

Name _____



LONE STAR
FLIGHT MUSEUM
HOUSTON, TEXAS

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.

Vocabulary

Acceleration- increase in the rate or speed of something.

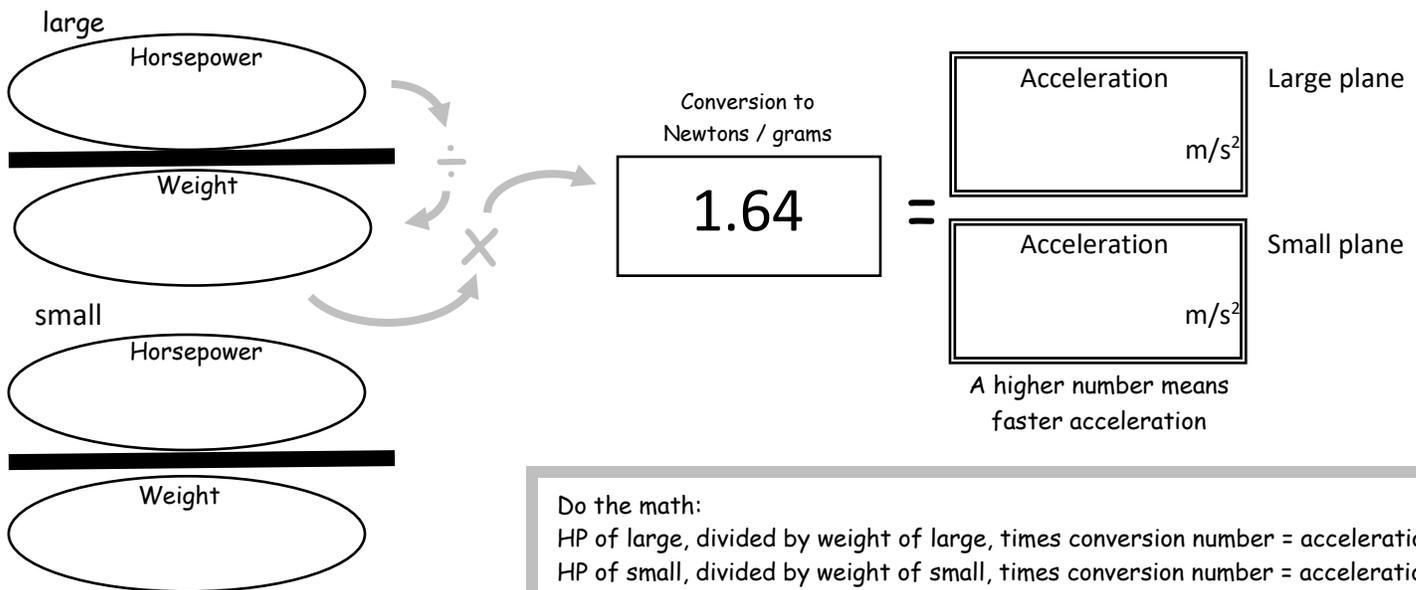
Horsepower – a measurement of mechanical force.

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 _____



Do the math:

HP of large, divided by weight of large, times conversion number = acceleration.
HP of small, divided by weight of small, times conversion number = acceleration.

Reasoning

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

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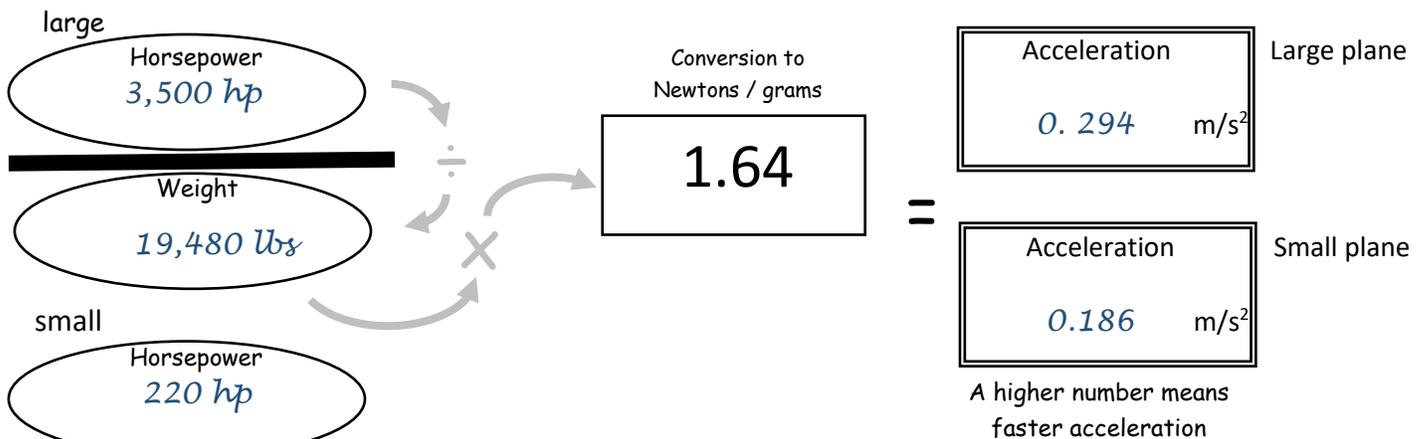
Horsepower – a measurement of mechanical power

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-25 Mitchell Name of small plane Stearman PT-17



Do the math:

HP of large, divided by weight of large, times conversion number = acceleration.

HP of small, divided by weight of small, times conversion number = acceleration.

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 (0.294 m/s² is greater than 0.186 m/s²). Even though it has more mass than the smaller plane, it also has greater force because of the two large engines. A misconception is that big means heavy, and it is easy to forget about the increase in force from the two engines.

Discussion Questions

Who thought the smaller plane would have greater acceleration? What made you think that?

Who thought the larger plane would have greater acceleration? What made you think that?

Using the formula **Force = mass x acceleration**, what are the two way to increase the acceleration?

Increase force or decrease mass

The larger plane has increased force and increased mass compared to the smaller plane. How did this result in a faster acceleration?