

CHAPTER 9

ASSESSMENT CATEGORIES



Application



Communication



Knowledge and Understanding



Thinking



Technology and Sport

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1

AREAS OF TECHNOLOGICAL ADVANCEMENT (Textbook pages 200–208)



1 Key Terms and Definitions



Define the key terms below in your own words.

Key term	Definition
aerodynamics	
air (wind) resistance	
boundary layer	
carbon fiber	
catastrophic failure	
drag	
lift	
load	
profile drag	
streamlining	



surface drag	
technology	



What a Drag!



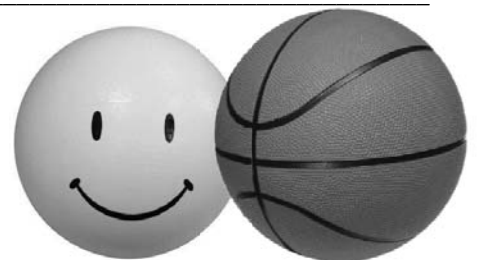
True or false? Justify your answer.

1. Two objects thrown at the same speed and trajectory will travel the same distance regardless of drag.

2. When throwing a javelin, a balance needs to be found between drag and lift.

3. If a paddle boat in the water was racing against a pedal go kart on land, the go kart would win.

4. A playground ball has lower friction drag than a basketball.





3 Equipment Fail

You're down 3-2 with a minute to go in the hockey game. Your center steals the puck from the opposing defenseman, and the two of you rush down the ice on a breakaway. You wind up to take a slapshot as your center threads a perfect cross-ice pass your way. But as you take the shot, your carbon fiber stick unexpectedly breaks in two. The scoring opportunity is lost, and your team loses the game. What just happened?

4 If the Shoe Fits . . .

Wear it, right? Not so fast. Many biomechanists don't support the trend of air pumps and gel cushioning. So why are shoe manufacturers constantly designing running shoes with more and more "fancy features"?

Do a survey of the students in your class (don't forget yourself!) to determine how many of you have bought into the hype surrounding running shoes. Were these purchases made for fashion or for (supposed) function? Will you think twice about what kind of running shoes you buy after reading this chapter?





2

CHECK YOUR UNDERSTANDING

**Multiple Choice**

1. In this text, the term technology describes any tangible, conceptual, or procedural element of modern sport and exercise science aimed at:

- A) success
- B) excellence
- C) progress
- D) research
- E) all of the above

Answer: _____

2. Which of the following statements regarding drag is **false**:

- A) As drag increases, more power or energy is required to travel at a given speed.
- B) Changing an object's shape can reduce drag.
- C) Objects moving through air or water are subject to drag.
- D) Water drag is not obvious at low speeds.
- E) None of the above.

Answer: _____

3. Which of the following statements regarding drag is **true**:

- A) In sports with a higher speed of movement, air resistance plays a minimal role.
- B) Altering body position affects speed significantly because the body produces much of the profile drag.
- C) A recumbent bicycle is not as efficient as a traditional model.
- D) Often a more aerodynamic position (e.g., more bent over) affects the joint angles at the hips, resulting in increased power output from the muscles.
- E) None of the above statements is true.

Answer: _____

4. Technological advancements in sports equipment have resulted in equipment that is ultimately:

- A) lighter
- B) stronger
- C) cheaper
- D) all of the above
- E) two of the above

Answer: _____

5. Which of the following statements about speedskating is **false**:

- A) The clap skate has revolutionized the sport.

B) Speedskaters use rockered skates (i.e., the blade is straight).

C) Speedskating blades have been fixed in design since the late 1800s.

D) The top speedskaters in the world now limit plantar flexion at the ankle joint.

E) Two of the above statements are false.

Answer: _____

**Fill in the Blanks**

Fill in the blanks for the following statements using words from the **word bank** below. Place the corresponding letter from the word bank in the blank spaces provided.

1. An object's shape can be changed to decrease the amount of profile drag, a process known as _____.
2. Javelins need to produce _____ to stay aloft longer and therefore increase the distance of the throw.
3. A single layer of air or water molecules, known as a _____ layer, reduces drag.
4. Most equipment breakages occur because of _____.
5. If less energy is required to generate the same force or amount of movement, the movement is said to be more _____.

Word Bank

- | | | |
|--------------|-------------|-----------------|
| a. boundary | e. fatigue | i. resistance |
| b. bubble | f. fluid | j. stiffness |
| c. drag | g. lift | k. streamlining |
| d. efficient | h. membrane | l. texture |

**True or False**

Indicate whether each statement is **true (T)** or **false (F)**. If the statement is false, provide the correct answer.

1. Aerodynamics is the study of objects moving relative to a fluid, such as air.

Answer: _____



2. Air resistance can be reduced in two ways: reducing surface drag and decreasing frontal surface area.

Answer: _____

3. Speedo has designed new bathing suits that cover much more of a swimmer's skin and have varied textures.

Answer: _____

4. Changes in computer technology are driven by the need to improve human performance in sport and other physical activities.

Answer: _____

5. Sliding rigger boats were approved by FISA, the international rowing federation.

Answer: _____



Think and Link



1. It's a perfect day to hit the slopes, so Jay and Sasha head for the mountains. Jay is pretty comfortable on skis, but Sasha always beats him to the bottom of the hill. Determined, Jay adjusts the fuzzy hat he always wears over his helmet (he thinks it looks cool), unzips his bulky jacket because he's a little warm, and starts out on another run, Sasha at his side. As the two friends race down the hill, Jay thinks to himself how much better he looks on the slopes than Sasha, who is always crouched over.

Explain what Jay is doing wrong and why his mistakes are slowing him down. What changes can he make to increase his speed?

2. Research the progression of world records in men's and women's speedskating events (concentrate on the shorter disciplines: the 500 meters, 1,000 meters, and 1,500 meters). By analyzing the times, see if you can determine the point where each record was broken by an athlete wearing clap skates. Do you think this technology has made a significant difference in the progression of world records in this sport? Justify your answer. Thinking of what you learned in this chapter, give another reason why athletes are skating faster than ever before.



