

Physics
Homework Set 6
Newton's Universal Law of Gravitation

Quantitative Problems
(Given, Find, Solution REQUIRED)

1. The mass of an Airbus 380 (with a full tank of gas) is 361,000 [kg].
 - a. What is the weight of the Airbus using the "normal" $W = mg$ equation when it is on the ground?
 - b. Using $W = mg$, what is the weight of the Airbus when it is at cruising altitude of 35,000 [ft] above the surface of the earth?
 - c. Using Newton's Universal Law of Gravitation equation, what is the weight of the Airbus when it is on the ground?
 - d. Using Newton's Universal Law of Gravitation equation, what is the weight of the Airbus when it is at cruising altitude of 35,000 [ft] above the surface of the earth? (Make sure to convert [ft] to [m]).

The mass of the earth is 5.972×10^{24} [kg]

The radius of the earth is 6.371×10^6 [m]

The Universal Gravitational Constant "G" = 6.67×10^{-11} [Nm²/kg²]

Qualitative Problems

Short answers (in a complete sentence) or a fully labeled graph
(Given, Find, Solution NOT required)

2. Draw the FBD for a helicopter that is hovering above the ground.
3. Draw the FBD for a helicopter that is accelerating forward.
4. Draw the FBD for a helicopter that is decelerating.
5. Think of a mode of transportation (other than a car) where a centripetal is necessary for the motion of the vehicle.
 - a. Briefly describe how the centripetal force affects the motion of the vehicle.
 - b. Draw an FBD of the vehicle when the centripetal force is acting. Be sure to label where the "center of curve" is.

HW Set 6 Answers

- 1a. 3,537,000 [N]
- 1b. 3,537,000 [N]
- 1c. 3,542,726.49 [N]
- 1d. 3,530,891.90 [N]

2-4. Will discuss in class