F=ma in Flight

Using the information displays for the plane, you will be able to calculate the acceleration of each plane. Isaac Newton determined that Force = mass x acceleration (or acceleration = force/mass). The airplane displays will give you force in horsepower, and mass in pounds. These numbers will need to be converted to the scientific standard of Newtons and grams.

Claim
Pick a large plane and a small plane. Which plane do you think will be able to accelerate (speed up) faster? Remember, a heavier plane will accelerate slower, but a more powerful engine will make it accelerate faster. The □ smaller □ larger plane will accelerate faster because _________________________________________

Evidence
Name of large plane __________________________  Name of small plane __________________________

<table>
<thead>
<tr>
<th>Horsepower</th>
<th>Weight</th>
<th>Conversion to Newtons / grams</th>
<th>HP of large, divided by weight of large, times conversion number = acceleration.</th>
<th>HP of small, divided by weight of small, times conversion number = acceleration.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td></td>
<td>1.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reasoning
Do the results match your claim? Describe the size and power of each plane to explain the differences in acceleration.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

Vocabulary

Acceleration - increase in the rate or speed of something.
Horsepower - a measurement of mechanical force.

TEKS 8.6c
F=ma in Flight

Using the information displays for the plane, you will be able to calculate the acceleration of each plane. Isaac Newton determined that **Force = mass \times acceleration** (or **acceleration = force/mass**). The airplane displays will give you force in horsepower, and mass in pounds. These numbers will need to be converted to the scientific standard of Newtons and grams.

**Claim**

Pick a large plane and a small plane. Which plane do you think will be able to accelerate (speed up) faster? Remember, a heavier plane will accelerate slower, but a more powerful engine will make it accelerate faster. The □ smaller □ larger plane will accelerate faster because **smaller=less mass / larger=greater force**

**Evidence**

Name of large plane  **B-17 Flying Fortress**  Name of small plane  **Stearman PT-17**

<table>
<thead>
<tr>
<th>Horsepower</th>
<th>Weight</th>
<th>Conversion to Newtons / grams</th>
<th>Acceleration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large</strong></td>
<td>36,135 lbs</td>
<td><strong>1.64</strong></td>
<td><strong>0.218 m/s^2</strong></td>
</tr>
<tr>
<td><strong>Small</strong></td>
<td>1,936 lbs</td>
<td></td>
<td><strong>0.186 m/s^2</strong></td>
</tr>
</tbody>
</table>

**Reasoning**

Do the results match your claim? Describe the size and power of each plane to explain the differences in acceleration.

**The larger plane has faster acceleration. Even though it has much more mass than the smaller plane, it also has greater force because of the four large engines.**