



*Drexel-SDP GK-12 ACTIVITY*

## Activity

- Subject Area(s): ***Motion, Energy, Design***

**Associated Unit:** ***K'Nex Force and Motion***

**Associated Lesson:** ***Bridge Building***

**Activity Title:** ***Boulder Dash: Ratios and Trajectory***

**Grade Level:** (6-8)

**Time Required:** **60-90 minutes**

**Group Size:** **Classroom**

**Summary:** *Students are to design and construct two separate ramps from K'Nex and other items around the classroom to have a ball roll down a large ramp and projected off a smaller one in order to clear a gap between two desks. The group with the largest gaps wins.*

**Engineering Connection:** Students should realize that even fundamental science concepts such as gravity and kinetics greatly influence the design principles of some of the most advanced technology on the planet, including aircrafts, automobiles, etc.

**Keywords:** **Motion, Force, Energy, Design, Kinetics, Potential**

**Educational Standards:** [PA] 3.2.7D, 3.4.7C, 3.6.7C

**Objectives:** After this lesson students should be able to relate differing heights (and its proportion to potential energy) to the resulting kinetic energy through conservation of energy.

## **Materials List**

- Intermediate K'Nex set (roughly 500 pieces), measuring tape/ruler, worksheet

## **Introduction/Motivation:**

### ***Procedures:***

1. I like to start with a very brief introduction to energy and the conservation of energy. Asking the kids about riding their bikes from a taller hill and smaller hill and which will go faster helps. They know the concept already, you just have to pry it out of them :)

2. This meant as a follow up to the bridge lesson. The same baggie routine applies, as does the design rules and initial setup.

3. Students will find it near impossible to construct two ramps solely from K'Nex, as the ball will not want to travel up the second smaller K'Nex ramp. Usually books, sheet protractors/stencils...these kind of things work as a second ramp.

4. Its pretty straight forward and fun. The kids build their ramps, then have a golf ball to roll down the ramp. They get 5 attempts this time, as it is fairly difficult to keep the ball on both ramps.

5. Have fun, its meant as an exercise in design and execution. The execution may not be perfect, but they'll have a blast trying.

**Assessment:** There really is no tangible assessment, as this activity is more to engage the students' minds to think constructively.

**Attachments:** **BoulderDash Worksheet**

**References:** **[www.knex.com](http://www.knex.com) (education link)**

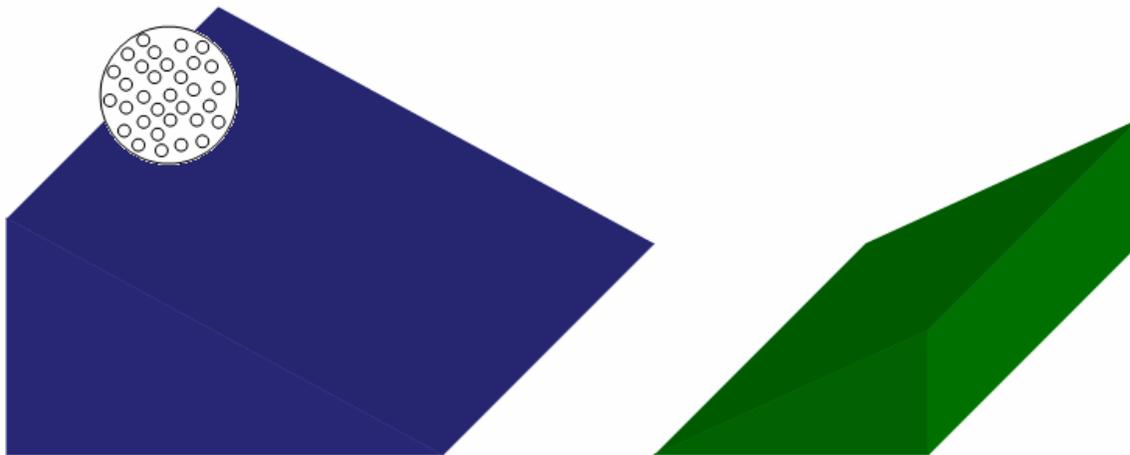
### **Owner**

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Using K'Nex, you and your team will build 2 separate ramps. One should be 4 times larger than the other (The teacher will measure the heights). The object is to roll a ball on the large ramp and off the smaller one, sending it in the air over a gap. Whichever team can cross the largest gap between two desks wins. You have a total of 30 pieces (15 rods and 15 connectors) to choose from. Draw out your design below:

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