

EDITION 4

# HESI ADMISSION ASSESSMENT

## *EXAM REVIEW*

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# Admission Assessment Exam Review

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FOURTH EDITION

HESI

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# Table of Contents

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Cover image

Title page

Copyright

Preface

Pretest

## 1. Mathematics

Basic Addition and Subtraction

Sample Problems

Basic Multiplication (Whole Numbers)

Sample Problems

Basic Division (Whole Numbers)

Sample Problems

Decimals

Sample Problems

Sample Problems

Sample Problems

Fractions

Sample Problems

Sample Problems

Multiplication of Fractions

Sample Problems

Division of Fractions

Sample Problems  
Changing Fractions to Decimals  
Sample Problems  
Changing Decimals to Fractions  
Sample Problems  
Ratios and Proportions  
Sample Problems  
Percentages  
Sample Problems  
Sample Problems  
12-hour Clock versus Military Time  
Sample Problems  
Algebra  
Sample Problems  
Helpful Information to Memorize

## 2. Reading Comprehension

Identifying the Main Idea  
Identifying Supporting Details  
Finding the Meaning of Words in Context  
Identifying a Writer's Purpose and Tone  
Distinguishing between Fact and Opinion  
Making Logical Inferences  
Summarizing

## 3. Vocabulary

## 4. Grammar

Eight Parts of Speech  
Nine Important Terms to Understand  
Ten Common Grammatical Mistakes  
Five Suggestions for Success  
Fifteen Troublesome Word Pairs  
Summary

## 5. Biology

Biology Basics

Water

Biologic Molecules

Metabolism

The Cell

Cellular Respiration

Photosynthesis

Cellular Reproduction

Genetics

DNA

## 6. Chemistry

Scientific Notation, the Metric System, and Temperature Scales

Atomic Structure and the Periodic Table

Chemical Equations

Reaction Rates, Equilibrium, and Reversibility

Solutions and Solution Concentrations

Chemical Reactions

Stoichiometry

Oxidation and Reduction

Acids and Bases

Nuclear Chemistry

Biochemistry

## 7. Anatomy and Physiology

General Terminology

Histology

Mitosis and Meiosis

Skin

Skeletal System

Muscular System

Nervous System

Endocrine System  
Circulatory System  
Respiratory System  
Digestive System  
Urinary System  
Reproductive System

## 8. Physics

Nature of Motion  
Sample Problem  
Acceleration  
Sample Problem  
Projectile Motion  
Sample Problem  
Newton's Laws of Motion  
Sample Problem  
Sample Problem  
Friction  
Sample Problem  
Rotation  
Sample Problem  
Uniform Circular Motion  
Sample Problem  
Kinetic Energy and Potential Energy  
Sample Problem  
Linear Momentum and Impulse  
Sample Problem  
Universal Gravitation  
Sample Problem  
Waves and Sound  
Sample Problem  
Light  
Sample Problem  
Optics

Atomic Structure

The Nature of Electricity

Sample Problem

Sample Problem

Sample Problem

Magnetism and Electricity

Posttest

Glossary

Index

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# Copyright

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# Preface

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Congratulations on purchasing the *HESI Admission Assessment Exam Review*! This study guide was developed based on the HESI Admission Assessment Exam; however, test items on the HESI Admission Assessment Exam are not specifically derived from this study guide. The content in this study guide provides an overview of the subjects tested on the Admission Assessment Exam and is designed to assist students in preparation for entrance into higher education in a variety of health-related professions. The *HESI Admission Assessment Exam Review* is written at the high school and beginning college levels and offers the basic knowledge that is necessary to be successful on the Admission Assessment Exam.

The HESI Admission Assessment exam consists of 10 different exams—8 academically oriented exams and 2 personally oriented exams. The academically oriented subjects consist of:

- Mathematics
- Reading Comprehension
- Vocabulary
- Grammar
- Biology
- Chemistry
- Anatomy and Physiology
- Physics

Chapter content in the *HESI Admission Assessment Exam Review* includes conversion tables and practice problems in the Mathematics chapter; step-by-step explanations in the Reading Comprehension and Grammar chapters; a substantial list of words used in health professions in the Vocabulary chapter; rationales and sample questions in the Biology and Chemistry chapters, helpful terminology in the Anatomy and Physiology chapter, and sample problems in the Physics chapter. Also included throughout the exam review are “HESI Hint” boxes, which are designed to offer students a suggestion, an example, or a reminder pertaining to a specific topic.

The personally oriented exams consist of a Learning Style assessment and a Personality Profile. These exams are intended to offer students insights into their study habits, learning preferences, and dispositions relating to academic achievement. Students generally like to take these personally oriented exams for the purpose of personal insight and discussion. Because each of these exams takes only approximately 15 minutes to complete, the school may include them in their administration of the Admission Assessment Exam.

Schools can choose to administer any one, or all, of these exams provided by the Admission Assessment. For example, programs that do not require biology,

chemistry, anatomy and physiology, or physics for entry would not administer those specific Admission Assessment science-oriented exams.

The HESI Admission Assessment Exam has been used by colleges, universities, and health-related institutions as part of the selection and placement process for applicants and newly admitted students for approximately 10 years.

## Study Hints

It is always a good idea to prepare for any exam. When you begin to study for the Admission Assessment Exam, make sure you allocate adequate time and do not feel rushed. Set up a schedule that provides an hour or two each day to review material in the *HESI Admission Assessment Exam Review*. Mark the time you set aside on a calendar to remind yourself when to study each day. Before you begin, take the 25-question Pretest at the beginning of the text to help you initially assess your strengths and weaknesses of the content. For each section in the *HESI Admission Assessment Exam Review* review the material that is relevant to your particular field of the health care professions. Complete the review questions at the end of each chapter, then complete the 50-question Posttest at the end of the text. This Posttest gives you additional practice in the text's subject areas using a more comprehensive approach. The Posttest will help you to assess your readiness for the exam. Once you have completed your review and self-assessment of topics in the study guide, more test-taking practice is available on the text's corresponding Evolve site (<http://www.elsevier.com/HESI/A2Review>) with two comprehensive 82-question Practice Exams on the various subject areas that will help you prepare for the Admissions Assessment Exam. If you are having trouble with the review questions or the Practice Exams for a particular section, review that content in the *HESI Admission Assessment Exam Review* study guide again. It may also be helpful to go back to your textbook and class notes for additional review.

## Test-Taking Hints

1. Read each question carefully and completely. Make sure you understand what the question is asking.
2. Identify the key words or phrases in the question. These words or phrases will provide critical information about how to answer the question.
3. Rephrase the question in your words.
  - a. Ask yourself, "What is the question really asking?"
  - b. Eliminate nonessential information from the question.
  - c. Sometimes writers use terminology that may be unfamiliar to you. Do not be confused by a new writing style.
4. Rule out options (if they are presented).
  - a. Read all of the responses completely.
  - b. Rule out any options that are clearly incorrect.
  - c. Mentally mark through incorrect options in your head.
  - d. Differentiate between the remaining options, considering your knowledge of the subject.
5. Computer tests do not allow an option for skipping questions and returning to them later. Practice answering every question as it appears.  
Do not second-guess yourself. TRUST YOUR ANSWERS.

# Pretest

---

1. A die is rolled once. What is the probability of getting the number 5?
  - A.  $\frac{1}{6}$
  - B.  $\frac{2}{5}$
  - C.  $\frac{1}{5}$
  - D.  $\frac{5}{6}$
2. Select the meaning of the underlined word in the sentence.  
The veterinary technician gave the dog a  cursory  examination.
  - A. Rigorous
  - B. Thorough
  - C. Concentrated
  - D. Quick
3. In the hierarchic system of classification, which of the following is the least inclusive?
  - A. Kingdom
  - B. Class
  - C. Genus
  - D. Species
4. How does the trachea remain open like a hollow tube?
  - A. Air pressure inside keeps it open.
  - B. Supporting cartilaginous rings keep it open.
  - C. It is reinforced with bone that cannot collapse.
  - D. Special muscles are working to keep the trachea open.
5. Write the following quantity, 1 kilojoule (kj), in powers of tens: \_\_\_\_\_
6. The quotient of  $y$  and  $-25$  is  $-100$ ; find the value of  $y$ .
  - A. 4
  - B.  $-2500$
  - C.  $-4$
  - D.  $2500$

Use the passage below to answer questions 7-9.

## Doppler Effect

Have you ever wondered why the whistle of a traveling, distant locomotive predicts its approach several yards before anyone actually sees it? Or why an oncoming ambulance's screaming siren is heard momentarily several feet before the ambulance comes into full view, before it passes you, and why its siren is still heard faintly well after the ambulance is out of sight?

What you are witnessing is a scientific phenomenon known as the *Doppler effect*. What takes place is truly remarkable. In both of these instances, when the train or ambulance moves toward the sound waves in front of it, the sound waves are pulled closer together and have a higher frequency. In either instance, the listener positioned in front of the moving object hears a higher pitch. The ambulance and locomotive are progressively moving away from the sound waves behind them, causing the waves to be farther apart and to have a lower frequency. These fast-approaching modes of transportation distance themselves past the listener, who hears a lower pitch.

7. What is the main idea of the passage?
  - A. Trains and ambulances make distinctly loud noises.
  - B. Low-frequency waves make high-pitched sounds.
  - C. High-frequency waves make low-pitched sounds.
  - D. The Doppler effect explains why sound is heard initially more strongly and then faintly after a moving object has passed.
8. What is the meaning of the word *phenomenon* in the second paragraph?
  - A. Something that is lifeless to the senses
  - B. Something that is nonchalant
  - C. Something that is significant but unusual
  - D. Something that is chemical in origin
9. Which sound waves have a lower pitch?
  - A. Those waves that are closer together
  - B. Those waves that are farther apart
  - C. Those waves that travel a long distance
  - D. Those waves that travel a short distance
10. What word meaning "abrupt, intense" best fits in the following sentence?  
The paramedics arrived at the home of a patient who was experiencing \_\_\_\_\_ chest pain.
  - A. Distal
  - B. Acute
  - C. Chronic
  - D. Dynamic
11. Which of the following sentences is grammatically incorrect?
  - A. We took him to the store, the library, and the restaurant.
  - B. We took him to the store and the library.
  - C. We took him to the store, and then we went to the library.
  - D. We took him to the store and then went to the library.

12. Sixteen (16) more than a number is nine (9). What is the number?
- A. -7
  - B. 7
  - C. -25
  - D. 25
13. Select the best word for the blank in the following sentence.  
I will \_\_\_\_\_ that chart to the patient's room later today.
- A. Bring
  - B. Take
  - C. Brought
  - D. Took
14. The nucleus of an atom contains, or is made up of, which of the following?
- A. Protons and electrons
  - B. Protons only
  - C. Protons and neutrons
  - D. Neutrons and electrons
15. After observing an event, you develop an explanation. This explanation is referred to as which of the following?
- A. Hypothesis
  - B. Experiment
  - C. Conclusion
  - D. Theory
16. Which word in the following sentence should be replaced?  
The department chairman stepped up to the podium.
- A. Podium
  - B. Stepped
  - C. Chairman
  - D. Up
17. Which of the following is a benefit of the intermolecular hydrogen bonding of water? (Select all that apply.)
- A. Water has a relatively high specific heat value.
  - B. Water has strong cohesive and adhesive properties.
  - C. Polarity of water allows it to act as a versatile solvent.
  - D. Water moves from higher to lower concentrations.
18. What is the best definition of the word *expedite*?
- A. Impel
  - B. Empathize
  - C. Accelerate
  - D. Hinder
19. What is the charge on potassium in the compound KCl?
- A. -1
  - B. +1
  - C. -2
  - D. +2
20. Which of the following are correct units for energy?
- A. Joules

- B. Kg-m/Sec<sup>2</sup>
  - C. Newton
  - D. Watt
21. What mineral is responsible for muscle contractions?
- A. Chloride
  - B. Sodium
  - C. Calcium
  - D. Magnesium
22. Of all the molecules that are significant to biology, which of the following are considered the most important?
- A. Carbohydrates, lipids, protein, and nucleic acids
  - B. Carbohydrates, lipids, protein, and calcium
  - C. Carbohydrates, lipids, protein, and sulfur
  - D. Carbohydrates, lipids, protein, and iron
23. The reaction  $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$  has a ratio of 2 parts ethane ( $\text{C}_2\text{H}_6$ ) and 7 parts oxygen ( $\text{O}_2$ ). How many parts of ethane ( $\text{C}_2\text{H}_6$ ) will be needed to react with 21 parts of oxygen ( $\text{O}_2$ )?
- A. 3 parts of ethane  $\text{C}_2\text{H}_6$
  - B. 6 parts of ethane  $\text{C}_2\text{H}_6$
  - C. 9 parts of ethane  $\text{C}_2\text{H}_6$
  - D. 14 parts of ethane  $\text{C}_2\text{H}_6$
24. A tissue examined under the microscope exhibits the following characteristics: cells found on internal surface of stomach, no extracellular matrix, cells tall and thin, no blood vessels in the tissue. What type of tissue is this?
- A. Epithelial
  - B. Connective
  - C. Muscle
  - D. Cartilage
  - E. Nervous
25. Which of the following physical quantities are scalars? (Select all that apply.)
- A. Energy
  - B. Time
  - C. Velocity
  - D. Distance

## Answers to Pretest

1. A—There are 1 out of 6 chances on 1 die.
2. D
3. D
4. B
5.  $10^3$
6. D—Multiply  $-25 \times -100 = 2500$ .
7. D
8. C
9. B
10. B
11. D—“We took him to the store” and “then we went to the library” are two independent clauses joined by the conjunction “and.” Therefore, there should be a comma after the word “store.” The correct sentence is “We took him to the store, and then we went to the library.”
12. A—Add  $-16$  to  $9$  in which the solution is  $-7$ .
13. B—In this sentence, the action is away from the speaker, who will carry the patient’s chart from a near place (where the speaker is) to a far place (the patient’s room). Therefore, the best word is “take.”
14. C
15. A
16. C—The word “chairman” is considered sexist language. Sexist language can be avoided by changing *chairman* to *chair* or *chairperson*.
17. A, B, C
18. C
19. B
20. A
21. C
22. A
23. B
24. A
25. A, B, D

# Mathematics

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## CHAPTER OUTLINE

Basic Addition and Subtraction  
Basic Multiplication (Whole Numbers)  
Basic Division (Whole Numbers)  
Decimals  
Fractions  
Multiplication of Fractions  
Division of Fractions  
Changing Fractions to Decimals  
Changing Decimals to Fractions  
Ratios and Proportions  
Percentages  
12-hour Clock versus Military Time  
Algebra  
Helpful Information to Memorize  
Answers to Sample Problems

## KEY TERMS

**Common Denominator**  
**Constant**  
**Denominator**  
**Digit**  
**Dividend**  
**Divisor**  
**Exponent**  
**Expression**  
**Factor**  
**Fraction Bar**

**Improper Fraction**  
**Least Common Denominator**  
**Numerator**  
**Percent**  
**Place Value**  
**Product**  
**Proper Fraction**  
**Proportion**  
**Quotient**  
**Ratio**  
**Reciprocals**  
**Remainder**  
**Terminating Decimal**  
**Variable**

Members of the health professions use math every day to calculate medication dosages, radiation limits, nutritional needs, mental status, intravenous drip rates, intake and output, and a host of other requirements related to their clients. Safe and effective care is the goal of all who work in the health professions. Therefore, it is essential that students entering the health professions be able to understand and make calculations using whole numbers, fractions, decimals, and percentages.

The purpose of this chapter is to review the addition, subtraction, multiplication, and division of whole numbers, fractions, decimals, and percentages. Basic algebra skills will also be reviewed: evaluating expressions, and solving for a specific variable. Mastery of these basic mathematic functions is an integral step toward a career in the health professions.

# Basic Addition and Subtraction

## Vocabulary

**Digit:** Any number 1 through 9 and 0 (e.g., the number 7 is a digit).

**Place Value:** The value of the position of a digit in a number (e.g., in the number 321, the number 2 is in the “tens” position).



(From Ogden SJ, Fluharty LK: *Calculation of drug dosages: A work text*, ed 9, St. Louis, 2012, Elsevier/Mosby.)

## HESI Hint

1 ten = 10 ones

1 hundred = 100 ones

1 thousand = 1000 ones

## Basic Addition

### Example 1

$$462 + 133$$

$$\begin{array}{r} 462 \\ + 133 \\ \hline 595 \end{array}$$

## Steps

1. Line up the **digits** according to **place value**.
2. Add the digits starting from right to left:
  - Ones:  $2 + 3 = 5$
  - Tens:  $6 + 3 = 9$
  - Hundreds:  $4 + 1 = 5$

## Addition with Regrouping

### HESI Hint

To solve an addition problem, it may be necessary to regroup by moving, or carrying over, an extra digit from one place value column to the next.

### Example 2

$$835 + 559$$

$\begin{array}{r} 1 \\ 835 \\ + 559 \\ \hline 1,394 \end{array}$
--

## Steps

1. Line up the digits according to place value.
2. Add:
  - Ones:  $5 + 9 = 14$
  - Carry the 1 to the tens place, which is one place to the left.
  - Tens:  $1 + 3 + 5 = 9$
  - Hundreds:  $8 + 5 = 13$

## Basic Subtraction

Subtraction provides the difference between two numbers.

## HESI Hint

It may be easier to solve a subtraction problem by first rewriting it vertically.

### Example 1

$$5,234 - 4,112$$

$\begin{array}{r} 5,234 \\ - 4,112 \\ \hline 1,122 \end{array}$
---

### Steps

1. Line up the digits according to place value.
2. Subtract:
  - Ones:  $4 - 2 = 2$
  - Tens:  $3 - 1 = 2$
  - Hundreds:  $2 - 1 = 1$
  - Thousands:  $5 - 4 = 1$

## Subtraction with Regrouping

### HESI Hint

Remember, if the number to subtract is not a positive number, you must borrow, or regroup, from one place value to a lower place value.

### Example 2

$$457 - 29$$