

# Speech and Voice Science Workbook

FOURTH EDITION

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Typeset in 12/14 Garamond by Flanagan's Publishing Services, Inc.  
Printed in the United States of America by Integrated Books International

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ISBN-13: 978-1-63550-193-3  
ISBN-10: 1-63550-193-8

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# About This Workbook

Welcome to the *Speech and Voice Science Workbook, Fourth Edition*! Our intention in creation of this workbook is to offer you a tool for learning. The contents can be used for review, self-study and exam preparation, to highlight areas of confusion, to learn concepts, to connect ideas, and to spark new questions and thoughtful discussions. We believe that all faculty who teach this course, from novice instructors to well-established speech scientists, will find at least some portion of this workbook to be an asset to teaching and learning. We hope that students will feel the same.

This workbook is divided into chapters that correspond to the chapters in the textbook *Speech and Voice Science, Fourth Edition*. Within each chapter, you will find four sections: *Foundational Knowledge* questions, *Conceptual Integration* questions, TRY IT! activities, and *Clinical Application* questions. (Exceptions are Chapter 1, which contains only TRY IT! activities, and Chapters 2 and 3, which contain no clinical questions.)

The *Foundational Knowledge* questions in each chapter are organized by major section and reference the first page of their respective sections in the textbook. Therefore, the questions in this section follow the order of the material presented in the chapters. These questions are in the format of multiple choice, true/false, matching, figure identification, and complete the statement/fill-in-the-blank. The purpose of these questions is to allow students to assess their basic knowledge of factual information obtained from their reading and to highlight information that they need to review.

The *Conceptual Integration* questions demand that the student pull together diverse information and interrelate that information into a coherent structure. It asks the student to delve deeper into the material and demands understanding rather than memorization. Thus, the questions in this section do not follow a specific order within the chapter or relate to a single page number in the textbook. Furthermore, some of these questions address similar information to that found in the *Foundational Knowledge* section, but with greater complexity. The questions in this section are presented in a variety of formats, including many questions that require a few sentences or short paragraph in response.

The TRY IT! activities are fun (we hope), short activities that students can use to explore concepts presented in the chapter. These activities can be assigned as homework or they can be in-class activities that students can work through in pairs or small groups or online within virtual break-out rooms. We believe that, through this opportunity of experiential learning, new insights will be attained, and new questions will arise that could spark good classroom discussions or online discussion board topics.

The *Clinical Application* questions are designed to help guide students in the usefulness of speech and voice science. Hopefully, these questions will help to answer the common student query, “Why do I have to take this course?” Some of the questions are taken directly from the Clinical Case questions in the textbook. (Answers are not

provided in the textbook, but they are provided here in this workbook.) Other questions in this section address clinically relevant topics that were not part of the textbook clinical cases.

The first half of this workbook contains all of the questions. The second half of the book contains the answers. We separated the answers from the questions to encourage students to try (and perhaps to struggle) to answer the questions before looking at the answers. Quickly checking the answers defeats the purpose of learning. Strongly encourage your students to resist the temptation to glance at the answers too quickly.

Unlike many workbooks in speech-language pathology and audiology, we did not include blank lines for students to write their answers. It takes up much space and it can prevent students from returning and trying a second (or third) time to answer questions. We encourage students to answer questions on their computer or with old-fashioned paper and pencil.

Some of the questions have accompanying illustrations, particularly the *Conceptual Integration* questions. A few of the illustrations come directly from the textbook with labels removed. Most of the illustrations, however, were created specifically for this workbook to give students a new look at concepts.

You will find that topics of particular importance, or topics that often confuse students, are addressed in multiple questions within the *Foundational Knowledge* and *Clinical Integration* sections. We have found, and we're sure you have as well, that students can be misled into thinking they understand a concept because they can answer a single question on the topic. However, a rephrasing of the questions, or addressing the concept from a different approach, reveals fundamental confusion.

We hope that you find this workbook a useful teaching and learning tool. Please let us know your thoughts—what you like, what you don't, and suggestions for additions and changes.

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# 2

## Describing and Explaining Motion Questions

### Foundational Knowledge

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#### 2.1 Systems of Measurement (p. 12)

1. In the “MKS” system of measurement, “M,” “K,” and “S” stand for
  - A. Meters, Kilograms, Seconds
  - B. Miles, Kilometers, Seconds
  - C. Meters, Kilometers, Sound
  - D. Miles, Kings’ Foot, Sound
2. Which of the following are used in the English system of measurement?
  - A. Meter
  - B. Gram
  - C. Quart
  - D. Liter

3. The liter is a measurement of
  - A. Volume
  - B. Time
  - C. Length
  - D. Sound intensity
  
4. Which of the following is the International System of measurement?
  - A. The standard system
  - B. The metric system
  - C. The English system
  - D. The foot, yard, minute system
  
5. The MKS system of measurement is also known as the \_\_\_\_\_ system.
  
6. There are \_\_\_\_\_ centimeters in a meter.

**2.2 Describing Motion: Speed, Velocity, Acceleration, and Deceleration (p. 13)**

7. “Uniform motion” occurs when a moving object’s
  - A. Position is unchanging.
  - B. Speed is constantly increasing.
  - C. Speed is unchanging.
  - D. Speed changes randomly.
  
8. If an object’s speed is increasing over time, that object is undergoing
  - A. Uniform motion
  - B. Deceleration
  - C. Constant velocity
  - D. Acceleration
  
9. Velocity may be defined as
  - A. An object’s speed and direction of movement
  - B. An object’s total distance moved
  - C. An object’s maximum acceleration
  - D. The force applied to an object



10. "Speed" defines the relationship between an object's changing distance over \_\_\_\_\_.
11. "Speech rate" can be described as the speed of \_\_\_\_\_.
12. True/False "Velocity" and "Speed" are synonymous terms.

### 2.3 Newton's Laws Explain Motion (p. 14)

13. The physical law stating that an object at rest will remain at rest unless acted on by an external force is known as
  - A. Newton's first law of motion
  - B. Newton's second law of motion
  - C. Newton's third law of motion
  - D. Gravity
14. In the equation of Newton's second law of motion,  $F = m \cdot a$ 
  - A. "m" stands for mass and "a" stands for angle.
  - B. "m" stands for mass and "a" stands for acceleration.
  - C. "m" stands for movement and "a" stands for acceleration.
  - D. "m" stands for movement and "a" stands for angle.
15. "Force" can be described as
  - A. An object's weight
  - B. The change in direction of movement of an object
  - C. An object's inertia
  - D. A "pull" or "push" on an object
16. Newton's first law of motion suggests that the only way for an object to accelerate or decelerate is by application of
  - A. Gravity
  - B. An outside (unbalanced) force
  - C. Uniform motion
  - D. Balanced forces

17. Newton's third law of motion states that for every action (force), there is an equal and opposite
- A. Mass
  - B. Inertia
  - C. Reaction (force)
  - D. Motion
18. The unit of "force" is named after
- A. Sir Alec Guinness
  - B. Heinrich Hertz
  - C. Sir Isaac Newton
  - D. James Watt
19. Newton's first law is often called the law of \_\_\_\_\_.
20. The tendency of an object to resist change in its motion is called \_\_\_\_\_.
21. The amount of matter that an object contains is known as its \_\_\_\_\_.

#### **2.4 Momentum and Energy (p. 15)**

22. Momentum is defined as an object's mass multiplied by its \_\_\_\_\_.
- A. Inertia
  - B. Velocity
  - C. Size
  - D. Distance from where it started to move
23. The ability to do work is termed
- A. Force
  - B. Speed
  - C. Momentum
  - D. Energy
24. Work is defined as force exerted over
- A. Distance (when an object is moved or displaced)
  - B. Time
  - C. Energy
  - D. Mass

25. The amount of work completed over time is termed
- A. Inertia
  - B. Momentum
  - C. Power
  - D. Speed
26. The unit for power is
- A. Distance/second
  - B. Joules
  - C. Newtons
  - D. Watts
27. The formula for work is
- A. Force / Energy
  - B. Energy \* Time
  - C. Power / Energy
  - D. Force \* Displacement
28. Power is the relationship between
- A. Energy and distance
  - B. Force and distance
  - C. Work and time
  - D. Displacement and velocity
29. The law of conservation of energy states that
- A. An object's potential energy always equals its kinetic energy at any time.
  - B. An object's kinetic and potential energy can be exchanged, but the total energy (kinetic and potential) will remain the same.
  - C. Potential energy is the same as momentum.
  - D. The amount of work done equals the momentum of the object.
30. The type of energy that is "stored" and can be used in the future is known as \_\_\_\_\_ energy.
31. True/False Momentum is another term for "inertia."

**2.5 Three States of Matter** (p. 18)

32. The way that the molecules are arranged within a substance is related to the
- A. Amount of mass of an object
  - B. Three states of matter (solid, liquid, gas)
  - C. Amount of inertia of an object
  - D. Amount of potential energy within that object
33. Which state of matter contains the lowest level of kinetic energy of its molecules?
- A. Solid
  - B. Liquid
  - C. Gas
  - D. All are the same
34. Surface tension of a liquid is generated because
- A. The molecules are of greater mass at the surface of the liquid.
  - B. The liquid molecules do not exert an attraction force to the molecules at the surface.
  - C. The molecules at the surface are being pulled sideways and down, but not upward, due to attraction from the other molecules in that liquid.
  - D. The molecules at the surface are in the “solid” state of matter.
35. In which state are the molecules not able to move and slide relative to each other?
- A. Liquid
  - B. Gas
  - C. Solid
  - D. None of the states of matter allow the molecules to move.
36. The density of an object is defined as
- A. The mass of the object divided by its volume.
  - B. The volume of the object divided by its potential energy.
  - C. The inertia of the object.
  - D. The mass of the object multiplied by its acceleration.
37. An object’s resistance to a deformation in its shape is termed its
- A. Inertia
  - B. Stiffness
  - C. Density
  - D. Elasticity