0 Question: A train is coasting around a large circular track. It is then switched to a smaller circular track. How does its speed change? Assume no friction, and assume the train is a point mass

A1: Its speed does not change

A2: It's unclear, different models suggest its speed might increase or decrease or stay the same

Arguments for A1

1 Question: If nothing interacting with the train changes its energy, does the train's energy remain constant?

A1: Yes

A2: Yes, very likely

3 Question: If the train's energy remains constant, does the train's velocity remain constant?

A1: Yes

A2: Yes, very likely

5 Question: Does anything that interacts with the train (e.g. the rails) change in energy?

A1: No

A2: The earth might change in energy

Arguments for A2

2 Question: Can we view the situation in a rotating reference frame, where the frame is rotating at the same rate as the train is initially traveling round the track?

A1: Yes

A2: Yes

4 Question: In a rotating reference frame, does the speed of the train increase in some circumstances and decrease in others?

A1: Unsure, but these speed changes would not appear in an inertial reference frame

A2: Probably

6 Question: Do other models (conservation of angular momentum in a non-rotating reference frame) suggest its speed increases?

A1: No, conservation of angular momentum does not apply

A2: Yes, although it's not clear whether this conservation law actually applies to this system

7 Question: Do other models (conservation of energy in a non-rotating reference frame) suggest its speed stays unchanged, similarly strongly as the previous argument?

A1: Yes

A2: Yes, although it's not clear whether this conservation law actually applies to this system