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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

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

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

Yes

No

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Does the rotational kinetic energy of the train increase slightly?

Yes

No

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If energy is conserved, is it the case that objects in closed systems cannot increase velocity?

No, translational velocity can increase

Yes

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If the the number of times the train rotates around its centre of mass per second increases slightly, will the rotational kinetic energy of the train increase slightly?

Yes

No, it depends on the change in the moment of inertia

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Given that the train stays the same shape, to a good approximation, is the rotational kinetic energy of the train determined only by the speed of rotation, to a good approximation?

Yes

I reject this question; Beth (my opponent) does not have a coherent notion of "good approximation" in mind.