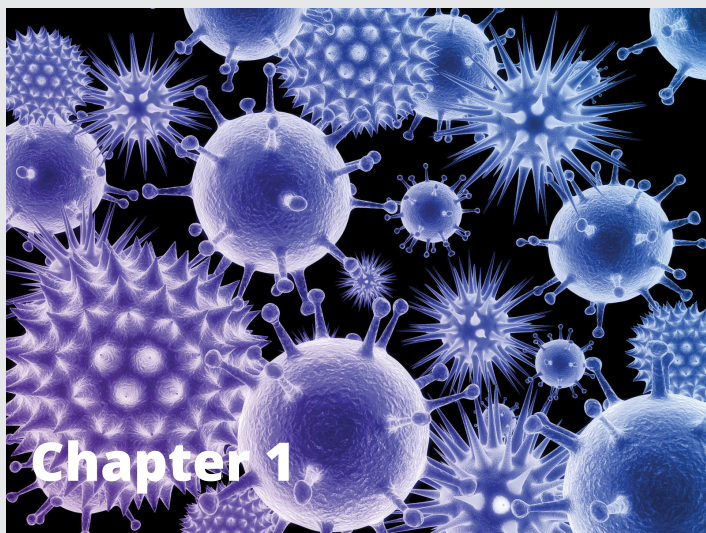


# LIFE SCIENCE

Instructor: Laura B. Barge, Ph.D.  
Textbook: Siyavula Life Science High School



## Chapter 1

### Lesson 1 - Introduction to Life Sciences

Read Sections 1.1 through 1.6

Note definition of key terms. Feel free to look up in dictionary those not explained to your understanding in the text.

#### 1.1 Life Sciences Orientation

- scientific method
- Life Sciences
- branches of Life Sciences
- hypothesis

#### 1.2 The Scientific Method

- variables
- controlled experiment
- experimental group
- control group
- dependent variable
- independent variable
- fixed/controlled variables
- validity of experiment
- reliability of experiment
- experimental errors

#### 1.3 Important principles and relationships in Life Sciences

- surface area
- volume

#### 1.4 Presenting data

- transverse section (T/S)
- cross section (C/S)
- longitudinal section (L/S)
- table
- line graph
- bar graph

- histogram
- pie chart

#### 1.5 Mathematical skills in Life Sciences

- scales
- averages
- percentages
- conversions

Complete Comprehension Quiz 1. Repeat until comprehension shows to be on desired level.

### Lesson 2 - Review and Assessment

Complete Comprehension Quiz 2. Repeat until comprehension shows to be on desired level (80% or higher recommended before continuing).

Complete Test 1. Repeat as needed.

Notes:

1) The word *data* is plural. Its singular form is *datum*. So we would say, "The datum is..." and, "The data are..."

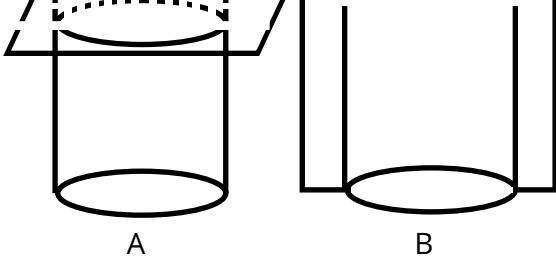
2) Some of the words in the text use British spelling instead of our more familiar American spelling. Words like "analyse" instead of our spelling "analyze." And "metre" instead of "meter." This should not cause any confusion once you know how to recognize the differences.

3) The British system uses a comma instead of a decimal point to divide the unit place from the tens place in a decimal number. Thus the text would show "12,6" whereas we would write it as "12.6"

# COMPREHENSION QUIZ 1

- 1) Which of the following is NOT considered a branch of Life Sciences?
- Taxonomy
  - Ecology
  - Geophysics
  - Genetics
- 2) Which is typically the first step in the scientific method?
- designing a controlled experiment
  - choosing a control group
  - identifying a problem or question
  - identifying the variables in a process
- 3) Sarah wants to design a Science Fair Experiment in the area of Life Sciences. Which of the following would NOT fall in the Life Sciences category?
- testing for genetically modified foods
  - building your own crystal radio set
  - testing a variety of foods on hamsters
  - correlating your body temperature to the time of day
- 4) True or False?
- 8) Which of the following is the definition of the "validity" of the investigation?
- Was it a fair test and did it test what it set out to test?
  - If the experiment were to be repeated would the results obtained be similar?
  - Did the result support the hypothesis?
- 9) Which of the following does NOT constitute a human error and therefore is a reasonable error to list in the experimental errors?
- improper measurement of liquids
  - fluctuation of room temperature
  - miscalculations
  - not following directions
- 10) An example of a large surface to volume ratio would be a:
- sphere
  - cube
  - long tubular shape
- 11) Which of the following is a transverse section?

Once you have a general question, background research needs to be undertaken to be sure you are not investigating something that has already been researched and answered.

- 5) Which of the following is the definition of the dependent variable in an experiment?
- the variables kept constant
  - a factor that is changed or controlled
  - the thing to be measured
- 6) Which of the following is NOT a key word used to express the aim of an investigation:
- to determine
  - to prove
  - to observe
  - to measure
- 7) True or False? The method should be written in the past tense using the passive voice, such as "The tomato plants were watered once a day at 10:00 am."
- 
- 12) In the previous question, which cross section is longitudinal?
- 13) Which of the following would be appropriate intervals for either axis on a line graph?
- 0, 3, 6, 9, 12...
  - 0, 5, 10, 15, 20...
  - 0, 7, 14, 21, 28...

not both?

14) True or False? The line on a line graph should always start at the origin.

15) Which type of graph would be best to represent the data of the frequency of certain ranges of birth weight of goats on a particular ranch.

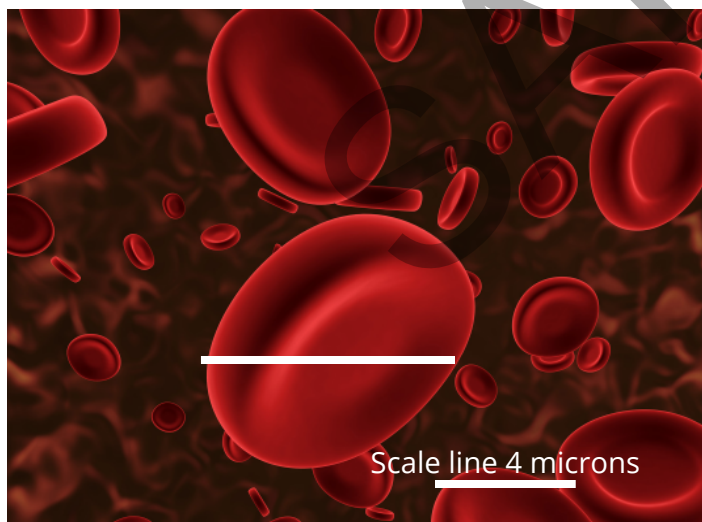
- a) line graph
- b) bar graph
- c) histogram

16) Samuel wants to create a histogram depicting the amount of time in a particular day he spent doing various activities. He calculated that he spent 8.5 hours sleeping. This would correlate to a percentage and a slice angle of:

- a) 35% and 126 degrees
- b) 25% and 126 degrees
- c) 35% and 140 degrees

17) The scanning electron micrograph picture below of a red blood cell gives a scale line of 4 microns (grey line at the bottom). Approximately what is the true width of the cell at the location of the white line?

- a) 6 microns
- b) 8 microns
- c) 10 microns



18) If there are 36 students in a class, 5 of which are left-handed, calculate the percentage of left-handed students.

What percentage are right-handed students, assuming all students use one hand or the other but

19) True or False? When spillages of chemicals occur, it is appropriate to wait until the experiment is over before you clean it up.

20) Which of the following is NOT an important lab safety rule?

- a) Take care not to cut yourself. If you draw blood, notify the person in charge immediately.
- b) The mouths of test tubes should always face away from any person when being heated.
- c) Hair and clothing should be secured. Always dress appropriately for the laboratory.
- d) Be sure to bring your own goggles and glasses from home to prevent contamination.

# COMPREHENSION QUIZ 2

1) Match the following branches of Life Science with their definition:

Anatomy	study of chemical process that occur within living organisms
Genetics	study of the forms of things
Biochemistry	study of the bodily structure of animals and humans
Morphology	study of the classification of animals
Taxonomy	study of heredity and inherited characteristics
Botany	study of insects
Entomology	study of plants

2) Which of the following is NOT a reasonable supposition to make when doing science:

- a) Creation is random and disorderly.
- b) There is a cause or reasonable explanation for every effect in creation.
- c) There is something tangible that can be learned about creation.

3) Which of the following represents the correct typical order of steps in the scientific method?

- a) identify problem, identify variables, make a hypothesis, generate prediction, design experiment, collect data, analyze data, make conclusions
- b) identify problem, make a hypothesis, identify variables, generate prediction, design experiment, collect data, analyze data, make conclusions
- c) identify problem, design experiment, identify variables, make a hypothesis, generate prediction, collect data, analyze data, make conclusions

4) A farmer notices that his tomato plants that are shaded have smaller tomatoes than his plants that are in a sunny spot. He wonders, "Does the

amount of sunlight a tomato plant receives affect the size of tomatoes?"

Which would be the independent variable in his experiment?

- a) mass or size of tomatoes
- b) how much light the tomato plants receive
- c) which species of tomato used
- d) what type of soil used
- e) how much water the plants receive

5) Which of the following is NOT an important quality for a hypothesis:

- a) being specific
- b) relating to the question asked
- c) expressible as a statement that includes the variables involved
- d) testable
- e) able to make a significant impact on society

6) True or False? The method you use to test your hypothesis should be written so that you are the only one who will be able to carry out the same procedure in the exact same way and get almost identical results.

7) True or False? Any results gotten that were not expected should be disregarded and the experiment repeated.

8) Which of the following is the definition of the "reliability" of the investigation?

- a) If the experiment were to be repeated would the results obtained be similar?
- b) Was it a fair test and did it test what it set out to test?
- c) Can the data be easily shown on a line graph?

9) True or False? If your original hypothesis does not match up with the final results of your experiment, it is acceptable to go back and change your hypothesis.

10) Which is an important rule to follow when drawing biological diagrams?

- a) draw with a sharp pencil
- b) draw two-dimensional (no shading)
- c) have a heading or caption
- d) all the above

11) True or False? In a table, the independent variable is placed in the first column.

12) Which type of graph is used when the relationship between the dependent and independent variables is continuous?

- a) line graph
- b) bar graph
- c) histogram

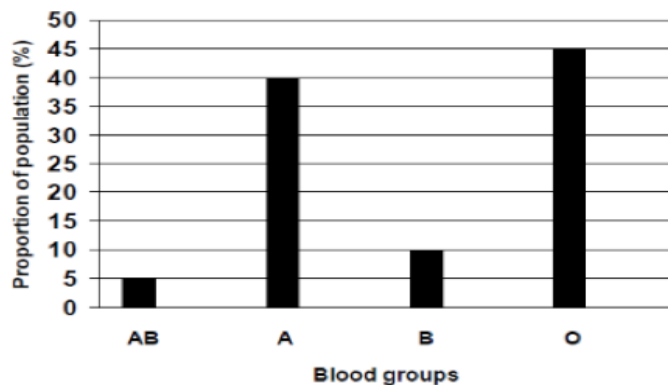
13) True or False? Line graphs need not have labels on the axis if it is obvious what the quantities represent.

14) Which type of graph would be best to represent the data of the number of students in a particular classroom with birthdays in each month of the year?

- a) line graph
- b) bar graph
- c) histogram

15) True or False? Pie charts are used when you want to give a visual representation of frequencies as a relative proportion of the total of a circle.

16) Convert the data in the graphs below into tables.



17) Thomas' last six science test grades were 94, 97, 93, 90, 91 and 99. What was his average test grade?

18) Which of the following are the most common length units used in Life Sciences?

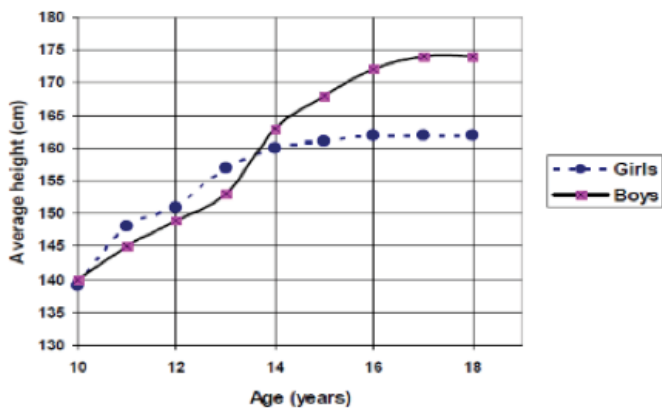
- a) km, m, cm, mm
- b) m, mm,  $\mu\text{m}$ , nm
- c) km, m, mm, nm

19) Which of the following solution is effective to neutralize acid spills in the laboratory?

- a) borax
- b) sodium bicarbonate (baking soda)
- c) ammonia
- d) sodium chloride (table salt)

20) When should a fume hood or cupboard be used?

- a) When working with hazardous chemicals and gases.
- b) When performing any experiment using a Bunsen burner.
- c) When using any acid.



# UNIT TEST - CHAPTER 1

1) Number the steps of the scientific method below in their proper order:

- \_\_\_ Identify variables
- \_\_\_ Design a controlled experiment
- \_\_\_ Generate aim/prediction
- \_\_\_ Identify a problem or question
- \_\_\_ Make conclusions
- \_\_\_ Collect data
- \_\_\_ Make a hypothesis
- \_\_\_ Repeat and revise if necessary
- \_\_\_ Analyze and present data

4) Plot the following data from the table onto the graph. Be sure to label horizontal and vertical axes. Connect the data points with line segments.

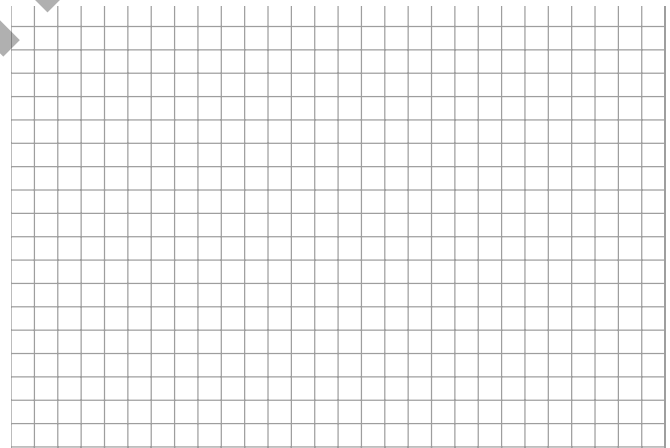
Time (s)	Speed (feet/sec)
0.0	0
1.0	3.0
2.0	7.0
3.0	12.0
4.0	18.0
5.0	30.0
6.0	45.0

2) Mark notices that his plants that are mulched with hardwood chips survive the summer heat better than the same plants that are covered in crushed granite. He wonders, "If all other factors are the same, does the type of mulch used affect moisture retention?"

Which would be the independent variable in his experiment?

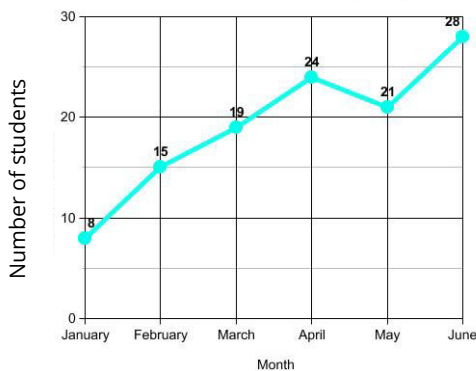
What would be the dependent variable?

What would be some of the fixed variables?



3) Convert the data in the graph into a table.

Number of students at skating rink on Mondays



5) Julie's last five science quiz grades were 80, 90, 93, 85 and 85. What was her average quiz grade?

6) There are 16 students in a class. Nine of the students are boys. What percentage of the students are boys? What percentage of the students are girls?