STEMify Low Ropes
Pinball

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NGS Standards:

Connections to Math
ETS1 Engineering Design

Time:

Plan/design: 3-5 minutes
Activity/testing: 10-15 minutes
Group Processing: 3-5 minutes

Materials:

Boundary markers; numbered objects that are easy to see and pick up; stopwatch

STEM Themes:

Observation
Counting; Sequencing
Engine Pistons

Team Building Themes:

Planning
Communications
Time Management

Permission:

Educators are welcome to utilize this curriculum resource after receiving e-permission from the author at tanner.128@osu.edu

Activity Objective

The group will work together to get a series of numbered objects out of a large square in sequential order as fast as possible. They may only have one person in the square at a time, and everyone must retrieve at least one object during the course of a round. Play several rounds to generate improved group results.

Opening Inquiry

Lead the group in a discussion that will begin the planning/design stage of this challenge by asking a few guiding questions:

- What is the most efficient way to accomplish your task?
- Are there any physical or emotional safety concerns you should factor in to your plan?

Set Up

Give the group 3-5 minutes to plan and design how they will successfully accomplish the task. *Facilitator: listen covertly for themes you can draw out at the conclusion of the activity.*

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Safety in Focus

The primary safety component of this activity is ***terrain induced slipping.*** Facilitators should ensure that the square is not placed on loose gravel or wet grass. Indoor settings should be careful of heavily waxed floors.

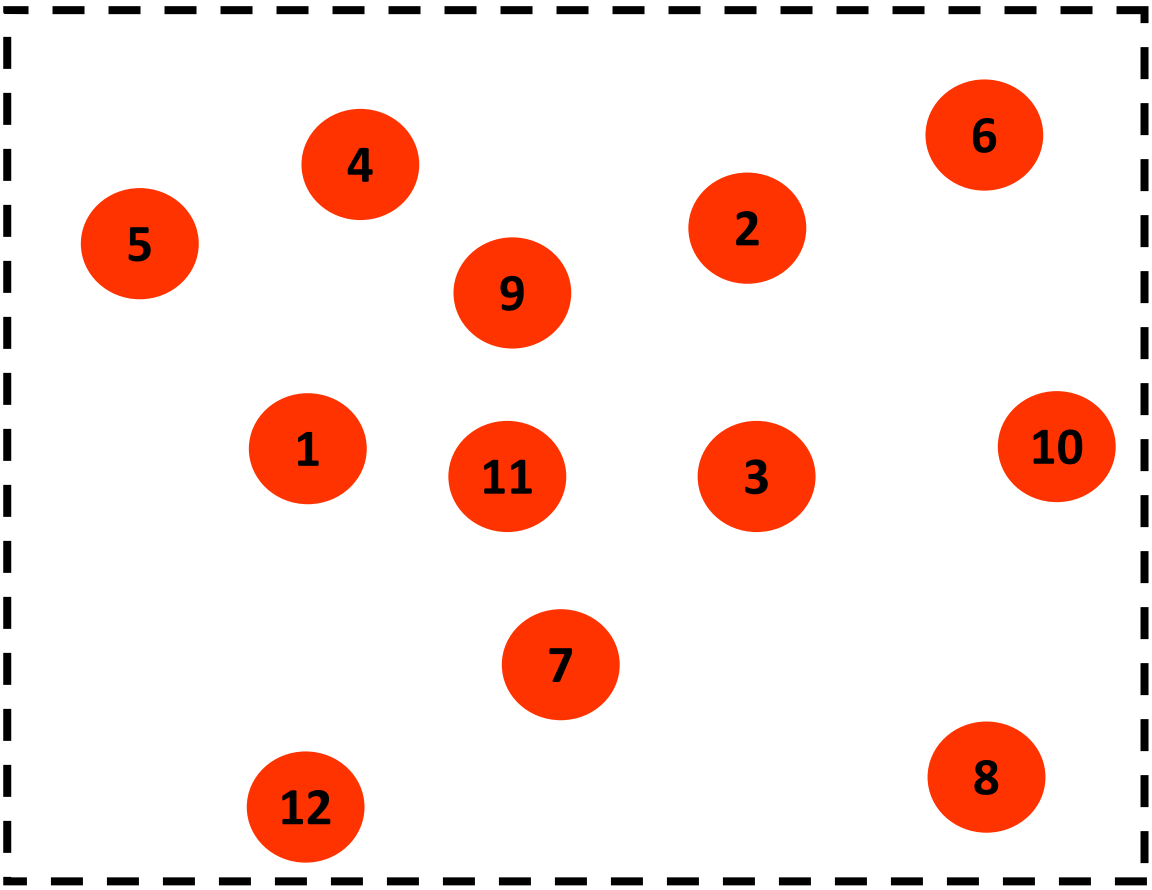
Other rules to share with the group related to safety:

- Only one person can be in the square at a time.
- Do not crash into one another.
- Spread out enough that the person can enter and exit the square safely.
- It saves no time to throw or kick the object. Keep it in your possession at all times.

Procedure Perfect

The perfect group will first assign each person to a number. Then, they will spread out around the square to the place with the shortest distance between them and their number. Next, they will assign a caller (usually the first or last person to go) who will verbally alert the next number. Finally, all members will listen throughout and properly anticipate their turn inside the square.

The diagram below is a representation of a typical Pinball game. It is best to have an equal number of objects to persons participating. The objects can be anything of your choosing, but pieces of numbered paper are frowned upon because of their difficulty to retrieve without paper cuts. 3" x 3" foam blocks would be the ideal material.



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Facilitator Tips

Consider the following as the activity unfolds:

- Are there any safety concerns you need to immediately address?
- Did they form a good strategy? Did that strategy improve from one round to the next?
- What STEM words do you hear utilized by the group in their planning and testing?
- Does the level of challenge seem about right? Should an *Increasing the Challenge* be added?

Increasing the Challenge

1. Allow the group to determine where the objects get placed inside the square (after round 1). Yes, if they are smart, this will make the activity easier for them...but they will have thought of the idea and that is worthy of discussion at the end.
2. If there are 12 members of the group, have 18 total objects in the square. This will cause the group to decide who its most attentive and speediest members are (those who will get a 2nd object presumably), which can be discussed pro/con at the end of the activity.
3. Give a penalty of 5 seconds every time there are two people in the square at the same time. This will stop the behavior quickly!

Variation

In situations in which a previous injury might prevent active participation, encourage that individual to serve as the caller and group organizer. Technically though, the team is competing against its own time score, so a slightly hobbled individual should still participate unless it will exacerbate the injury.

Processing the Activity

Spend 2-3 minutes discussing the following questions before moving on to the next activity:

- In what ways did your team work well together? What might you have done differently?
- What science and math skills did you use to complete this activity?

As appropriate, review the unmentioned/remaining *Themes* from page 1 to ensure group learning.

Citation

As noted in "permissions," you must request permission from the author to utilize this curriculum (in part or whole) for teaching purposes. If you wish to cite this resource in a book or article, here is the APA citation for your convenience:

> Tanner, T., (2014). *STEMify Low Ropes: Pinball* [Program of Studies]. Retrieved from the Ohio State University Extension website: http://go.osu.edu/stemropes

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Date Created: February 2014

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Team Building Themes: Planning; Communications (Listening especially!); Time Management

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