Gravitational Forces on the Earth's Surface Questions

1. The average mass of a basketball is 0.63 kg. What is the force of gravity acting on the ball?

2. The force of gravity on a 251 kg spacecraft on the Moon's surface is 408 N [downward].
   a. What is the gravitational field strength there?
   b. What is the acceleration of a free-falling object on the surface of the Moon?

3. To summarize the differences between mass and weight, set up and complete a table using these titles.

	Definition	Symbol	SI Unit	Method of Measuring	Variation with Location
Mass					
Weight					

4. Calculate the weight of a 54 kg robot on the surface of Venus where the gravitational field strength is 8.9 N/kg [downward].

5. (a) What is your mass in kg?
   (b) Calculate your own weight at sea level at
   (i) the equator
   (ii) the North Pole

6. A vegetable vendor sets up a stall in an elevator of a tall building. The vendor uses a spring scale to measure the weight of vegetables in Newtons.
   a. Under what conditions of changing velocity would it be advantageous for you to buy from the vendor? What about for the vendor to sell to you?
   b. Under what conditions would neither of you have an advantage?

7. If you wanted to reduce the number of forces acting on your body to a minimum, what would you have to do?

8. Why is the gravitational field strength halfway up Mount Everest the same as at sea level at the equator?

9. Suppose you wanted to make some money by purchasing precious materials such as gold at one altitude and selling them for the same price in dollars per Newton at another altitude. Describe the conditions that would favor your "buy high sell low" strategy.

10. What is the weight of each of the following masses at Earth's surface?
    a. 25 g b. 102 kg c. 12 mg

11. Copy the table to the right into your notebook and complete it for a 57 kg instrument on each planet.

Planet	$\vec{F}_g$ (N[downward])	$\vec{g}$ (N/kg[downward])
(a) Mercury	188	?
(b) Venus	462	?
(c) Jupiter	?	26

12. An astronaut with mass 75 kg travels to Mars. What is his weight
    a. on Earth?
    b. What is his weight on Mars where $\vec{g}$ = 3.8 m/s^2?
    c. What is the value of $\vec{g}$ on top of a mountain if the astronaut weighs 683 N?

13. A 95.0 kg boxer has his first match in the Canal Zone (g = 9.782 m/s^2) and his second match at the North Pole (g = 9.832 m/s^2)
    a. What is his mass in the Canal Zone?
    b. What is his weight in the Canal Zone?
    c. What is his mass at the North Pole?
    d. What is his weight at the North Pole?
    e. Does he "weigh-in" or does he really "mass-in"?