TWO SIGMA

MoMath 2018 Expressions Hackathon

Newton's Bouncehouse

July 15th, 2018

MO MATH

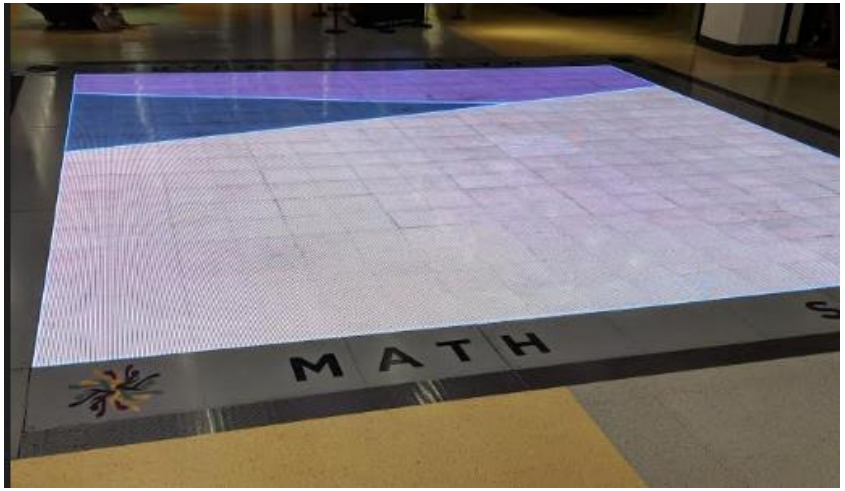
MUSEUM OF MATHEMATICS

Agenda

- **Project Introduction**
- Details of completed steps
- Next Steps for Newton’s Bouncehouse

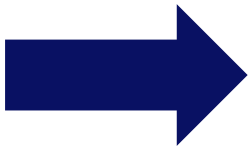
MoMath Math Square – Usage Observations

- Static and Dynamic Games – Several levels of difficulty!
- Many different levels of user intuition who interact at the same time
- Many implementations focus on geometric and algorithmic topics



Desired Qualities of Project

- Dynamic in Nature: attracts the most participants from all ages
- Appeal to several different levels of intuition at once while also allowing for novel challenges to be discovered
- Tailored to hardware system responsiveness
- Emergent Cooperation



1D Kinematics!

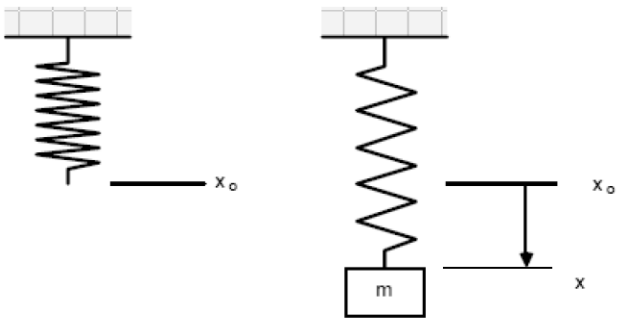
Newton's Bouncehouse!

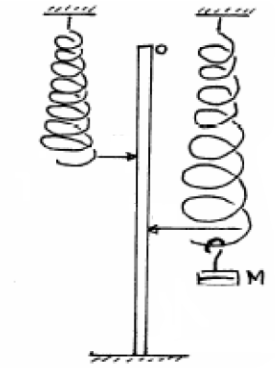
- Overall Idea: Several different "beams" bounce around the Dynamic Square allowing for user interaction

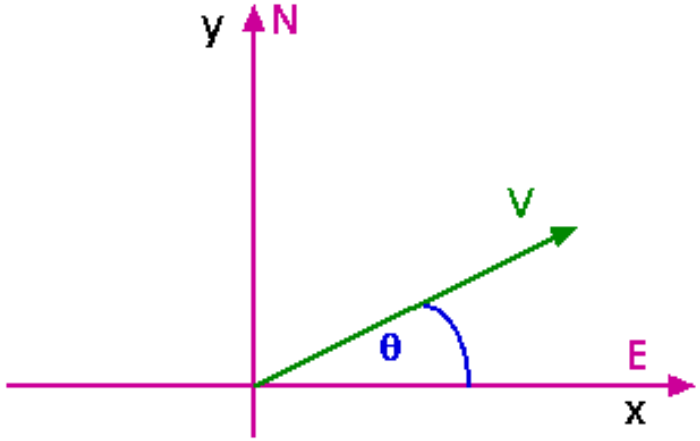
- Key Components
  - Users can redirect the beans "blocks" with their feet
  - Walls act as springs
  - New beams are generated under unique conditions

Fundamental Math Concepts Illustrated

- Velocity and Acceleration
- Spring constants
- Trigonometry Fundamentals







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Overview of Completed Steps

- Core functionality has been achieved:
  - Beams are created at beginning of the file instance
  - Beams change color as once they hit edge boundaries
  - Users can block beams by applying pressure to the floor effectively creating edges to bounce

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Next Steps

- Implement “springiness” to wall bouncing
- Add velocity and acceleration to beams
- Implement function to add new beams when all of the current beams are the same color

