Summary

The goal of the National Geographic Learning (NGL) Academic Testing Center – NGL Cengage sponsored event is to provide as many International Leadership Conference HOSA delegates as space permits with the opportunity to demonstrate their basic knowledge in preparation to become future health professionals.

The series of events in the NGL Academic Testing Center (ATC) are written tests based on items from the identified text 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.

Dress Code

Competitors must be in official HOSA uniform or in proper business attire. Bonus points will be awarded for proper dress.

Rules and Procedures

1. Competitors in this event must be active members of HOSA-Future Health Professionals and in good standing in one of the following divisions: Secondary, Postsecondary/Collegiate, or Alumni.

2. Competitors must be familiar with and adhere to the “General Rules and Regulations of the HOSA Competitive Events Program (GRR).”

3. A tie-breaker question(s) will be administered with the original test. In case of a tie, the tie-breaker question(s) will be graded to break the tie.

4. All competitors shall report to the site of the event at the time designated for the test in ILC publications. Competitors will bring a photo ID as well as two #2 lead pencils for test-taking.

5. Test Instructions: The competitors will be given instructions and will be notified to start the test. There will be a maximum of 60 minutes to complete the test.
6. **Time Remaining Announcements:** There will be a verbal announcement when there are 30 minutes, 15 minutes, 5 minutes, and 1 minute remaining to complete the test.

**Testing Areas and Resources**

7. Eleven (11) of the NGL Academic Testing Center events are sponsored by National Geographic Learning / Cengage. A summary page of resources for these 11 NGL ATC events is available, as well as a listing of all resources provided from National Geographic Learning / Cengage for all HOSA events.

8. The eleven (11) approved tests for ILC 2022 and their associated resources are as follows:

<table>
<thead>
<tr>
<th>Event</th>
<th>Resource Title (National Geographic Learning/Cengage)</th>
<th>ISBN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Allied Health Statistics</td>
<td>Basic Allied Health Statistics and Analysis, 5th Edition</td>
<td>97811227796965</td>
</tr>
<tr>
<td>2. Anatomy and Physiology</td>
<td>Body Structures and Functions, 14th edition</td>
<td>9780357457542</td>
</tr>
<tr>
<td>3. Biochemistry</td>
<td>Introduction to General, Organic and Biochemistry, 12th edition</td>
<td>9781337571357</td>
</tr>
<tr>
<td>4. Biology</td>
<td>Biology: The Unity and Diversity of Life, 15th AP Edition</td>
<td>9781337408592</td>
</tr>
<tr>
<td>5. Career Development</td>
<td>DHO Health Science Updates 9th Edition</td>
<td>9780357419991</td>
</tr>
<tr>
<td>8. Math for Health Professionals</td>
<td>Math for Health Professionals, 2nd edition</td>
<td>9781305509788</td>
</tr>
<tr>
<td>9. Microbiology</td>
<td>Microbiology: Practical Applications and Infection Prevention, 1st Edition</td>
<td>978113369642</td>
</tr>
<tr>
<td>10. Organic Chemistry</td>
<td>Introduction to General, Organic and Biochemistry, 12th edition</td>
<td>9781337571357</td>
</tr>
</tbody>
</table>

9. Chapter Advisors – contact your Cengage Sales Consultant for a review copy of the reference title of your choice, for events 1-11 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**

10. **ILC registration** includes the opportunity to take one NGL Academic Testing Center test. Delegates who wish to take additional NGL Academic Testing Center tests may do so by paying $20 per additional test. There is no maximum 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.

11. Delegates will pre-register for the NGL Academic Testing Center at ILC 2022 in the HOSA Conference Management System. If testing space allows, delegates may also register and pay on-site at ILC on a first-come, first-serve basis.
12. Competitors should refer to the General Rules and Regulations #6 for information on how many competitive events they can register for at ILC.

Recognition and Awards

13. A Certificate of Participation is given to every delegate who takes a test in the NGL Academic Testing Center.

14. The Top Ten HOSA members in each event will be recognized on stage at the Grand Awards Ceremony, with 1st, 2nd and 3rd place receiving special recognition.

15. HOSA Advisors will receive a Certificate of Excellence for any HOSA members from their chapter ranking in the Top Ten.

Sample Test Questions
The remaining pages of these guidelines include sample test questions from each of the eleven 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?
   a. Bottom and to the right
   b. Bottom and to the left
   c. Top and to the right
   d. Top and to the left

Anatomy and Physiology
1. Health care workers use a spirometer to measure the___________.
   a. level of carbon dioxide in the blood
   b. lungs’ capacity for air
   c. amount of pressure in the lungs
   d. level of pleural fluid

2. What causes plasma like fluid to flow from the blood in the glomerulus into Bowman’s capsule?
   a. Increase in blood pressure in the capillaries
   b. Hormonal secretions
   c. Stimulation from the nerves
   d. Level of salt in the blood

3. Which of the following is the definition of a fomite?
   a. Bacterial infection transmitted through contaminated water
   b. Small worm that may be present in meat and which infects the intestinal tract.
   c. Person who experiences no symptoms but can transmit an infection.
   d. Nonliving object that is contaminated with an infectious agent
Biochemistry
   1. Which of the following compounds would have the highest boiling point?
      a. CH₃CH₂CH₂CH₃
      b. CH₃NH₂
      c. CH₃OH
      d. CH₂F₂

   2. Which subatomic particle is found in all isotopes of hydrogen?
      a. Proton
      b. Neutron
      c. Electron
      d. Positron

   3. CH₃C ≡ CCH₂CH₂Cl is named:
      a. 1-chloro-3-pentyne
      b. 5-chloro-2-pentene
      c. 1-acetylenyl-3-chloropropane
      d. 5-chloro-2-pentyne

Biology
   1. In the electromagnetic spectrum,_________.
      a. infrared energy has the shortest wavelength
      b. infrared radiation has more energy than red radiation
      c. visible light provides the energy for photosynthesis
      d. 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. 5/8 + 3/12 = _____.
      a. 11/12
      b. 13/16
      c. 8/24
      d. 7/8
General Chemistry
1. Select the correct molecular structure for CO₂:
   a. linear
   b. trigonal planar
   c. tetrahedral
   d. Bent

2. Consider the molecular orbital description of the NO⁻ anion. Which of the following statements is false?
   a. NO⁻ is paramagnetic.
   b. NO⁻ is isoelectronic with CO.
   c. The bond energy in NO⁻ is greater than the bond energy in NO⁺.
   d. The bond order in NO⁻ 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. orthochlorotoluene

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.
   a. 30
   b. 25
   c. 18
   d. 22
Microbiology

1. By what mechanism does a virus cause disease?
   a. by infecting the nervous system in humans
   b. by shutting down or destroying a cell
   c. by living on or in another organism
   d. by infecting red blood cells

2. Toxic proteins that can be secreted outside of the cell are called?
   a. bactericides
   b. endotoxins
   c. exotoxins
   d. aspergillus

3. Which main class of disease-causing parasites contain tapeworms?
   a. helminths
   b. protozoa
   c. ectoparasites
   d. Ergosterol

Organic Chemistry

1. Name the following: CH₃–CH₂–CH₃
   a. ethane
   b. propane
   c. butane
   d. Pentane

2. CH₃C ≡ CH₂CH₂Cl is named:
   a. 1-chloro-3-pentyne
   b. 5-chloro-2-pentene
   c. 1-acetylenyl-3-chloropropane
   d. 5-chloro-2-pentyne

3. What is the correct (IUPAC) name of the following molecule: 2-methyl-4-t-butylpentane
   a. 2-t-butyl-4-methylpentane
   b. 2,2,3,5-tetramethylhexane
   c. 2,4,5,5-tetramethylhexane
   d. 1-sec-butyl-1,2,2-trimethylpentane

Physics College

1. How many moles of air must escape from a 15.0-m × 9.0-m × 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 J/mol·K)
   a. 4.9E+3 moles
   b. 1.2E+3 moles
   c. 2.2E+3 moles
   d. 7.9E+2 moles

2. A loop of area 0.384 m² is in a uniform 0.0565-T magnetic field. If the flux through the loop is 6.10 × 10⁻³ T·m², what angle does the normal to the plane of the loop make with the direction of the magnetic field?
   a. 73.7°
   b. 89.3°
   c. 16.3°
   d. 76.0°
3. The escape speed from the surface of the Earth is 11.2 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 km/s
b. 4.0 km/s
c. 5.6 km/s
d. 8.7 km/s