

Gravity on Earth

Name: _____

Sir Isaac
Newton



In 1687, Sir Isaac Newton published a revolutionary theory that explained what gravity is and how it works. Newton explained that the earth pulls all objects to the center and that every object must have gravity. Every object pulls on every other object. This is known as universal gravitation.

What does that mean to you and me? Well, the earth is so massive that it pulls our weight downward and keeps us from floating. But the farther away we get from the earth, the less pull it has on us, and the more likely we are to float away!

See if you can solve these problems to see how helicopters and other flying objects escape the earth's powerful pull:

- If a helicopter has a mass of 16,000 kg, how much lifting force is needed to get off the ground?

- Once the helicopter is off the ground, how much thrust force is needed to move horizontally against a 10km/hr wind? _____
- On chart/graphing paper, place an *X* near the center of your sheet. This is your starting point. Then, draw a compass rose in the top right corner to indicate north, south, east, and west. Let each square represent 5 km of distance. Starting from the *X*, chart the following path of the helicopter:
 - Travel north 75 km in 2 hrs.
 - From point A, travel west 50 km in 1 hr.
 - From point B, travel south 100 km in 1.5 hrs.
 - From point C, travel east 75 km in 2 hrs.
 - From point D, travel south 50 km in 1 hr.
- Calculate the average velocity, using the formula **Velocity = Distance/Time**, of each leg of the flight. A. _____ B. _____ C. _____ D. _____ E. _____
- What is the total distance traveled by the helicopter? _____
- What was the total time traveled by the helicopter? _____



Flying Tactics

Did you know there are three things helicopters can do that airplanes cannot? Helicopters can fly backward, rotate in the air, and hover motionless.

Visit www.science.howstuffworks.com/helicopter.htm
for more information and video clips of how helicopters fly.