

# Horsing Around with Contexts for Teaching Proportional Reasoning

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**Thanks to colleagues who helped me gain insight into the  
challenges and opportunities of contexts and proportional  
reasoning**

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- Real Contexts: Why spend the time?
- Exploring Equestrian Events Together
- Are they really gaining insights about mathematics?
- What is gained?
- What are characteristics of “good” contexts?

## Overview

- Time it will take to explore and gain insight about the context
- Whose contexts are these anyway?
- Time it will take to wrestle with questions contexts and insights developed provoke
- Contexts and Reasoning: What is enabled? What is constrained?

**Contexts: Why spend the time?**

- ~~Real~~ or **Realistic** explorations
- Mathematics teaching and learning:  
What is it for?
- What are contexts good for?

**Reaching beyond Pacing to  
Excitement about the World &  
Mathematics**

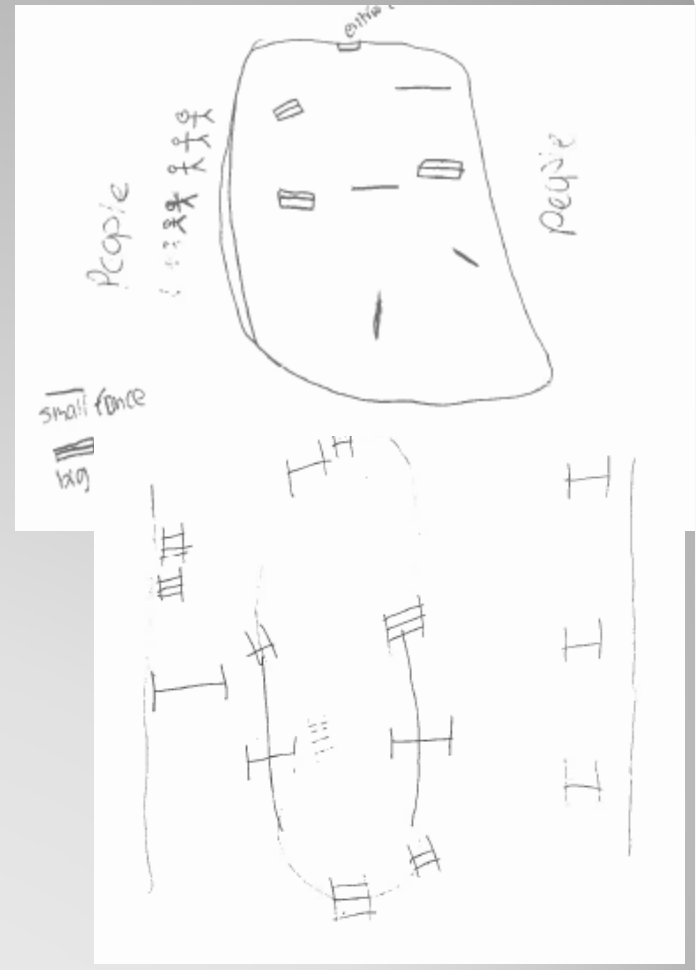
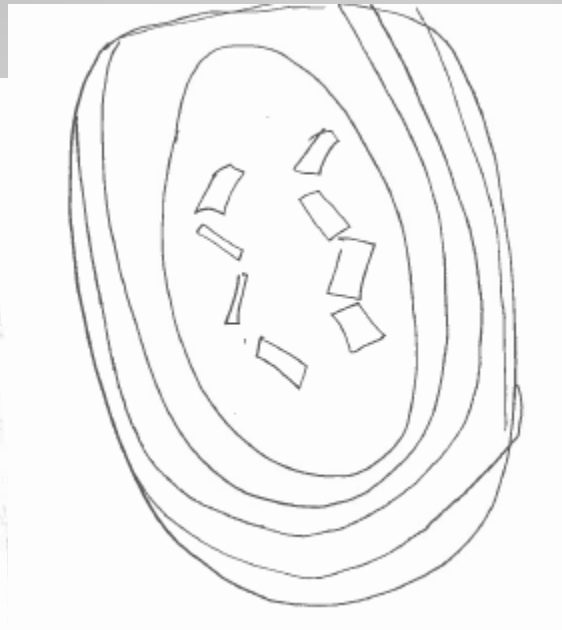
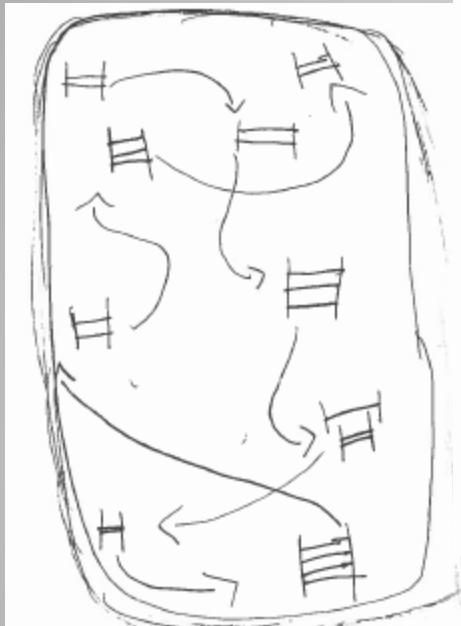
1. Motivating students to explore new mathematics
2. Offering students a chance to apply mathematics
3. Serving as a source of new mathematics
4. Suggesting a source of a solution strategy
5. Providing an anchor for understanding mathematics

**Contexts What are They Good For?**  
(Meyer, Dekker, & Querelle, 2001)

- International of Omaha 2013
- Building an Intuitive Model of the Course
- Extending Intuition

**Exploring Jumping!**

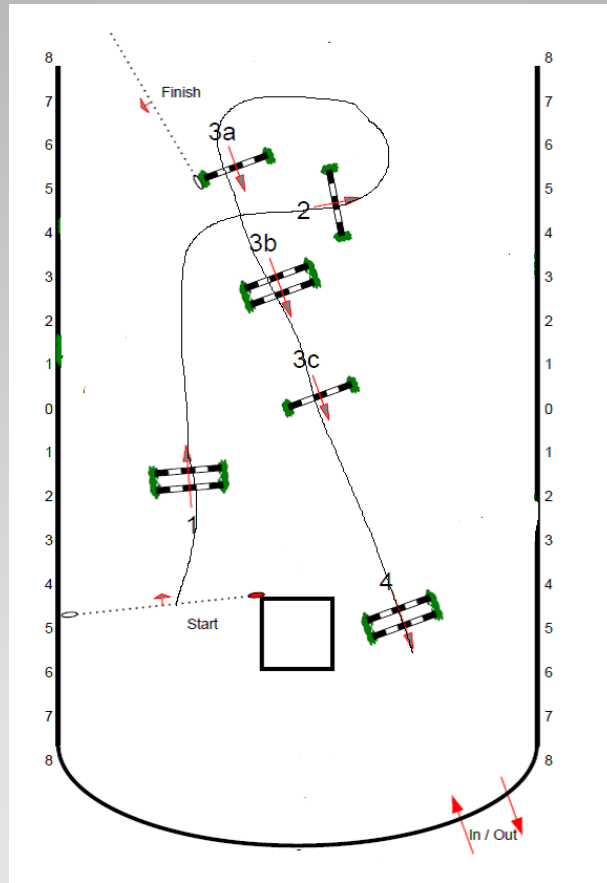
- Arena
- Jumps
- Path



2. explain what you noticed to help you know what the course looks like. When the camera zoomed out you could see the whole course. It's oval. The whole thing look like a maze.

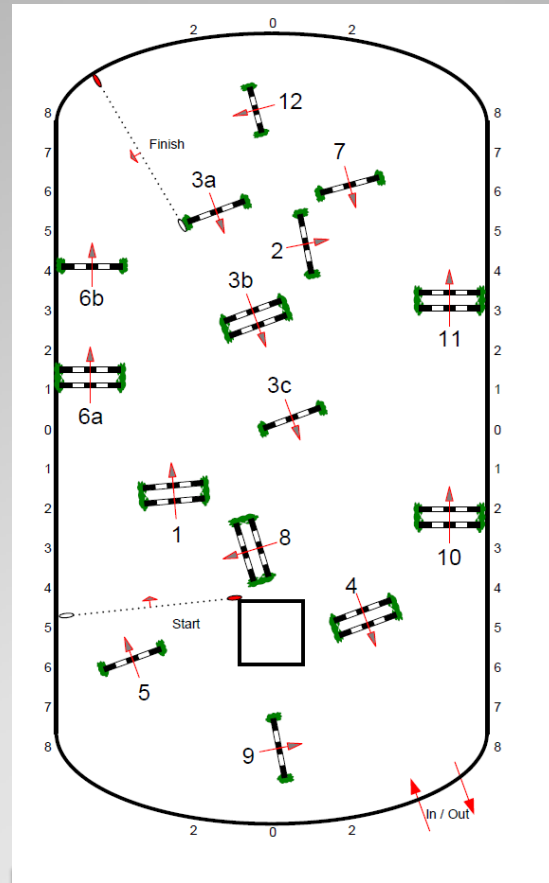
like. As the horses were running and jumping they weren't going in a circle they were

## Student Intuition



**Where are the jumps?**





# Path of the Horse and Rider Scaling the Arena and Locations of the Jumps

- How big is your horse?
- Intuitive ideas about size
- Understanding Hands

**Scaling Up your Horse**



**Elatrice**

- Horse height is measured in hands. One hand is 4 inches.



**How many hands tall is Elatrice?**

- Based on our discussion of the plan for finding the height of your horse, revise and carry out your plan.
- Scale Factor: \_\_\_\_\_
- Important Measurements
- \_\_\_\_\_

- REVISED PLAN and Calculations

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

# Planning and Finding the Height of the Horse

- What will the students bring to the context from their experiences?
- What will they have opportunities to learn about mathematics?
- What will they have opportunities to learn about the world?

## **Opportunities to Build Proportional Reasoning in Context**

NCTM (2000) Grades 6-8	Common Core Progressions	Indiana
<ul style="list-style-type: none"> <li>• <b>Number:</b> Develop, analyze, and explain methods for solving problems involving proportions, <b>such as scaling</b> and finding equivalent ratios</li> <li>• <b>Geometry:</b> Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and <b>scaling</b></li> <li>• <b>Measurement:</b> Solve problems <b>involving scale factors</b>, using ratio and proportion</li> </ul>	<p>“The study of ratios and proportional relationships extends students’ work in measurement ...”</p> <p>“Students use ratios in geometry and in algebra when they study similar figures and slopes of lines...”</p> <p><b>7.G.1:</b> Solve problems involving <b>scale drawings...</b></p>	<p><b>7.GM.3:</b> Solve real-world and other mathematical problems involving <b>scale drawings</b> of geometric figures, including computing actual lengths and areas from a scale drawing. <b>Create a scale drawing</b> by using proportional reasoning.</p>

## Ratio & Proportion in Standards

- What do we learn with our students when we use problems in context?
- How can we work with the complexity of contexts and learners?

**Exploring and Understanding  
the World with Mathematics**



- Situating mathematics as a tool to create, explore, and communicate with
- Understanding the limitations of mathematical analyses
- Opportunity to wrestle with questions the contexts and insights about them provoke

## **Contexts and Affordances**

- Support the mathematics
- Be real or at least imaginable by the students
- Varied, not repeated over and over
- Result in real problems to solve
- Sensitive to culture, gender, and racial norms and not exclude groups of students
- Allow a student to make a mathematical model

**Contexts should:**

**(Meyer, Dekker, & Querelle, 2001)**



- Questions and Comments
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**Thank You!**