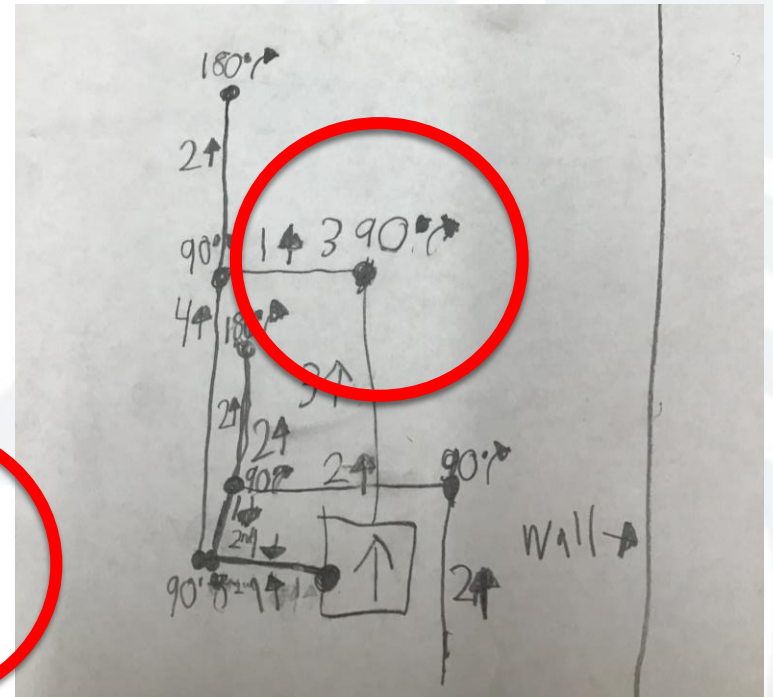
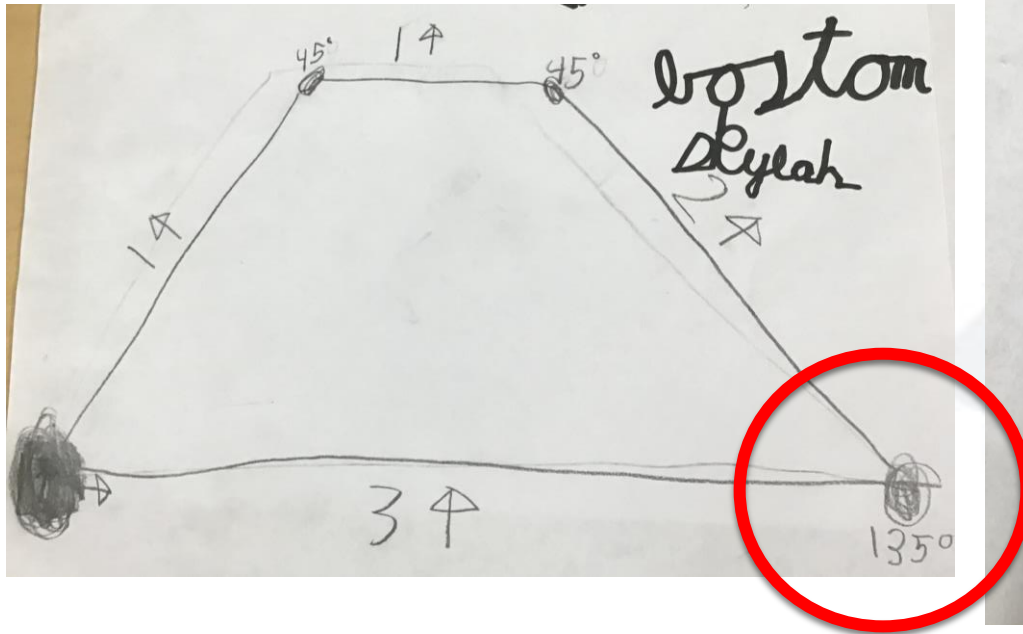
Non-Closed Shapes



Combination Shapes



Just Interesting Mathematics!





What's Next?

Useful Classroom Activities

- Engages body in mathematics learning
- Rich geometrical experiences

Formal Research

- IRB
- Controlled student engagement
- Collect formal data

Questions?



If you have any further questions, please feel free to contact us at Lauren.nix@usu.edu or Joseph.kozlowski@usu.edu

References

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