0 Question: A ball is attached to a pole by a string. The ball is swinging in a circle, and the pole is rotating freely, so that the part of the pole where the string is attached is always facing the ball. Now you stop the pole rotating, so the string starts wrapping around the pole. What happens to the speed of the ball?
(ignore effects due to gravity, assume the ball is a point mass)

A1: the speed increases

A2: It stays the same

Arguments for A1

1 Question: Is angular momentum approximately conserved?

A1: yes

A2: No

2 Question: If the angular momentum is conserved, then does the ball speed up?

A1: yes

A2: Yes

Arguments for A2

3 Question: Does the kinetic energy of the ball stay the same?

A1: yes, approximately; it increases slightly.

A2: Yes

4 Question: If the kinetic energy of the ball stays the same, does its speed stay the same?

A1: Yes

A2: Yes