Consider waves traveling along two wires which are made of an identical material.

<table>
<thead>
<tr>
<th>wire</th>
<th>mass/length</th>
<th>tension</th>
<th>diameter</th>
<th>length</th>
<th>speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>μ₁</td>
<td>T₁</td>
<td>d₁</td>
<td>L₁</td>
<td>v₁</td>
</tr>
<tr>
<td>#2</td>
<td>μ₂</td>
<td>T₂</td>
<td>d₂</td>
<td>L₂</td>
<td>v₂</td>
</tr>
</tbody>
</table>

Given \( d_2 = 2d_1 \), \( L_2 = 2L_1 \). The ratio \( \frac{μ₁}{μ₂} \) is given by

A) \( \frac{μ₁}{μ₂} = \frac{1}{4} \).
B) \( \frac{μ₁}{μ₂} = \frac{1}{2} \).
C) \( \frac{μ₁}{μ₂} = 1 \).
D) \( \frac{μ₁}{μ₂} = 1 \).

linear mass density = \( \frac{\text{density} \times \text{volume}}{\text{length}} \) = density \( \times \) cross section.

For two identical materials the densities are the same, so

\[
\frac{μ₁}{μ₂} = \frac{\pi \left( \frac{d₁}{2} \right)^2}{\pi \left( \frac{d₂}{2} \right)^2} = \left( \frac{d₁}{d₂} \right)^2 = \left( \frac{1}{2} \right)^2 = \frac{1}{4}
\]

Answer A.