7.5 Translational Equilibrium

**LEARNING TARGETS**

7.3 I can define, analyze, and solve dynamic problems involving tension forces and connected objects.

### Translational Equilibrium

When an object is in **translational equilibrium**, the net force acting on it is zero.

\[ \sum \vec{F} = 0 \]

\[ \sum \vec{F}_x = 0 \quad \sum \vec{F}_y = 0 \]

\[ \vec{F}_A \Rightarrow \vec{F}_B \quad \vec{N} = \vec{F}_g \]

\[ T_{RB} = \frac{F_{gB}}{2} \quad \frac{1}{2}T_{AB} = \frac{F_{gB}}{2} \]

**ANNOUNCEMENTS**

<table>
<thead>
<tr>
<th>HOMEWORK</th>
<th>LABS</th>
<th>TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 7 Practice Problems (1-16)</td>
<td>Correct Spring Lab TODAY</td>
<td>UNIT 7 TEST Friday Dec. 7</td>
</tr>
</tbody>
</table>

### SPRING LAB EVALUATION

<table>
<thead>
<tr>
<th>SECTION</th>
<th>EVALUATION</th>
<th>POINTS EARNED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Title of lab is present and labeled</td>
<td></td>
</tr>
<tr>
<td>PURPOSE</td>
<td>Purpose of lab is labeled and clearly written in a complete sentence</td>
<td></td>
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<tr>
<td>HYPOTHESIS</td>
<td>Hypothesis of lab is labeled and clearly written in a complete sentence</td>
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<tr>
<td>MATERIALS</td>
<td>Materials of lab are labeled and clearly listed</td>
<td></td>
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<tr>
<td>DATA AND CALCULATIONS</td>
<td>Data is clearly labeled and appropriately displayed through tables or charts</td>
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</tr>
<tr>
<td>CONCLUSION</td>
<td>Purpose of lab is restated</td>
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<td>Findings are verified with 3 or more results including important numerical values and their significance</td>
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<td>Counterclaim is provided to address specific experimental error and provide possible experimental improvements</td>
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<tr>
<td></td>
<td>Specific real-world applications are given to provide importance of the experimental process</td>
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</table>

**TOTAL** 20
7.5 Translational Equilibrium

December 04, 2018

Suspended Vegetation

6) To hang a 6.20 kg pot of flowers, a gardener uses two wires - one attached horizontally to a wall, the other sloping upward at an angle of \( \theta = 40.0^\circ \) and attached to the ceiling. Find the tension in each wire.

7) A 1.84 kg bag of clothespins hangs in the middle of a clothesline, causing it to sag by an angle of \( \theta = 3.50^\circ \). Find the tension, \( T \), in the clothesline.

\[
\begin{align*}
T_2 \cos \theta &= T_1 \\
T_2 \sin \theta &= F_g \\
72.4 \text{ N} &= T_1 \\
T_2 \sin \theta &= mg \\
T_2 &= mg / \sin \theta \\
T_2 &= (6.20 \text{ kg})(9.8 \text{ m/s}^2) / (\sin 40.0^\circ) \\
T_2 &= 94.5 \text{ N}
\end{align*}
\]

Suspended Vegetation

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Suspended Vegetation

A 1.84 kg bag of clothespins hangs in the middle of a clothesline, causing it to sag by an angle of \( \theta = 3.50^\circ \). Find the tension, \( T \), in the clothesline.

\[
\begin{align*}
2(T \sin \theta) &= F_g \\
T &= (mg) / (2 \sin \theta) \\
T &= 148 \text{ N}
\end{align*}
\]