

## Chapter 2 Test Mechanical Equilibrium

## True or False Questions

Circle the correct answer.

- T**     **F**     1. The net force on an object is the combination of all forces that act on it.
- T**     **F**     2. An object can be in equilibrium whether it is at rest or moving steadily at constant speed in a straight line.
- T**     **F**     3. A scalar quantity has both magnitude and direction, whereas a vector quantity is described by only its direction.
- T**     **F**     4. An airplane in an acrobatic loop-the-loop maneuver is in dynamic equilibrium if the speed is constant.
- T**     **F**     5. Nellie Newton can hang suspended from the middle of two ends of a rope in such a way that the tension in the rope can greatly exceed her weight.

## Multiple Choice Questions

Choose the best answer to each question and write the appropriate letter in the space provided.

- \_\_\_\_\_ 6. Suzie holds an apple at rest in her outstretched hand. The force she applies in holding it still
- equals the weight of the apple.
  - is slightly more than the weight of the apple.
  - is slightly less than the weight of the apple.
  - is zero, until she drops the apple.
- \_\_\_\_\_ 7. A pair of parallel forces of 8 N and 12 N can have a resultant of
- 4 N.
  - 20 N.
  - either (a) or (b).
  - neither (a) or (b).
- \_\_\_\_\_ 8. The number of forces that act on a bag of sugar suspended by a weighing scale are
- one.
  - two.
  - three.
  - none because they cancel to zero.
- \_\_\_\_\_ 9. The equilibrium rule,  $\Sigma F = 0$ , applies to
- objects or systems at rest.
  - objects or systems in uniform motion in a straight line.
  - both (a) and (b).
  - neither (a) or (b).
- \_\_\_\_\_ 10. The equilibrium rule,  $\Sigma F = 0$ , applies to
- vector quantities.
  - scalar quantities.
  - both (a) and (b).
  - neither (a) or (b).

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- \_\_\_\_\_ 11. When you press a coiled spring downward, the spring presses upward on your hand with
- a smaller amount of force.
  - the same amount of force.
  - a greater amount of force.
  - It can't be determined from the information given.
- \_\_\_\_\_ 12. When you stand on two bathroom scales, one foot on each scale with weight evenly distributed, each scale will read
- your weight.
  - half your weight.
  - zero.
  - actually more than your weight.
- \_\_\_\_\_ 13. When Nellie Newton hangs by a pair of vertical ropes, the tension in each rope will be
- less than half her weight.
  - half her weight.
  - more than half her weight.
  - equal to her weight.

**Math Problems**

*Solve the following problems in the space provided. Show all your work.*

14. Consider a pair of parallel vectors, one of 5 N and the other of 12 N, both acting on the same object. Show that the net force on the object can be either 8 N or 17 N.
15. Burl and Paul have combined weights of 1300 N. The tensions in the supporting ropes that support the scaffold they stand on adds to 1700 N. Solve for the weight of the scaffold itself.

**Essay Question**

*On a separate sheet of paper, answer the following question.*

16. When Burl and Paul stand on the scaffold, explain why the sum of the tensions in the supporting ropes must equal the weights of Burl and Paul, plus anything else on the scaffold.