**Experiment Title**

Ski Deflection

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Investigators
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**Objective**
The goal of this experiment is to determine the average maximum deflections of a group of skis so that the final project can accommodate the required movements.

**Background**
Skis have a wide range of construction techniques and materials so their deflections are not directly relatable from brand to brand or model to model. This experiment has the double objectives of finding an average range that a set of skis will deflect when placed in a simple beam load situation and also if the deflection is linearly related to the applied load.

**Hypothesis**
Going into this experiment we had varying opinions on whether or not the ski deflection would be linear or not. Several of the group members cited the different cross sections that a ski has along its length as evidence that they would deflect more in loading that acts mainly in the thinner areas while the remaining members hypothesized that the cross section differences would be minor.

The amount of deflection of the ski was fairly certain because of prior non-formal tests where the skis were loaded with one end on the ground and the other held up by a team member. We really just needed to get a numerical value for the deflection of the ski family.

**Procedure**
The experiment consisted of a ski supported at one end by a dolly and at the other by a table. The end of the ski was attached to the dolly with a C-clamp so that the ski had a lesser chance to slide off the dolly and potentially injure a team member and/or break. The load was accomplished by attaching an NRS web strap 62cm from the tail support of the ski and then looping a carabineer through the strap. Weights borrowed from the Campus Recreation center were looped to the carabineer with another length of NRS web strap. Deflections were measured with a yard stick that would be placed vertically from the ground to a marked point just forward of the applied load.
1. Attach ski to dolly with C-clamp
2. Loop NRS strap around ski 62 cm from tail support
3. Measure ski height with no load
4. Loop carabineer around NRS strap
5. Loop weight through second NRS strap and loop into carabineer
6. Load ski and observe deflection
7. Repeat with varying weights
Data

<table>
<thead>
<tr>
<th>LOAD (lb)</th>
<th>SALOMON (cm)</th>
<th>DYNASTAR (cm)</th>
<th>FISCHER (cm)</th>
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<tr>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>1.3</td>
<td>1.7</td>
<td>1.2</td>
</tr>
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<td>45</td>
<td>3.2</td>
<td>3.7</td>
<td>3</td>
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<td>6.1</td>
<td>5</td>
</tr>
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<td>7.2</td>
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</tr>
<tr>
<td>150</td>
<td>12.3</td>
<td>13.2</td>
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</tbody>
</table>

Analysis
The above graph shows that the skis deflection was linear and that under our max test load of 150 lbs the ski families bent around 10-15 cm, which gives us a maximum deflection area.

Conclusions
Our hypothesis seemed correct in that several members found the flex to be linear. Also, we now have a maximum deflection

Error Discussion
The only area of concern is that the skis were of different lengths which dictated that different percentages of the skis were acting under the load suspension. This would need to be corrected if the test were to be performed in the future. Also, for a more accurate portrait of the results we would need to suspend the entire ski and then divide the deflection by the ski length to get a strain of deflection/unit length.