

Middle school | Height into Motion

Name: _____ Date: _____

Goal: Compare two starting positions and explain which supplies more energy from the drop. You need only this sheet and a pencil. The picture is a model to reason about, not a record of measured trials.

Before the explanation

Quinn wants a marble to reach his catch cup without escaping. His camera has had enough surprise endings. He can choose release mark A or B on the same ramp, with one fixed finish.

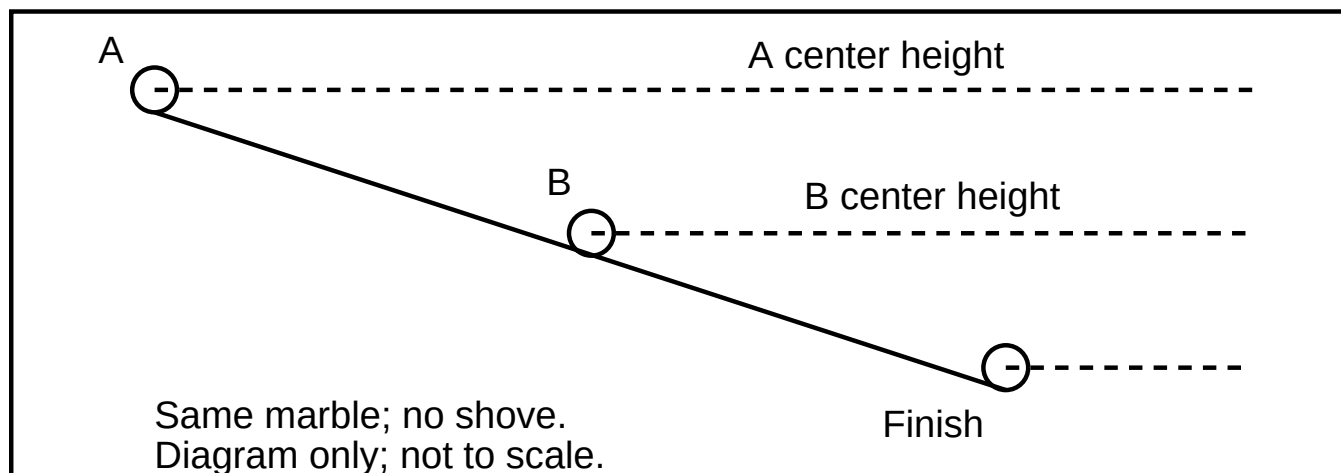


Diagram description: A is higher than B on one ramp. Dashed horizontal guides mark the marble-center heights at A, B and the shared finish. The picture has no measured scale.

MS01. Before reading page 2, which release would you choose if you wanted less energy supplied by the drop? Circle A or B and explain your prediction. You may revise it later.

MS02. Draw a straight vertical line from each release-center height to the finish-center height. Which measurement are your lines showing? How is it different from distance along the ramp?

Read, compare, reconsider

When the marble is held above the finish, its position relative to Earth gives the marble-Earth system stored gravitational energy. Gravity can turn this into movement as the marble descends. For the same marble near Earth, a larger vertical drop supplies more gravitational energy. Vertical means straight up and down: compare the marble-center height at release with its height at the finish. Track length is a different measurement. Release without a shove.

MS03. Return to your MS01 choice. Keep or change it, and explain why using the two center heights. Name two conditions that stay the same.

MS04. Imagine the finish is moved higher while the release mark stays fixed, still above it. The marble is unchanged and released without a shove. Does the drop supply more, less or the same energy? Sketch or explain the changed separation.

MS05. A friend says, "The lower release will definitely keep the marble in any cup." What can this height comparison tell you? What would still need observing in the actual setup?

Optional reading and sources

Height into Motion is the source micro-lesson for this worksheet. You can complete this activity offline using the explanation [here](#).

One More Take: Quinn compares release marks, then adjusts the start when the finish moves. This story is optional.

[Read or revisit Height into Motion](#)

[Read or return to One More Take](#)

[MIT: Potential Energy and Conservation of Energy \(sections 14.2 and 14.4.1\)](#)

[OpenStax: Gravitational Potential Energy \(section 7.3\)](#)