Warm Up Question 1

A gate is hinged on its left side (the rotation axis is vertical). You push perpendicularly against the gate from one of two places: a) the midpoint of the gate and b) the right side of the gate. If the force that you exert on the gate is the same in either case, then how does the torque exerted on the gate compare in case a) to that of case b)? Explain your answer.

1. Smaller for a) (midpoint). Distance is smaller.

2. Half for a) (midpoint). Distance is half.

3. Larger for a). Larger lever arm.

4. Both torques are zero.

Warm Up Question 2

Figure 8.2 illustrates a person using a beam to hold a bucket of rocks. Suppose that the person holds the beam and bucket horizontally at rest. The person can do this either by holding the beam a) closer to the left end or b) closer to the right end. How will the necessary force in case a) compare (same, smaller, larger) to that of case b)? Explain your answer.

1. Smaller force when closer to the left. Distance larger.

2. Larger force when closer to the left. Distance is smaller.

3. Same. They have to balance the same mass.

Question 1

Rods with length $2.0\,\mathrm{m}$ rotate about an axle at their midpoints. Two such rods are set up with masses attached as illustrated.

Case A

20 N

axle

Case B

20 N

axle
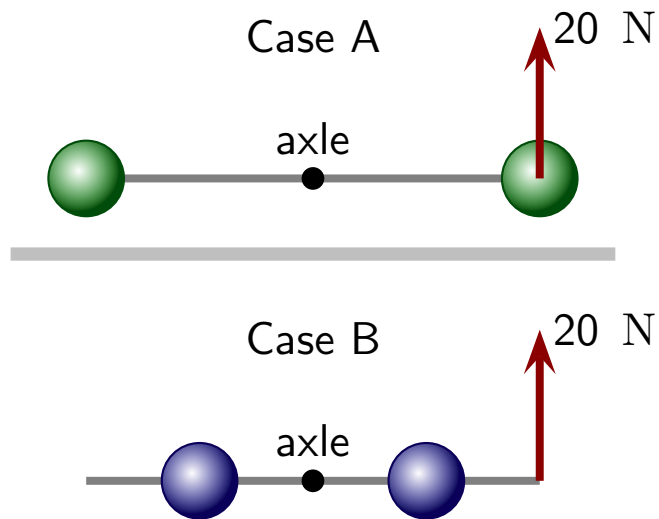
The masses in both cases are the same. The same force acts at the end of each rod. Which of the following is true regarding the resulting angular acceleration?

1. $\alpha_{\mathsf{A}} > \alpha_{\mathsf{B}}$

2. $\alpha_{\mathsf{A}} < \alpha_{\mathsf{B}}$

3. $\alpha_{\mathsf{A}} = \alpha_{\mathsf{B}} \neq 0$

4. $\alpha_{\mathsf{A}} = \alpha_{\mathsf{B}} = 0$