

Phys 117 HW#4 Problems

Ch 5: Q: 24, 29, 39; E: 10, 18, 21;
Ch 6: Q: 6, 11; E: 4, 9.

24. Why do we use the form $W = mg$ for the gravitational force on an object near Earth, but the form $F = Gm_1m_2/r^2$ when the object is far from Earth?
29. Would you expect the value of g to be larger or smaller than normal over a large deposit of uranium ore? Why?
39. When the tide is high along the American western seaboard, is the tide in Japan nearer high tide or low tide? Japan is approximately 90 degrees west of San Francisco.
10. How does Earth's gravitational force on you differ when you are standing on Earth and when you are riding in a space shuttle 400 km above Earth's surface? (Earth's radius is 6400 km.)
18. Mars has a radius of about 0.53 Earth radii and a mass of only 0.11 Earth masses. Estimate the acceleration due to gravity on Mars.
21. The radius of Venus's orbit is 0.72 times that of Earth's orbit. How much stronger is the Sun's gravitational field at Venus than at Earth?
6. How does padding dashboards in automobiles make them safer? Explain your answer in terms of impulse and momentum.
11. A 2-kilogram sack of flour falls off the counter and lands on the floor. Just before hitting the floor, the sack has a speed of 4 meters per second. What impulse (magnitude and direction) does the floor exert on the sack?
4. You have a mass of 60 kg. How fast (in mph) would you have to run to have the same momentum as an 18-wheeler ($m = 24,000$ kg) rolling along at 1 mph?
9. A 1500-kg car has a speed of 30 m/s. If it takes 8 s to stop the car, what is the impulse and the average force acting on the car?