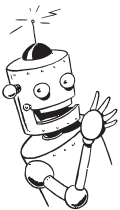


Chapter 5 Newton's First Law of Motion

Equilibrium**Pre-Test - Post-Test**

1. Suzie holds an apple at rest in her outstretched hand. The force she applies in holding it still
 - A) equals the weight of the apple.
 - B) is slightly more than the weight of the apple.
 - C) is slightly less than the weight of the apple.
 - D) is zero, until she drops the apple.
2. The number of forces that act on a bag of sugar suspended by a weighing scale are
 - A) one.
 - B) two.
 - C) three.
 - D) none because they cancel to zero.
3. When Nellie Newton hangs by a pair of vertical ropes, the tension in each rope will be
 - a. less than half her weight.
 - b. half her weight
 - c. more than half her weight.
 - d. equal to her weight.
4. When you stand on two bathroom scales, one foot on each scale with weight evenly distributed, each scale will read
 - A) your weight.
 - B) half your weight.
 - C) zero.
 - D) actually more than your weight.
5. The equilibrium rule, $\Sigma F = 0$, applies to
 - A) objects or systems at rest.
 - B) objects or systems in uniform motion in a straight line.
 - C) both (a) and (b).
 - D) neither (a) or (b).
6. When you press a coiled spring downward, the spring presses upward on your hand with
 - A) a smaller amount of force.
 - B) the same amount of force.
 - C) a greater amount of force.
 - D) It can't be determined from the information given.



Chapter 5 Newton's First Law of Motion

Equilibrium

5.05 Zero Net Force

1. Describe a force.
2. Describe a net force.
3. Objects in equilibrium (not accelerating) must have a net force of zero. Express this statement mathematically.
4. Does a book sitting motionless have any forces acting on it? Draw all force.
5. How much tension is in a rope that holds up a 20-N bag of apples at rest?
9. If you weigh 150 pounds and distribute your weight equally between two bathroom scales, how much will each scale read?
10. What happens when you stand with more of your weight on one foot than the other?
11. For an object at rest on a horizontal surface, what is the support force equal to?
12. What is the net force on an apple that weighs 1 N when you hold it at rest above your head?
13. What is the net force on it when you release the apple?

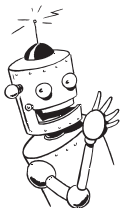
5.05 Support Force

6. What is a normal force?
7. If I placed an ant under the book, does the book squish the ant or the table?
8. You step on a bathroom scale does the scale read your weight or the supporting force?

5.05 Equilibrium for Moving Objects

14. Can an object be moving and still be in equilibrium (no net force)? Defend your answer.
15. Distinguish between static equilibrium and dynamic equilibrium.
16. When your car moves along the highway at constant velocity, the net force on it is zero. Why, then, do you continue running your engine?

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Chapter 5 Newton's First Law of Motion

17. If a constant force of 75 N is required to push a crate across the floor at constant speed what is the magnitude of the force of friction?

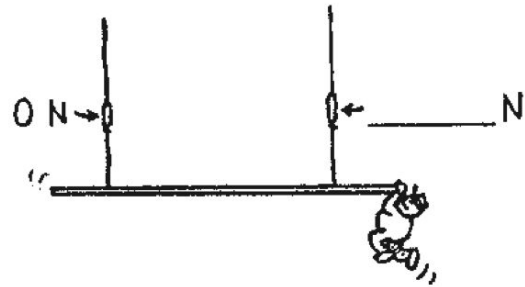
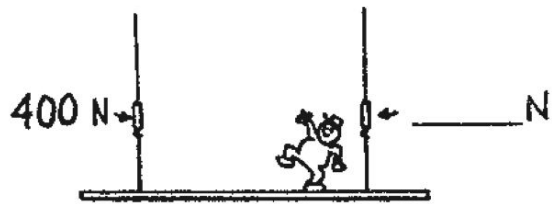
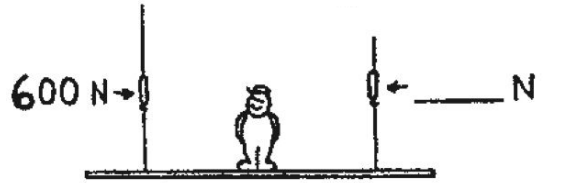
18. Draw a picture of the above question and label all the forces

19. If an object has no acceleration, can you conclude that no forces are exerted on it? Explain.

21. When you do pull-ups and you hang at rest, how much of your weight is supported by each arm?

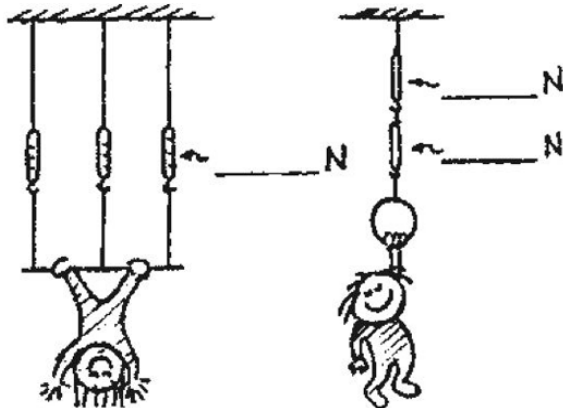
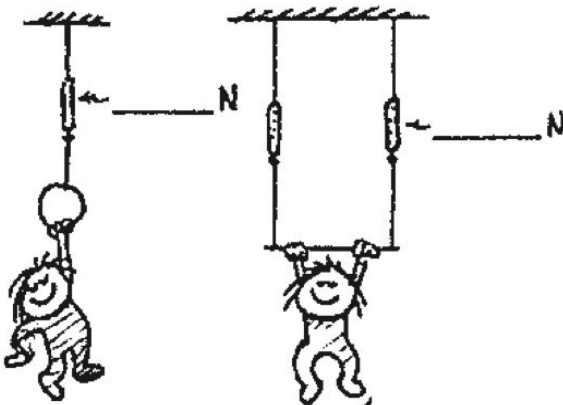
5.05 Window Washing

22. Find the tension in each of the ropes in the following images.

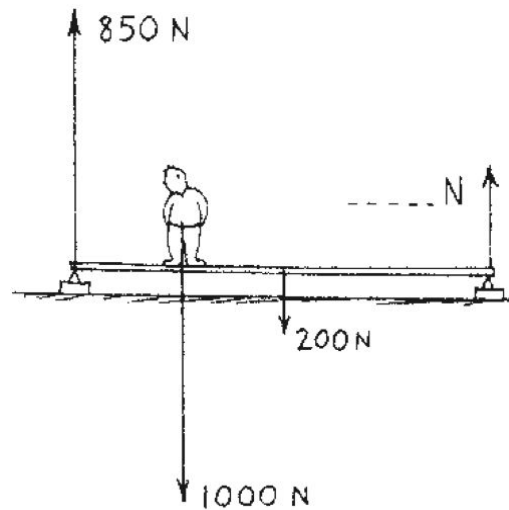


5.05 Hanging

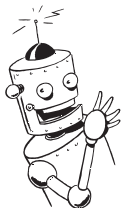
20. Nellie hangs at rest as shown. What is the tension in each rope?



23. Fill in the correct weight reading on the scale.

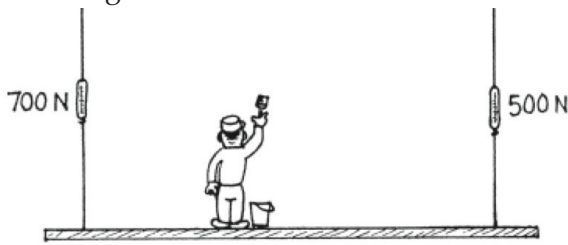


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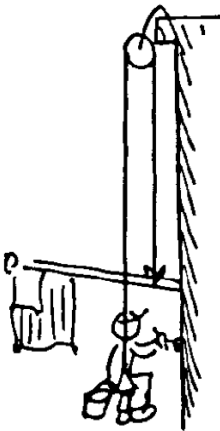
Chapter 5 Newton's First Law of Motion

24. Tim's weight is 600-N, and he carries a 100-N bucket of water. What is the weight of the scaffold?



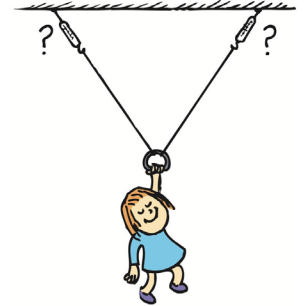
25. Tim is washing windows from his bosun's chair. Tim's weight is 600 N and the rope, unknown to Tim, has a breaking point of 350 N. Does the rope break when Tim is supported as shown? Explain

26. One day Tim is washing near a flagpole, and, for a change, he ties the free end of the rope to the flagpole instead of to his chair as shown to the right. Does the rope break when he is supported as shown below? Explain?

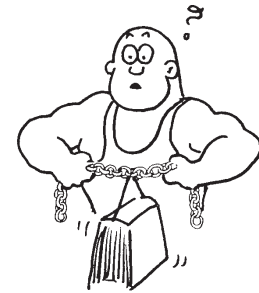


5.05 Hanging at Angles

27. What happens to the tension in a rope as the angle increases?



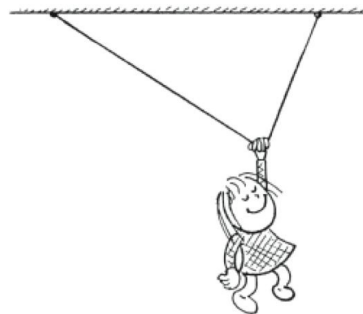
28. Can the strong man ever pull hard enough to make the chain perfectly straight? Explain



29. Can you ever tighten a tennis net so tight that it does not sag? Explain

5.05 Brain Challenge

30. Nellie hangs by one hand from a clothesline as shown - which is on the verge of breaking. Which side of the line is most likely to break?



- a. the left side.
- b. the right side.
- c. 50/50 chance of either side breaking.

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