

54. A force is applied to a door at an angle of 60.0° and 0.35 m from the hinge. The force exerts a torque with a magnitude of $2.0 \text{ N}\cdot\text{m}$. What is the magnitude of the force? How large is the maximum torque this force can exert?
55. Imagine a balance with unequal arms. An earring placed in the left basket was balanced by 5.00 g of standard masses on the right. When placed in the right basket, the same earring required 15.00 g on the left to balance. Which was the longer arm? Do you need to know the exact length of each arm to determine the mass of the earring? Explain.

Alternative Assessment

1. Research the historical development of the concept of gravitational force. Find out how scientists' ideas about gravity have changed over time. Identify the contributions of different scientists, such as Galileo, Kepler, Newton, and Einstein. How did each scientist's work build on the work of earlier scientists? Analyze, review, and critique the different scientific explanations of gravity. Focus on each scientist's hypotheses and theories. What are their strengths? What are their weaknesses? What do scientists think about gravity now? Use scientific evidence and other information to support your answers. Write a report or prepare an oral presentation to share your conclusions.
2. In the reduced gravity of space, called *microgravity*, astronauts lose bone and muscle mass, even after a short time. These effects happen more gradually on Earth as people age. Scientists are studying this phenomenon so that they can find ways to counteract it, in space and on Earth. Such studies are essential for future plans that involve astronauts spending significant time on space stations, or for distant missions such as a trip to Mars. Research the causes of this phenomenon and possible methods of prevention, including NASA's current efforts to minimize bone density loss for astronauts on the International Space Station. Create a poster or brochure displaying the results of your research.
3. Research the life and scientific contributions of one of the astronomers discussed in the chapter: Claudius Ptolemy, Nicolaus Copernicus, Tycho Brahe, or Johannes Kepler. On a posterboard, create a visual timeline that summarizes key events in the astronomer's life and work, including astronomical discoveries and other scientific advances or inventions. Add images to some of the events on the timeline. You may also want to include historical events on the timeline to provide context for the scientific works.
4. Describe exactly which measurements you would need to make in order to identify the torques at work during a ride on a specific bicycle. Your plans should include measurements you can make with equipment available to you. If others in the class analyzed different bicycle models, compare the models for efficiency and mechanical advantage.
5. Prepare a poster or a series of models of simple machines, explaining their use and how they work. Include a schematic diagram next to each sample or picture to identify the fulcrum, lever arm, and resistance. Add your own examples to the following list: nail clipper, wheelbarrow, can opener, nutcracker, electric drill, screwdriver, tweezers, and key in lock.