

## Connections to School —

NPASS2 after school projects are relaxed, informal and fun. All of the projects stress five common process skills that are mentioned in state and national science standards: observing, investigating, questioning, explaining and problem-solving. Children also gain hands-on experience with important ideas they will learn in school. In Balls & Tracks these ideas include gravity, speed, angle, momentum, friction, trajectory, energy, acceleration and slope.

## NPASS Master Student Attributes



### MASTER QUESTIONER

Seeks quick answers  
Follows the trail  
Speculates from the evidence



Quick answers are useful – sometimes. But mostly you have to follow a trail of questions, each one based on the answer to the last one. Finally, you may come up with a big question or idea.

*“I think (wonder if) this all means that .....”*

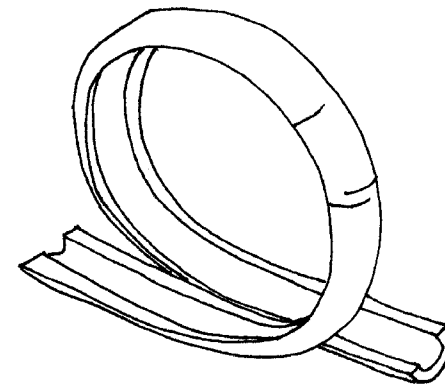
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# Making Science Fun

## Balls & Tracks: an after school science and engineering project



This curriculum offers a playful way to investigate the behavior of a marble rolling down a sloping track.



Brought to you by NPASS2 — National Partnerships for After School Science

## FOR PARENTS

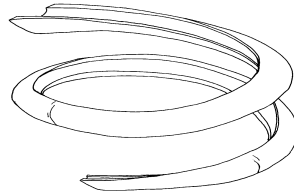
### Summary

Students discover how the speed of the marble down the track and how far it flies off the end (like a ski jumper) are related to the length, angle, height and shape of the track. They also explore how to keep the marble safely on the track as it speeds up and over hills or around curves and loops in the track.

### Activities

The Balls & Tracks activities include:

- Building a Ski Jump
- Creating Hills and Valleys
- Adding Loops and Spirals
- Running the Obstacle Course
- Designing a Super Coaster



### Materials

|                       |                       |
|-----------------------|-----------------------|
| Marbles               | Pipe insulation       |
| Masking tape          | Index cards           |
| Boxes to stop marbles | Cups to catch marbles |

### Questioning

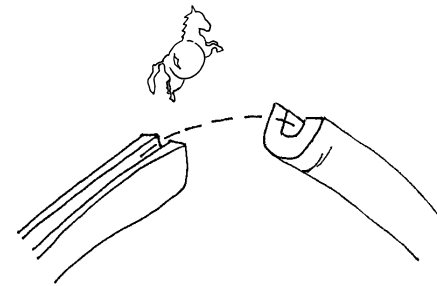
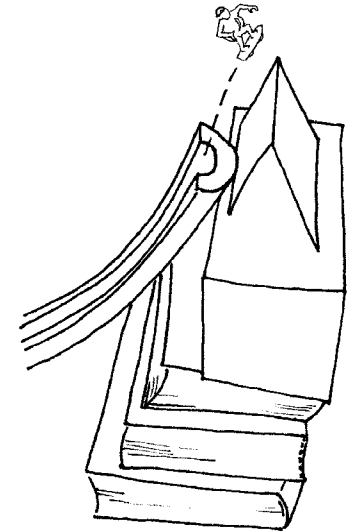
Ask these types of questions as your child designs the challenges at home:

- What works (and what doesn't)?
- What have you tried (and what happened)?
- What could you change (and what do you think would happen)?
- What else works like this?

## FOR KIDS

Try these challenges using materials you have at home. If you don't have pipe insulation, try cutting cardboard paper towel tubes in half lengthwise and taping them together to form a track.

Build a high jump from an index card and place it on top of books. How high can the marble (or skateboarder) jump into the air?



Set up a gap in your track. Test how far a marble (or unicorn) can jump and still land in the track.