

Gravitational Forces on the Earth's Surface

Questions (Extra Practice)

1. Show that a N/kg is equivalent to m/s^2 .
2. The force of gravity on the heaviest person in history is about 6.2 kN [downward]. Determine the mass of this record-holder in kilograms.
3. Assume you are in a space colony on Mars, where the gravitational field strength is 3.7 N/kg [downward]. What is the force of gravity on you?
4. (a) What is the weight of a 19 kg curling stone?
(b) What force is required to raise the curling stone without acceleration?
5. (a) Calculate Earth's force of gravity on each of two steel balls of masses 6.0 kg and 12.0 kg.
(b) If the force of gravity on the 12 kg ball is greater than that on the other ball, why do the two balls accelerate at the same rate when dropped?
6. In a videotape of the Apollo astronauts on the Moon, it seems that the astronauts are moving about in slow motion. Explain why this is the case.
7. Why is the gravitational field strength at the South Pole less than that at the North Pole? (Hint: Look at the globe to see which pole is at sea level and which is on a thick ice shelf.)
8. What is the force of gravity at Earth's surface on each of the following masses?
a. 75.0 kg b. 454 g c. 2.00 t
9. Use these magnitudes of the forces of gravity at Earth's surface to determine the masses of the objects on which they act.
a. 0.98 N b. 62 N c. 44.5 MN
10. A 20 N stone rests on a table. What is the force the table exerts on the stone? In what direction?
11. A weight lifter lifts a 115 kg barbell from the ground
a. How does the force exerted by the lifter compare with the weight of the barbell? Explain.
b. How does the force exerted by the lifter on the barbell compare with the force exerted by the barbell on the lifter?
12. You place a 7.50 kg television set on a spring scale. If the scale reads 78.4 N, what is the acceleration of gravity at that location?