

# NGL / Cengage Academic Testing Center

12 Events Sponsored by NGL / Cengage .....

**Allied Health Statistics**  
**Anatomy and Physiology**  
**Biochemistry**  
**Biology**  
**Career Development**  
**Environmental Health**

**General Chemistry**  
**Human Heredity**  
**Math for Health Professionals**  
**Microbiology**  
**Organic Chemistry**  
**Physics College**

<b>Eligible Divisions:</b> Secondary, Postsecondary / Collegiate, and Alumni	<b>Round 1:</b> 50 Q test in 60 minutes	<b>Digital Upload:</b> NO
<b>Solo Event:</b> 1 competitor		



### New for 2025 – 2026

Math for Health Careers will no longer be a multiple-choice test to align with other medical math tests offered through HOSA Competitive Events. Calculators and periodic tables will continue to be supplied as referenced in [Appendix I](#). Resource and editorial changes have been made.

### Event Summary

The National Geographic Learning Academic Testing Center (NGL ATC) Cengage-sponsored events aim to provide HOSA Members at chartered association conferences and the International Leadership Conference with additional opportunities to demonstrate their basic knowledge in preparation for becoming future health professionals.

The NGL ATC series of events are written tests based on items from the identified text/resource specific to each event. Competitors will recognize, identify, define, interpret, and apply knowledge in a 50-item multiple-choice test with a tie-breaker question. The written test will measure knowledge and understanding at the recall, application, and analysis levels. Higher-order thinking skills will be incorporated.

### Sponsorship

HOSA-Future Health Professionals appreciates the sponsorship of these events by [NGL/ Cengage](#)



### Dress Code

Bonus points are NOT awarded for [proper dress](#) in ATC events, but competitors are still encouraged to dress professionally.

### Competitors Must Provide

- [Photo ID](#)
- Two #2 lead pencils (not mechanical) with erasers

HOSA Conference Staff will provide equipment and supplies as listed in [Appendix I](#)

## General Rules

1. Competitors must be familiar with and adhere to the [General Rules and Regulations](#).
2. In case of a tie, the tie-breaker essay/question(s) will be judged and used to break the tie.
3. All competitors shall report to the event site at the time designated for the test in ILC publications. For test-taking, competitors will bring a [photo ID](#) and two #2 lead pencils (not mechanical).
4. [Test Instructions](#): The written test will consist of 50 multiple-choice items in a maximum of 60 minutes.
5. TIME REMAINING ANNOUNCEMENTS: There will be NO verbal announcements regarding the time remaining during ILC testing. All ILC testing will be completed in the Testing Center, and competitors are responsible for monitoring their own time.

## Testing Area and Resources

6. The twelve (12) approved and sponsored Cengage tests for ILC and their associated resources used in the development of the test questions are as follows:

Event	Resource Title (National Geographic Learning/Cengage)	ISBN
A. Allied Health Statistics	<a href="#">Basic Allied Health Statistics and Analysis, 5<sup>th</sup> Edition</a>	9781337796965
B. Anatomy and Physiology	<a href="#">Body Structures and Functions, 14<sup>th</sup> edition.</a>	9780357457542
C. Biochemistry	<a href="#">Introduction to General, Organic and Biochemistry, 12<sup>th</sup> edition</a>	9781337571357
D. Biology	<a href="#">Biology: The Unity and Diversity of Life, 15<sup>th</sup> AP Edition</a>	9781337408332
E. Environmental Health	<a href="#">Environmental Science: 17th Edition</a>	9780357976319
F. Career Development	<a href="#">Your Career: How to Make it Happen 11th edition</a> <a href="#">Career Success in Health Care 4th edition</a>	9798214115972 9780357936849
G. General Chemistry	<a href="#">Chemistry 11<sup>th</sup> Edition</a>	9780357850794
H. Human Heredity	<a href="#">Human Heredity: Principles and Issues, 11<sup>th</sup> edition</a>	9781305251052
I. Math for Health Professionals	<a href="#">Math for Health Care Professionals, 2nd edition</a>	9781305509788
J. Microbiology	<a href="#">Microbiology: Practical Applications and Infection Prevention, 1st Edition</a>	9781133693642
K. Organic Chemistry	<a href="#">Introduction to General, Organic and Biochemistry, 12<sup>th</sup> edition</a>	9781337571357
L. Physics College	<a href="#">College Physics AP Edition, 12th</a>	9780357976425

## 7. Test Plans:

### Allied Health Statistics:

- Identify the importance of health statistics and health data across the continuum - 20%
- Understand statistics related to census, occupancy, and length of stay in hospitals - 24%
- Understand hospital obstetric and neonatal statistics - 8%
- Identify clinical and non-clinical statistics - 8%
- Understand terms and rates related to mortality and autopsy - 8%
- Understand community health statistics - 8%
- Understand the basics of math, statistics and organization of data for analysis - 16%
- Understand the fundamentals of research - 8%

### Anatomy & Physiology:

- Describe the physiology of the human body - 40%
- Identify the anatomy of the human body - 40%
- Identify common diseases and disorders of the human body - 20%

### Biology:

- Describe the study of life and levels of organization - 10%
- Describe the structures and functions of plant and animal cells - 20%
- Describe the mechanisms of genetics and heredity - 20%
- Apply the principles of evolution - 10%
- Describe evolution and biodiversity - 10%
- Identify structures and functions of plant and animal systems - 20%
- Describe the principles of ecology - 10%

### Biochemistry:

- Understand the characteristics of water - 10%
- Describe the structure and functions of proteins, including amino acids, peptides, and enzymes - 20%
- Identify the structures and functions of carbohydrates - 20%
- Understand nucleic acids (DNA and RNA) and the role in genetics - 20%
- Describe the structure and functions of lipids - 10%
- Understand biological membranes and their role in cell transport - 6%
- Explain metabolism and how ATP is produced - 14%

### Career Development:

- Recognize how to begin the process of career development - 10%
- Identify the required skills needed for career development - 12%
- Describe individual preferences for career development - 8%
- Identify values needed for career development - 8%
- Understand the exploration stage of career development - 10%
- Describe the relationships required for career development - 10%
- Identify the stages of the decision making - 14%
- Determine the tools required for career development - 6%
- Understand the launch stage of career development - 16%
- Recognize the skills required for career management - 6%

### **Environmental Health:**

- Sustaining Resources and Environmental Quality- 10%
- Natural Resources - 10%
- Environmental Pollution - 10%
- Climate Change - 10%
- Sustainable Development - 10%
- Human Population and Environment - 10%
- Environmental Laws and Policies - 10%
- Environmental Health and Toxicology - 10%
- Environmental Hazards and Human Health 10%
- Global Environmental Issues - 10%

### **General Chemistry:**

- Describe chemistry concepts, measurements, and calculations of moles, molar mass, and energy - 20%
- Identify elements, atoms, ions, and periodicity - 10%
- Describe chemical reactions, energy, and solutions - 30%
- Identify chemical composition, quantities, kinetics, & equilibrium - 10%
- Understand general concepts of bonding - 4%
- Identify modern atomic theory - 4%
- Compare and contrast acids and bases - 4%
- Understand principles of chemical nomenclature - 4%
- Identify the properties of matter, including solids, liquids, and gasses - 10%
- Understand electrochemistry and entropy - 4%

### **Human Heredity:**

- Identify common genetic diseases and disorders, including cancer - 24%
- Understand chromosomes, inheritance, and the transmission of traits - 10%
- Explain Punnett squares, pedigrees, karyotypes and the inheritance of traits - 14%
- Explain how the immune system and viruses affect genes - 2%
- Explain phenotypes, gene expression and gene regulation - 8%
- Describe how mutations and epigenetics affects genes - 8%
- Describe genetic technologies, genomes, biotechnology, reproductive technology, genetic testing and gene therapy - 12%
- Describe the role of genetics, DNA, RNA, and chromosomes, and protein synthesis - 12%
- Understand the process of cell division (meiosis), DNA mutations, and chromosome mutations - 10%

### **Math for Health Professionals:**

- Understand how to create the proper solution - 20%
- Understand basic mathematical concepts and conversions - 22%
- Understand how to determine proper drug dosages - 30%
- Understand how to measure input and output - 4%
- Identify how to convert roman numerals - 2%
- Identify how to determine drops per minute and flow rate - 10%
- Identify how to convert from the metric system to the English system and vice versa - 10%
- Understand basic medical terminology - 2%

**When a Scantron form is used** – the Scantron form for this event will require competitors to grid their responses with pencils. Numbers must be written with the last number of the answer in the far right box. (See sample to the right.) When a paper/pencil test is used or administered on a computer, the competitor will write in or key in their response to each question.



### Microbiology:

- Identify the different types of sanitization, sterilization, and disinfection - 8%
- Identify infectious diseases and disorders - 26%
- Understand infection control, the chain of infection & pathogens transmission - 14%
- Identify healthcare associated infections - 6%
- Understand the history of microbiology - 4%
- Describe the types of immunity, immunizations, & antimicrobials - 10%
- Identify tests that can be used to determine infection - 4%
- Understand asexual reproduction - 2%
- Identify the characteristics of mold - 4%
- Understand classifications of organisms - 6%
- Identify characteristics of prokaryotic cells, including bacteria - 8%
- Describe the different types of stains used in microbiology - 6%
- Understand the pH scale and effect on microorganisms - 2%

### Organic Chemistry:

- Describe electronegativity – structure and bonding - 16%
- Describe chemical bonds, shapes and naming of compounds- 16%
- Describe stereochemistry - 4%
- Describe substitution and elimination reactions - 6%
- Identify aromatic compounds and IUPAC names - 12%
- Differentiate and describe alkanes, alkenes, alkynes, cycloalkanes, alcohols, ethers, epoxides, sulfides, aldehydes, ketones, and functional groups - 26%
- Identify carboxylic acids and derivatives - 8%
- Understanding how to name amines - 8%
- Describe spectroscopy - 4%

### Physics:

- Understand work, energy and particle dynamics (velocity, acceleration, force, heat, friction, motion) - 10%
- Understand concepts of waves & sound and laws of thermodynamics - 10%
- Understand the principles of fluid mechanics including buoyancy - 4%
- Understand the principles of electricity, including current, watts, amp resistance, electrical charges, electrical circuits and electric fields - 20%
- Compare and contrasts properties of light, waves and particle model - 12%
- Describe optics, images and focal points - 4%
- Describe the laws of thermodynamics - 10%
- Understand the concept of magnetism and inductance - 10%
- Understand basic mathematical concepts related to physics - 20%

8. Chapter Advisors – contact your Cengage Sales Consultant for a review copy of the reference title of your choice, for events 1-12 above. Most resources also offer online interactive study tools, virtual labs, and auto-graded practice. Find your Sales Consultant at [NGL.Cengage.com/repfinder](http://NGL.Cengage.com/repfinder)

## Registration Priority and Process

9. Chartered Associations now have the opportunity to offer NGL Academic Testing Center Events at their state conferences. Previously, the tests were only offered at ILC. Delegates should check with their State Advisor to determine if this event is being offered in their chartered association.
10. There are no qualification rules for NGL ATC tests between state and ILC. Members can take the test at state, ILC, both, one or the other, etc. They do not need to score a certain percentage or finish at a certain rank at the state conference. Members do NOT need to have taken the test at state to take the test at ILC.
11. **ILC registration** includes the opportunity to take one (1) NGL Academic Testing Center test. Delegates who wish to take additional NGL Academic Testing Center tests may pay \$20 per additional test. There is no maximum limit to the number of NGL ATC tests that can be taken at ILC, as long as the competitor can logistically sit to test in all events for which they are registered.
12. Delegates will pre-register for the NGL Academic Testing Center at ILC in the HOSA Conference Management System. ONLY registered delegates by the published ILC deadline will be allowed to test. NO walk-up NGL ATC registrations are allowed at ILC due to the preparation required to offer these testing opportunities.
13. Competitors should refer to the [General Rules and Regulations](#) for information on how many competitive events they can register for at ILC.

## Recognition and Awards

14. At ILC, a Certificate of Participation will be available to delegates who take a test in the NGL Academic Testing Center.
15. The Top Ten HOSA members in EACH EVENT (not by division) will be recognized at ILC, with 1st, 2nd, and 3rd place receiving special recognition. Check the ILC Program for details.
16. If a chartered association is offering this event at their chartered association conference, awards and recognition are determined by the State Advisor.

### Sample Test Questions

*The remaining pages of these guidelines include sample test questions from each of the above event tests.*

#### Allied Health Statistics

1. Which of the following facilities delivers the highest level of nursing care?
  - a. Intermediate Care
  - b. **Residential Care**
  - c. Skilled Nursing Care
  - d. Rehabilitation Care
2. Which type of validity refers to how well the study adheres to accepted and established standards?
  - a. Face validity
  - b. Content validity
  - c. **Construct validity**
  - d. Criterion validity

3. Where do low numbers appear in a frequency polygon?
- Bottom and to the right
  - Bottom and to the left
  - Top and to the right
  - Top and to the left**

### Anatomy and Physiology

1. Health care workers use a spirometer to measure the\_\_\_\_\_.
- level of carbon dioxide in the blood
  - lungs' capacity for air**
  - amount of pressure in the lungs
  - level of pleural fluid
2. What causes plasma-like fluid to flow from the blood in the glomerulus into Bowman's capsule?
- Increase in blood pressure in the capillaries
  - Hormonal secretions**
  - Stimulation from the nerves
  - Level of salt in the blood
3. Which of the following is the definition of a fomite?
- Bacterial infection transmitted through contaminated water
  - Small worm that may be present in meat and which infects the intestinal tract.
  - Person who experiences no symptoms but can transmit an infection.
  - Non Living object that is contaminated with an infectious agent**

### Biochemistry

1. Which of the following compounds would have the highest boiling point?
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
  - $\text{CH}_3\text{NH}_2$
  - $\text{CH}_3\text{OH}$
  - $\text{CH}_2\text{F}_2$**
2. Which subatomic particle is found in all isotopes of hydrogen?
- Proton**
  - Neutron
  - Electron
  - Positron
3.  $\text{CH}_3\text{C} \equiv \text{CCH}_2\text{CH}_2\text{Cl}$  is named:
- 1-chloro-3-pentyne
  - 5-chloro-2-pentene
  - 1-acetylenyl-3-chloropropane
  - 5-chloro-2-pentyne**

### Biology

1. In the electromagnetic spectrum,\_\_\_\_\_.
- infrared energy has the shortest wavelength
  - infrared radiation has more energy than red radiation
  - visible light provides the energy for photosynthesis**
  - near-infrared radiation provides the energy for photosynthesis

2. In order for DNA molecules to undergo recombination, \_\_\_\_\_.
  - a. they must be from the same species
  - b. their strands must separate as in replication
  - c. **they must be cut and spliced at specific nucleotide sequences**
  - d. one of the two DNA strands must be degraded
  
3. In garden peas, one pair of alleles controls the height of the plant, and a second pair of alleles controls flower color. The allele for tall (*D*) is dominant to the allele for dwarf (*d*), and the allele for purple (*P*) is dominant to the allele for white (*p*). A tall plant with purple flowers crossed with a tall plant with white flowers produces 3/8 tall purple, 1/8 tall white, 3/8 dwarf purple, and 1/8 dwarf white. What is the genotype of the parents?
  - a. **Dd Pp x Dd pp**
  - b. Dd Pp x Dd Pp
  - c. DD Pp x dd Pp
  - d. Dd pp x dd Pp

### Career Development

1. If a physician fails to use a degree of skill and learning commonly expected and the person receiving care is injured, the physician can be sued for \_\_\_\_\_.
  - a. Negligence
  - b. Defamation
  - c. **Malpractice**
  - d. Assault and battery
  
2. Patients confined to bed should have their position changed at least every \_\_\_\_\_.
  - a. 30 minutes
  - b. Hour
  - c. **2 hours**
  - d. 3 hours
  
3.  $\frac{5}{8} + \frac{3}{12} =$ 
  - a.  $\frac{11}{12}$
  - b.  $\frac{13}{16}$
  - c.  $\frac{8}{24}$
  - d.  $\frac{7}{8}$

### Environment Health

1. What is the primary cause of ocean acidification?
  - a. overfishing in marine environments
  - b. increased volcanic activity
  - c. excessive plastic pollution
  - d. **absorption of carbon dioxide from the atmosphere**
  
2. What is the main driver of global climate change?
  - a. increased levels of oxygen in the atmosphere
  - b. expansion of agricultural land
  - c. **burning of fossil fuels**
  - d. natural variations in the Earth's orbit
  
3. Which environmental issue is directly caused by the accumulation of excess nutrients in water bodies?
  - a. ozone depletion
  - b. **eutrophication**
  - c. deforestation

- d. desertification

### General Chemistry

1. Select the correct molecular structure for CO<sub>2</sub>:
  - a. **linear**
  - b. trigonal planar
  - c. tetrahedral
  - d. bent
  
2. Consider the molecular orbital description of the NO<sup>-</sup> anion. Which of the following statements is false?
  - a. NO<sup>-</sup> is paramagnetic.
  - b. **NO<sup>-</sup> is isoelectronic with CO.**
  - c. The bond energy in NO<sup>+</sup> is greater than the bond energy in NO<sup>-</sup>.
  - d. The bond order in NO<sup>-</sup> is 2.
  
3. For which of the following compound(s) are *cis* and *trans* isomers possible?
  - a. **2,3-dimethyl-2-butene**
  - b. 3-methyl-2-pentene
  - c. 4,4-dimethylcyclohexanol
  - d. *ortho*chlorotoluene

### Human Heredity

1. The letters G, Q, R, and C, used to describe the appearance of chromosomes, refer to the \_\_\_\_.
  - a. position of the bands
  - b. **staining procedure used to reveal the bands**
  - c. number of arms per chromosome
  - d. number of centromeres per chromosome
  
2. Which of the following sequences indicates the promoter region of a gene?
  - a. **CAAT**
  - b. UAAG
  - c. CTTT
  - d. ACAT
  
3. The ability to taste PTC and other bitter chemicals is controlled by \_\_\_\_\_.
  - a. hormone levels that change throughout life
  - b. **proteins on the surface of receptor cells**
  - c. the amount of PTC exposure as a child
  - d. the amount of capsaicin present in taste buds

### Math for Health Professionals

1. Goniometers measure
  - a. **range of motion**
  - b. weight
  - c. surface area
  - d. Time
  
2. The hospital uses a 15-drop-per-mL drip set. How will you adjust the IV to infuse 250 mL over 3 hours?
  - a. constant infusion
  - b. every minute
  - c. every 30 seconds
  - d. **every 3 seconds**

3. Calculate the BMI for Weight: 165 pounds; Height: 73 inches.
- 30
  - 25
  - 18
  - 22**

### Microbiology

- By what mechanism does a virus cause disease?
  - by infecting the nervous system in humans
  - by shutting down or destroying a cell**
  - by living on or in another organism
  - by infecting red blood cells
- Toxic proteins that can be secreted outside of the cell are called?
  - bactericides
  - endotoxins
  - exotoxins**
  - aspergillus
- Which main class of disease-causing parasites contain tapeworms?
  - Helminths**
  - protozoa
  - ectoparasites
  - Ergosterol

### Organic Chemistry

- Name the following:  $\text{CH}_3 - \text{CH}_2 - \text{CH}_3$ 
  - ethane
  - propane**
  - butane
  - Pentane
- $\text{CH}_3\text{C} \equiv \text{CCH}_2\text{CH}_2\text{Cl}$  is named:
  - 1-chloro-3-pentyne
  - 5-chloro-2-pentene
  - 1-acetylenyl-3-chloropropane
  - 5-chloro-2-pentyne**
- What is the correct (IUPAC) name of the following molecule: 2-methyl-4-t-butylpentane
  - 2-t-butyl-4-methylpentane
  - 2,2,3,5-tetramethylhexane**
  - 2,4,5,5-tetramethylhexane
  - 1-sec-butyl-1,2,2-trimethylpentane

### Physics College

- How many moles of air must escape from a 15.0-m  $\times$  9.0-m  $\times$  6.0-m room when the temperature is raised from 10.0°C to 20.0°C? Assume the pressure remains unchanged at one atmosphere while the room is heated. ( $R = 8.31 \text{ J/mol}\cdot\text{K}$ )
  - 4.9E+3 moles
  - 1.2E+3 moles**
  - 2.2E+2 moles
  - 7.9E+2 moles

2. A loop of area  $0.384 \text{ m}^2$  is in a uniform  $0.0565\text{-T}$  magnetic field. If the flux through the loop is  $6.10 \times 10^{-3} \text{ T}\cdot\text{m}^2$ , what angle does the normal to the plane of the loop make with the direction of the magnetic field?
  - a.  $73.7^\circ$
  - b.  $89.3^\circ$
  - c.  **$16.3^\circ$**
  - d.  $76.0^\circ$
  
3. The escape speed from the surface of the Earth is  $11.2 \text{ km/s}$ . Estimate the escape speed for a spacecraft from the surface of the Moon. The Moon has a mass  $1/81$  that of Earth and a radius  $0.25$  that of Earth.
  - a.  **$2.5 \text{ km/s}$**
  - b.  $4.0 \text{ km/s}$
  - c.  $5.6 \text{ km/s}$
  - d.  $8.7 \text{ km/s}$

**Future Opportunities:**

Graduating from high school or completing your postsecondary/collegiate program does not mean your HOSA journey has to end. As a HOSA member, you are eligible to become a HOSA Lifetime Alumni Member - a free and valuable opportunity to remain connected, give back, and help to shape the future of the organization. Learn more and sign up at [hosa.org/alumni](https://hosa.org/alumni).