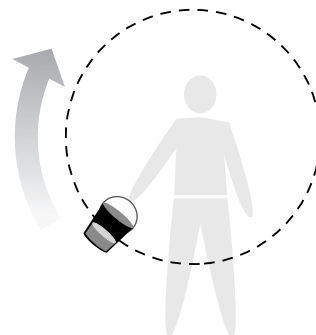


9. If each force is 6.0 N, the angle between \mathbf{F}_1 and \mathbf{F}_2 is 60.0° , and the radius of the wheel is 1.0 m, what is the resultant torque on the wheel?
- $-18 \text{ N}\cdot\text{m}$
 - $-9.0 \text{ N}\cdot\text{m}$
 - $9.0 \text{ N}\cdot\text{m}$
 - $18 \text{ N}\cdot\text{m}$
10. A force of 75 N is applied to a lever. This force lifts a load weighing 225 N. What is the mechanical advantage of the lever?
- $\frac{1}{3}$
 - 3
 - 150
 - 300
11. A pulley system has an efficiency of 87.5 percent. How much work must you do to lift a desk weighing 1320 N to a height of 1.50 m?
- 1510 J
 - 1730 J
 - 1980 J
 - 2260 J
12. Which of the following statements is correct?
- Mass and weight both vary with location.
 - Mass varies with location, but weight does not.
 - Weight varies with location, but mass does not.
 - Neither mass nor weight varies with location.
13. Which astronomer discovered that planets travel in elliptical rather than circular orbits?
- Johannes Kepler
 - Nicolaus Copernicus
 - Tycho Brahe
 - Claudius Ptolemy

SHORT RESPONSE

14. Explain how it is possible for all the water to remain in a pail that is whirled in a vertical path, as shown below.



15. Explain why approximately two high tides take place every day at a given location on Earth.
16. If you used a machine to increase the output force, what factor would have to be sacrificed? Give an example.

EXTENDED RESPONSE

17. Mars orbits the sun ($m = 1.99 \times 10^{30} \text{ kg}$) at a mean distance of $2.28 \times 10^{11} \text{ m}$. Calculate the length of the Martian year in Earth days. Show all of your work. ($G = 6.673 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$)

Test TIP

If you are solving a quantitative problem, start by writing down the relevant equation(s). Solve the equation(s) to find the variable you need for the answer, and then substitute the given data.