

Finish Speed versus Arrival Time

OKAY, BUT... HOW? · A closer look

Question: Can two journeys end at the same speed but take different amounts of time?

You'll be able to: Distinguish speed at the finish from elapsed time over the whole route.

Finish speed asks how fast the marble is moving at one place. Arrival time asks how long the whole journey took, from release to that place. A finish-speed comparison cannot tell you every part of the journey.

For the same marble let go without a push, rolling without skidding and with no energy losses, equal drops give equal ideal finish speeds. Different route shapes can still produce different journey times. Time depends on how the marble moves all along the route.

Harvard describes a ball race in which a curved route beats a straight incline. That is a specific demonstration, not a rule that every curve wins. A homemade track needs timing rather than a guess based on its length.



OKAY, BUT... HOW?

A closer look with Quinn

Route A



Route B



Matching relative heights

Release

Finish

Time: the whole interval

Speed: at the finish only.
Same marble, release from rest;
rolling, no skidding or losses.
No times or winner shown.
Not to scale.

A whole-journey interval and an endpoint speed answer different questions.

Diagram in words: Two stacked route panels have equal relative endpoint heights but different downhill profiles. A separate timing strip marks release to finish, while separate text identifies speed at the finish. No times or winning route are claimed.

[Open the full-resolution diagram](#)

Try the idea

You know two ideal runs have equal finish speeds. Can you announce a tie in arrival time?

Answer: No. Equal endpoint speed does not tell you the speeds throughout either route. You need the journey times to decide whether they tie.

A little further, if you want

Optional: Illinois derives the time distinction for a particle sliding without friction. That is not the spinning-marble speed model. It illustrates why a whole-path question needs more information than endpoint heights.

See it in action

No published Okay But story currently demonstrates this concept as a separate application.

From the story? Return to One More Take at this concept. Arrived directly? Browse Okay But stories. Normal browser Back returns you to your previous page.

Sources

- Harvard: Brachistochrone demonstration — A described curved-versus-straight ball race.
- Illinois: Brachistochrone teaching notes — Whole-route time in a frictionless sliding-particle model.
- OpenStax: Rolling Motion — Ideal rolling energy and real transfers.

Download this lesson with its diagram and answer (PDF)