0 Question: When the train is switched to the smaller track, how will its speed change? (assume no friction, and ignore small effects or effects that aren't related to angular momentum or kinetic energy) (A) Increase, (B) Decrease, (C) unchanged

A1: To a good approximation, the speed stays unchanged; in reality, it will probably slow down slightly

A2:

Arguments for A1

1 Question: To a good approximation, does the translational kinetic energy of the train stay unchanged?

A1: Yes

A2: Yes

2 Question: Is the speed of the train proportional to its translation kinetic energy?

A1: Yes

A2: Yes

3 Question: In reality, does the translational kinetic energy of the train decrease slightly?

A1: Yes

A2: No

Arguments for A2

4 Question: Does train/track system contains a component that exerts external work?

A1: No

A2: No

5 Question: If there is no external work, then will the energy of the system remain constant?

A1: Yes

A2: Yes

6 Question: Is rotational kinetic energy of an object is equal to the moment of inertia times the square of the angular velocity?

A1: Yes

A2: Yes

7 Question: Is the moment of intertia of an object of mass M rotating around a point at distance L equal to ML^2?

A1: Yes, for a point mass (for a large object you have to calculate this for all the different parts of the object)

A2: Yes

8 Question: When the train switches tracks, does the moment of inertia decrease, resulting in an increase in angular velocity?

A1: Yes

A2: Yes

9 Question: Is this increase in angular velocity balanced out by the decrease in radius such that the total velocity remains the same?

A1: Not necessarily

A2: Yes