

## Science Screening Test Guide & Sample Science Placement Test

The Science Placement Testing will be given to students who need to enroll in Anatomy and Physiology. The test will determine the student's initial course enrollment.

The test is a 40 minute, 40 question multiple-choice test and is scored immediately upon completion. Students are allowed ONE opportunity to take this test

The science screening test is used to help students enroll in a course that is appropriate for their background and to help students succeed in the biology courses they take. The science screening test is about academic preparation and background knowledge for college level biology courses. It does not test your knowledge of anatomy and physiology. BIO 030, Introduction to Biology, will cover academic preparation for biology courses including study skills, scientific reading and mathematical skills. BIO 130, Introduction to Physiology, will cover factual background information that is needed in the anatomy and physiology courses BIO 131 and BIO 132.

The science screening test has forty questions arranged in two parts.

- Achieve a score of 13 or below on the first part to place in BIO 030. If you place into BIO 030, you need a grade of C or better in BIO 030 to take BIO 130.
  - If you achieve a score of 14 or better the second part of the test will be evaluated.
  - If you achieve a score of 13 or below on the second part of the test you will place into BIO 130. If you place into BIO 130, you need a grade of C or better in BIO 130 to take BIO 131.
  - If you achieve a score of 14 or better you will place into BIO 131. Students who have not taken a science course in the last 5 years or more may find that they need to review material they have previously been exposed to. The following questions are similar to questions on the screening test.
1. Some of the questions are mathematical, involving questions such as metric conversions, scientific notation and size estimates. You should know how to set up and solve a proportion problem to answer these questions. Example - You measured the length of an infant, and she is 19 inches long. When you go to record the length, the chart requires the length in centimeters. You do not have a centimeter tape to measure with. How long is the infant? 1 inch = 2.54 centimeters
    - a. 0.31 cm
    - b. 7.5 cm
    - c. 21.54 cm
    - d. 48.3 cm
    - e. none of these is correct
  2. Some of the questions are interpretive questions based on written and graphic material. These questions are not the kind you study for.
  3. Some of the questions are fact recall questions from the objectives below. Chapter two and parts of chapter three of most college level anatomy and physiology textbooks contain information that can help you review for this part of the placement test. Example - A positive ion is one that has
    - a. Gained an electron
    - b. Lost an electron
    - c. Gained a proton
    - d. Lost a proton
    - e. Gained a neutron

**The following objectives are representative of the skills and knowledge level covered in BIO 030. If you have not taken these topics in school before, or it has been some time since you have taken them, you should register for BIO 030. It is better to take a course that will give you the background you need than to take a course that assumes you know material that you do not know.**

The student entering BIO 030 should gain a basic understanding of:

- Study skills in the biological sciences.
- The basics of scientific vocabulary.
- The liter, meter, gram, and Celsius units and their conversions.
- The scientific domain and the quantitative hypothesis.

- Some physical and chemical properties of living matter.
- The proton, neutron and electron and their role in atomic structure.
- The ionic, nonpolar covalent, polar covalent, and hydrogen bonds.
- AMU and Avogadro's number as they apply to molecules.
- The ionization of common physiological compounds.
- The role of hydrogen ions in physiology.
- Maintaining homeostasis in blood plasma.
- The basic structure and functions of organic macromolecules.
- The role of the cell in life processes.
- The use of common laboratory measuring tools.

**The following objectives are representative of the skills and knowledge level covered in BIO 130. If you have not taken these topics in school before, or it has been some time since you have taken them, you should register for BIO 130. It is better to take a course that will give you the background you need than to take a course that assumes you know material that you do not know.**

The student in BIO 130 should gain a basic understanding of:

- The structure of a Bohr atom and its relevance to physiology.
- The atomic structure and reactions of common physiological elements (C, H, O, N, Na, Cl, K, Ca, P, S).
- The formation and reactions of common ions in physiology ( $H^+$ ,  $Na^+$ ,  $K^+$ ,  $NH_4^+$ ,  $Ca^{+2}$ ,  $O^{2-}$ ,  $Cl^-$ ,  $OH^-$ ,  $CO_3^{2-}$ ,  $HCO_3^-$ ,  $PO_4^{3-}$ ,  $HPO_4^{2-}$ ,  $H_2PO_4^-$ ).
- Some bonding characteristics (ionic, nonpolar covalent, polar covalent, hydrogen, peptide, disulfide bridges, high-energy phosphate bonds) of compounds common in biology.
- The role of some groups and compounds in physiology (alcohol, aldehyde, carboxyl, organic acid, ketone, amino, phosphate, methanol, ethanol, glycerol, formaldehyde, glyceraldehyde, formic acid, carboxylic acid, lactic acid, ketones, keto acids, ammonia, amino acids, urea, phosphoglyceraldehyde, adenosine diphosphate, adenosine triphosphate).
- Acids and bases and their interactions in the body.
- The action of buffers in cells, plasma and urine.
- The role of some organic groups and compounds in physiology.
- The structure and metabolism of carbohydrates, lipids, proteins and nucleic acids.
- The structure and function of the eukaryotic cell.
- The structures and functions of the cell organelles.
- Active and passive movement of materials in cellular systems.
- Transcription and translation in protein synthesis.
- Enzyme activity and cellular respiration.
- The role of mitosis in cellular activity.
- The proper use of a dissecting microscope and compound light microscope.

### To Prepare for Science Placement Test:

The Allied Health and Biological Science Department suggests that before taking the test you review a college level biology textbook to make sure you are familiar with aspects of biochemistry. Textbooks by authors such as Marieb, Tortora, Seeley or Martini are good resources and are available in the DCC Library. Usually chapters found early in text, such as Ch. 1, 2, and 3, dealing with the following topics need be reviewed:

- |                             |                                       |
|-----------------------------|---------------------------------------|
| • atomic structure          | • pH                                  |
| • electron distribution     | • cell structures and their functions |
| • molecular structure       | • diffusion and osmosis               |
| • different types of bonds  | • ATP usage                           |
| • kinds of energy           | • DNA                                 |
| • macro and micro molecules | • cellular reproduction               |

You should be comfortable with skills such as exponential notation, measurement, metric conversions, scientific notation and geometry.

# Science Placement Test Sample Questions

## Dutchess Community College 2.04

The placement test will contain 40 questions.

You will be asked to use a number two pencil, and read the instructions on the sheet.

Your directions will say to darken the letter of the BEST answer on the answer sheet.

Answers to this practice quiz are at the end.

- The notation  $\text{Cl}^-$  indicates that the atom in question has:
  - lost one electron
  - gained one electron
  - lost one proton
  - gained one proton
  - not enough information is given to answer the question
- Place sodium in the appropriate category:
  - atom
  - tissue
  - organelle
  - molecule
  - compound
- A mole is
  - the atomic number
  - the oxidation number
  - the atomic weight
  - the valence number
  - the AMU of a molecule in grams
- $\text{CH}_3\text{COOH}$  is the molecular formula for a compound called *acetic acid*. This statement tells you that the dissociation products of acetic acid must be
  - $\text{H}_3$  and  $\text{C}_2\text{OOH}$
  - $\text{H}_2^+$  and  $\text{C}_2\text{OOH}_2^-$
  - $\text{H}_4$  and  $\text{C}_2\text{O}_2$
  - $\text{H}^-$  and  $\text{CH}_3\text{COO}^+$
  - $\text{H}^+$  and  $\text{CH}_3\text{COO}^-$
- Cellular respiration is a chemical process also known as the
  - catabolism of DNA
  - anabolism of starch
  - oxidation of DNA
  - oxidation of ATP
  - oxidation of glucose
- The *mitochondria* of a cell are the site of
  - lysosomal action
  - ATP production
  - amino acid production
  - protein synthesis
  - DNA synthesis
- The term *active transport* is best defined by
  - the movement of water
  - a process requiring ATP
  - net movement of a substance from an area of high to low concentration
  - a and b
  - b and c

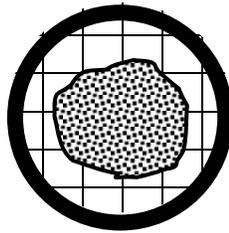
9. A solution with pH 5.8 is best described as being
- highly acidic
  - slightly acidic
  - highly alkaline
  - slightly alkaline
  - neutral
10. You place a 1% salt solution inside a sac whose pores are too small to allow the *solute* to pass. You then place the sac in a beaker of 10% salt solution. What will be the resulting movement?
- water will leave the sac by osmosis
  - water will enter the sac by osmosis
  - salt will leave the sac by osmosis
  - salt will enter the sac by osmosis
  - salt will enter the sac by facilitated diffusion
11. The building blocks of *DNA* are
- nucleotides
  - polypeptides
  - amino acids
  - glucose molecules
  - saturated fatty acids
12. If the temperature of a container containing a gas decreases, the pressure will
- Increase
  - Decrease
  - remain the same
  - cannot be answered with the information given
13. 24.0 milliliters equals \_\_\_\_\_ liters?
- 0.024
  - 0.24
  - 24
  - 2,400
  - 24,000
14. You know that a certain drug is administered at 13 milligrams for every 100 pounds of body weight. How much of the drug do you give a person who weighs 120 pounds?
- 10 milligrams
  - 13 milligrams
  - 15.6 milligrams
  - 1000 milligrams
  - 1560 milligrams
15. Which of the following equals  $10^{-8}$  grams?
- 8 grams
  - 8/10 grams
  - 8/1000 grams
  - 1/100000000 grams
  - 100,000,000 grams
16. Which is the smallest measurement listed?
- Micrometer
  - Millimeter
  - Decameter
  - Nanometer
  - Megameter

17. Choose the correct conversion factor ( $2.2 \text{ kg} = 1 \text{ lb}$ . OR  $2.2 \text{ lb.} = 1 \text{ kg}$ ) and use it to convert a weight of 22 lbs to kg.

- a. 0.1kg
- b. 1 kg
- c. 10 kg
- d. 100 kg
- e. 48.4 kg

18. You are observing a cell under a grid. Each square of the grid measures 0.33 mm. Which of the following best approximates the *horizontal diameter of the cell* you are observing?

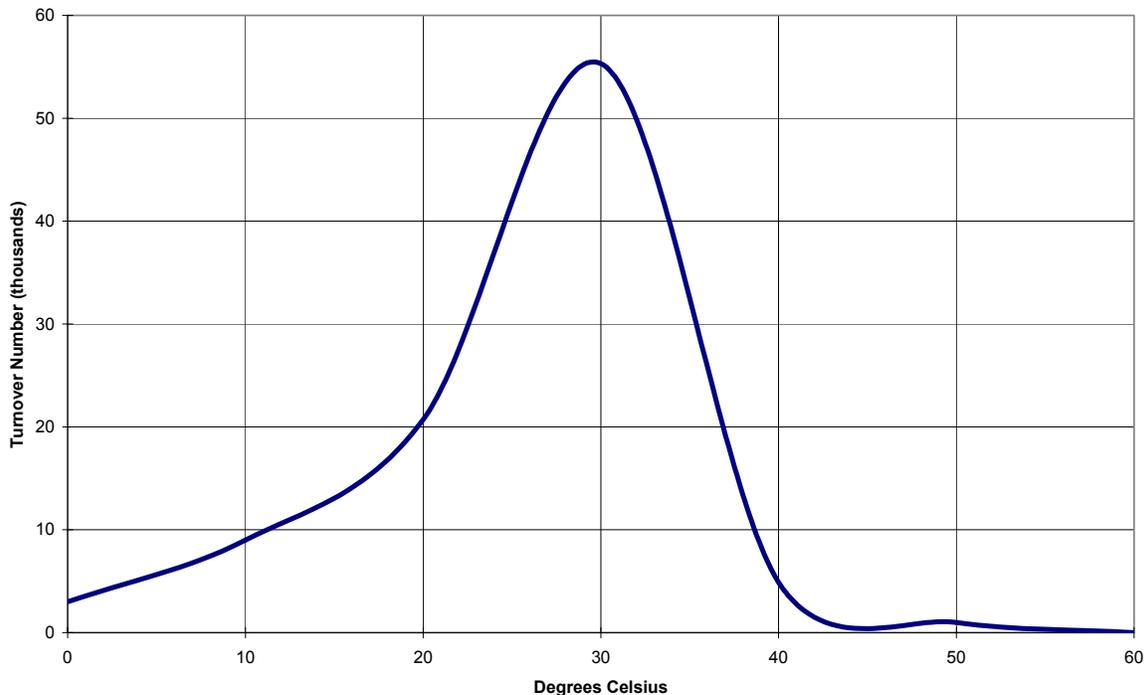
- a. 0.33mm
- b. 0.66mm
- c. 0.99mm
- d. 660mm
- e. 990mm



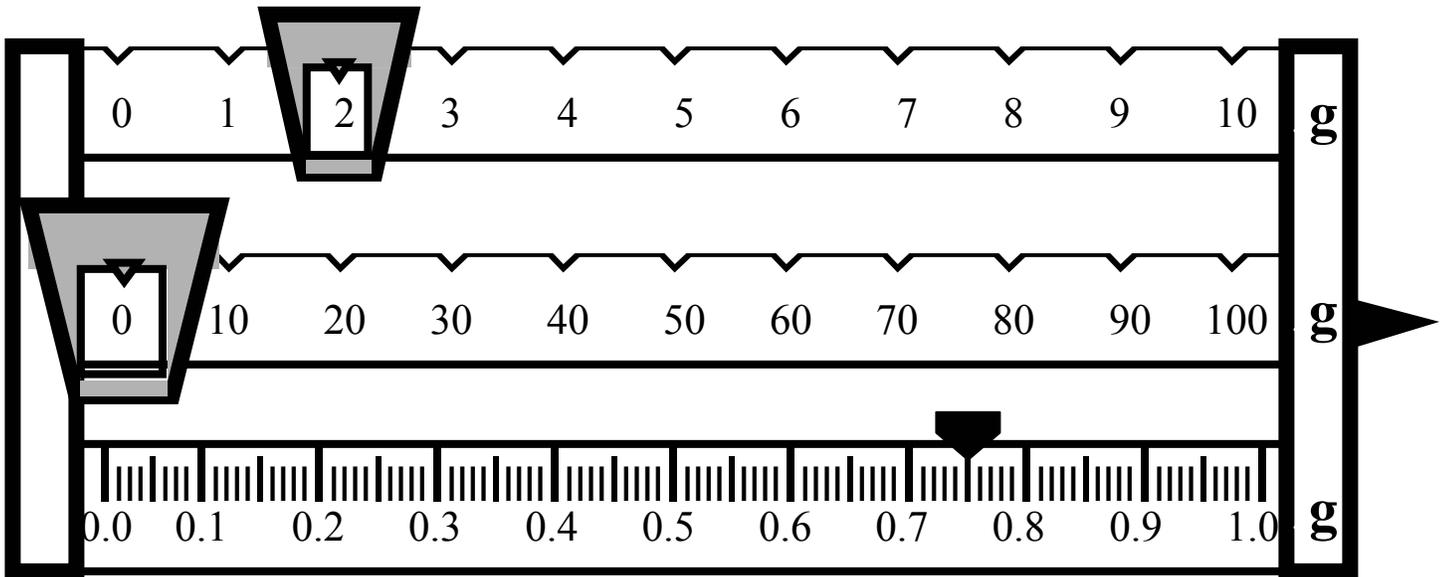
19. Analyze the graph below and choose from a-e to draw the most appropriate conclusion.

- a. the higher the temperature the higher the turnover rate;
- b. the most efficient turnover occurs at low temperatures;
- c. the most efficient turnover occurs at  $30^{\circ}\text{C}$  temperature;
- d. turnover rates increases temperature;
- e. very low and very high temperature increase turnover rate

**Enzyme Turnover Number vs Degrees Celsius**



20. The following is a diagram of a scale known as a triple beam balance that measures objects in grams. Read the total weight indicated on the scale in grams.
- a. 2 grams
  - b. 275 grams
  - c. 2.75 grams
  - d. 20.75 grams
  - e. 207.5 grams



Read the following paragraphs, and answer the questions below based on the information in the paragraph.

Lactose, a disaccharide sugar present in milk, consists of 2 smaller monosaccharide sugars, glucose and galactose. When lactose is ingested, it must be hydrolyzed into the two smaller molecules before it can be absorbed into the blood by the cells of the small intestine. An enzyme is secreted by the cells of the small intestine and must be present in order for lactose to be digested.

Lactose intolerance is due to the inability to digest the sugar lactose, which is found in milk. It was assumed that most individuals could digest lactose and therefore intolerance was the unusual condition. When test doses of lactose were administered to American blacks and whites, none of whom had had gastrointestinal complaints, there were some startling findings. Whereas only from 6 to 15 percent of the whites showed clinical symptoms of intolerance, about 70 percent of the blacks were intolerant. This immediately suggested that many human adults might be unable to digest lactose and more specifically, that there might be significant differences among ethnic groups. This possibility was soon confirmed by examining two different tribes in Uganda. It was found that only 20 percent of the cattle herding Tussi tribe were intolerant to

lactose but that 80 percent of the non-cattle herding Ganda tribe were intolerant. Soon many other ethnic groups were found to be intolerant to lactose.

To test for lactose intolerance, one would have to ingest a dose of lactose, which has been standardized at two grams of lactose per kilogram of body weight up to a maximum of 100 grams. One can then check for clinical symptoms of lactose intolerance, which include gas and diarrhea. These symptoms are variable and therefore not reliable.

One can do an intestinal biopsy to measure the activity of the enzyme involved in the digestion of lactose. This is inconvenient for the subject being tested. The preferred method to assess for lactose intolerance is to measure the increase in blood glucose levels as the lactose is digested. This is a direct measure of lactose breakdown and false-negative results are rare if the glucose is measured 15 minutes after lactose is administered.

21. How much lactose should be administered to test a person who weighs 65 kilograms?
  - a. 37 grams
  - b. 3.7 grams
  - c. 65 grams
  - d. 100 grams
  - e. 130 grams
22. One can infer from this paragraph that
  - a. lactose is broken down into glucose
  - b. glucose is broken down into lactose
  - c. diarrhea is a bad disease
  - d. intestinal biopsies are used to test for lactose intolerance
23. How much lactose should be administered to a child who weighs 42 kilograms?
  - a. 42 grams
  - b. 21 grams
  - c. 84 grams
  - d. 2.1 grams
  - e. 100 grams
24. Members of the Ganda tribe are tested with a dose of lactose. What percent of them will show the normal increase in blood glucose level?
  - a. 10
  - b. 15
  - c. 20
  - d. 40
  - e. 80
25. One learns from these paragraphs that
  - a. lactose intolerance is very unusual
  - b. lactose intolerance is genetically determined
  - c. all adults are lactose intolerant
  - d. many people are falsely diagnosed
  - e. a person who is lactose intolerant may get diarrhea from drinking milk

## Answers

1. b
2. a
3. e
4. c
5. e
6. e
7. b
8. b
9. b
10. a
11. a
12. b
13. a
14. c
15. d
16. d
17. c
18. c
19. c
20. c
21. d
22. a
23. c
24. c
25. e