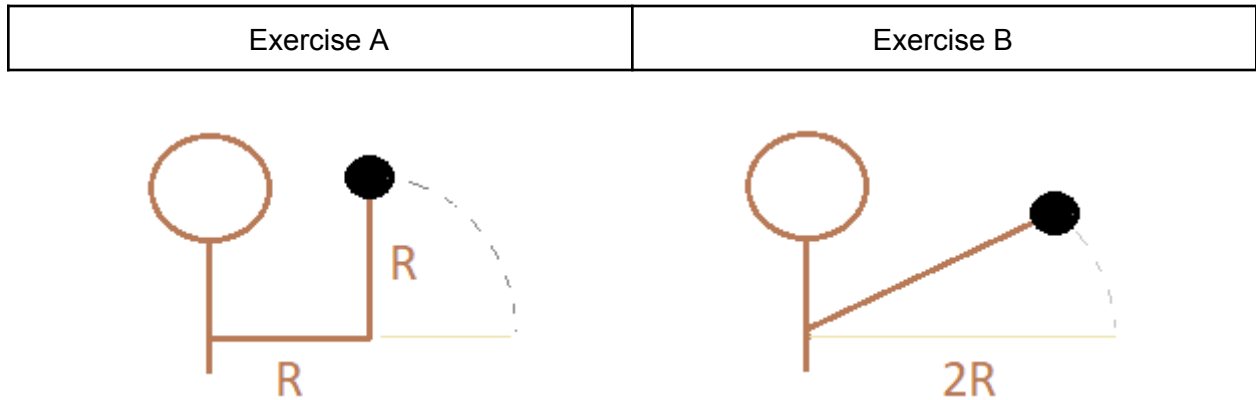


A weightlifter initially holds a dumbbell of mass M in a horizontal position. The length between her shoulder and elbow is known to be R . The length between her elbow and fingertips is also R .

- In exercise A, the weightlifter performs a bicep curl, bending her arm at the elbow.
- In exercise B, the weightlifter performs a front raise with the same dumbbell, lifting with her shoulder as the pivot point.

Assume the dumbbell moves along the dotted line shown in each image until it reaches the top of its circular arc. In Exercise B, the dumbbell would reach a final position directly above the weightlifter's head.



1. During which exercise would the weightlifter have a harder time changing the position of the dumbbell from its horizontal position to its vertical position?

Circle one answer choice:

- a. Exercise A
- b. Exercise B
- c. It would be equally difficult to perform each exercise
- d. Impossible to answer without knowing the mass of the dumbbell

In a clear, coherent, paragraph-length response that may also contain figures and/or equations, justify your selection for question #1.

