SCIENCE
Grade 8 Student Guide

Science is both a body of knowledge that represents current understanding of natural systems and the process that continually extends, refines, and revises that body of knowledge. Progress in science cannot be made without an understanding of both. While knowing specific facts and details about the natural world is important, science is much more than merely learning content. It is the active process of investigation and the critical review of evidence related to the world around us. Science is the process of gathering and evaluating information, looking for patterns, and testing possible explanations.

Students often wonder why science is necessary for them. Science students learn to think critically and to develop reasoning skills that allow them to become independent, lifelong learners. Science methods and thought processes have application well beyond the bounds of science, and students who understand the rules of evidence can transfer that knowledge into practical everyday life and to future endeavors.

A study by Arizona State University indicated that students who opt out of advanced levels of mathematics and science may now eliminate up to 75% of career opportunities from which to choose.[†] Employers want their employees to be able to make observations; gather, analyze, and critically review information; communicate information effectively; and work with other people to reach goals. It is clear that the science literacy of the twentieth century will **not** be sufficient for the twenty-first century.

[†]ASU Research, Fall, 1998, p. 41

ABOUT THE TEST

The science test contains 58 multiple-choice questions. Calculators are not allowed; however, the calculations required can be readily handled with pencil and paper. The questions will emphasize conceptual understanding, the inquiry process, and problem solving skills.

Hints for taking AIMS – Science

- Remember that this is **not** a timed test. Take your time and do your **best** work.
- Since calculators are not allowed on this test, double-check your work!
- Carefully read each question and all of the answer choices.

Sample Questions for Science

What To Expect From This Section

This AIMS Student Guide for Science provides examples of the format and types of questions that will appear on AIMS Science. An attempt has been made to provide a sampling of the types of questions that might be asked; however, not every concept in each strand has a corresponding sample question in this Guide. An answer key for all Science sample questions is provided in the appendices. Additionally, you will find an AIMS Reference Sheet of the Periodic Table of Elements at the end of this document. This reference sheet is identical to the one used in the AIMS Science test. **If mathematical formulas are required to solve a problem, they will be provided with the problem**.

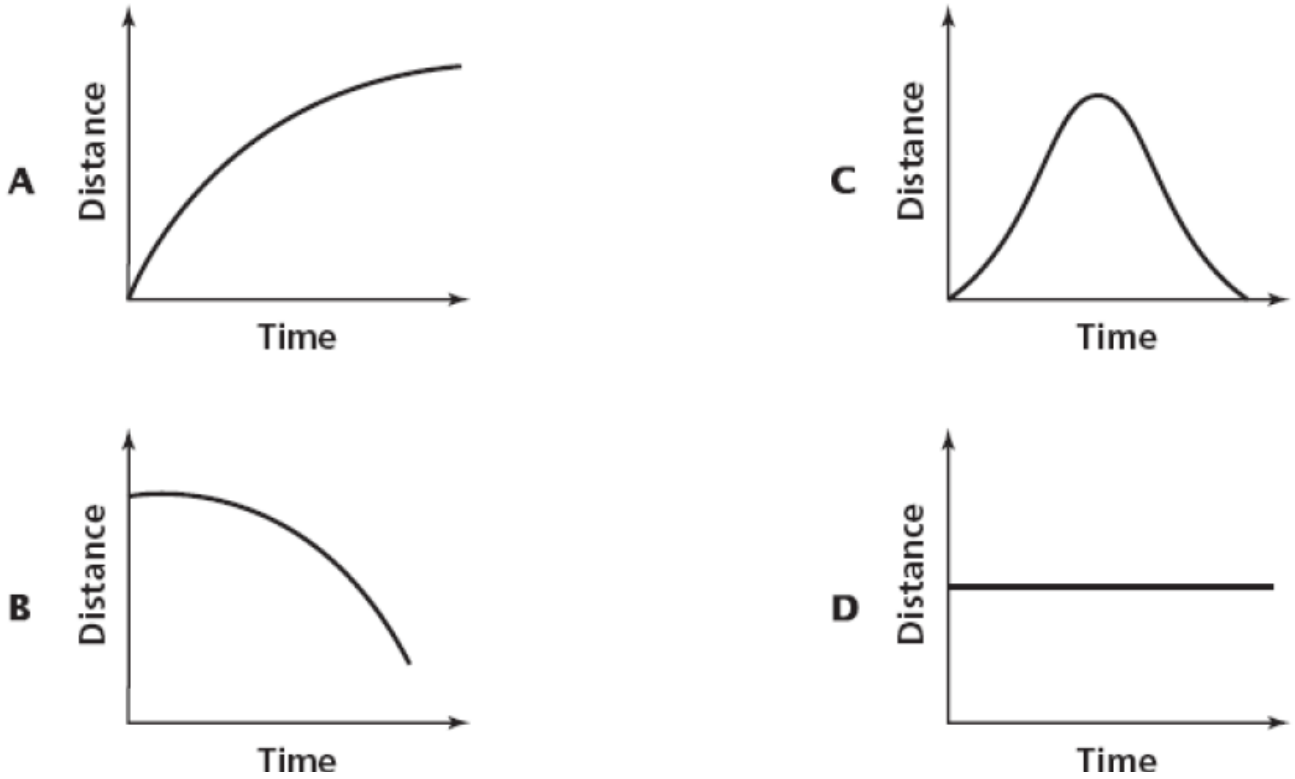
Strand 1: Inquiry Process

General concepts you should know:

- Formulate predictions, questions, or hypotheses based on observations. Locate appropriate resources.
- Design and conduct controlled investigations.
- Analyze and interpret data to explain correlations and results; formulate new questions.
- Communicate results of investigations.

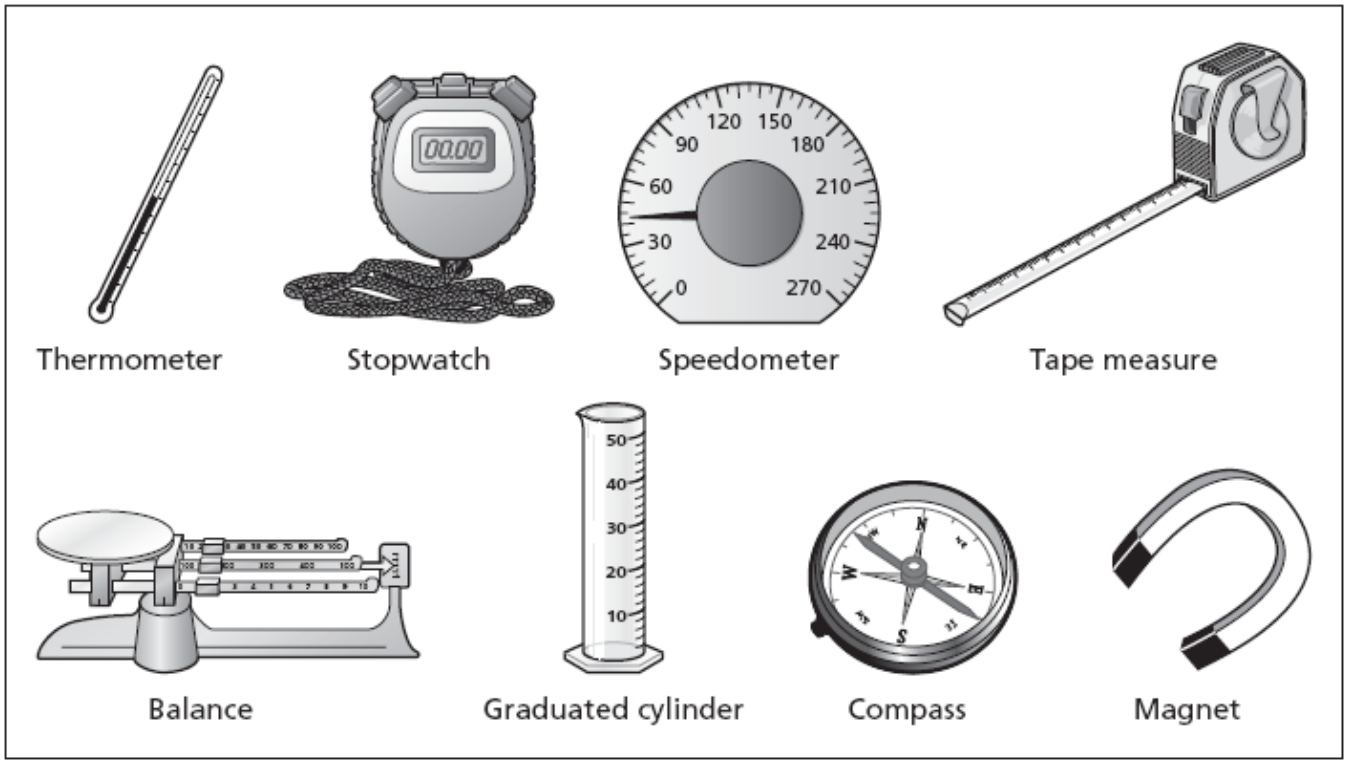
1.

After a baseball is thrown up into the air, it will eventually fall back down to Earth. Which graph **best** demonstrates the relationship between time and distance from Earth as the baseball falls?



Directions: Use the information below to answer Numbers 2 through 4.

Lee is planning an experiment to compare the velocity ($v = d/t$) of four objects with different masses and shapes when they are dropped from different heights. Lee must use only equipment from the diagram below to conduct his experiment.



2.

Which pieces of equipment are needed to calculate the velocity of a falling object?

A stopwatch and balance

B speedometer and magnet

C compass and tape measure

D tape measure and stopwatch

3.

During this experiment, which action would **most** likely lead to a measurement error?

A recording data in a table

B counting down before releasing the object

C conducting multiple trials from each height

D using different hand positions to release each object

4.

For his experiment, Lee made the list of steps below. The steps are **not** arranged in the correct order.

1. Measure the height from which the objects will fall.
2. Drop each object from the location marked.
3. Calculate the velocity for each object.
4. Mark the point from which each object must be dropped.
5. Record the time it takes the objects to fall.
6. Measure the mass of each object.

What is the **correct** order of steps for this investigation?

A 1, 2, 4, 5, 6, 3

B 2, 6, 5, 3, 1, 4

C 4, 2, 5, 3, 1, 6

D 6, 1, 4, 2, 5, 3

Strand 1 is also addressed in Item 16.

Strand 2: History and Nature of Science

General concepts you should know:

- Identify individual, cultural, and technological contributions to scientific knowledge.
- Understand how science is a process for generating knowledge.

5.

Some businesses offer customers the option to pay for merchandise using their fingerprints as identification. Which of the following would **most** benefit customers that use this new technology?

A cost of products is reduced

B protection of private information

C ability to track customer preferences

D funds would be credited immediately

Strand 2 is also addressed in Items 17 and 18.

Strand 3: Science in Personal and Social Perspectives

General concepts you should know:

- Describe the interactions between human populations, natural hazards, and the environment.
- Develop viable solutions to a need or problem.

6.

Which environmental risk is **not** associated with the disposal of used motor oil from cars?

A It is insoluble and difficult to clean up.

B It dissolves in water and causes acid rain.

C It enters storm drains and contaminates surface water.

D It leaks onto the ground and contaminates soil and ground water.

7.

Which of the following is a benefit of using radiation as a medical treatment?

A It kills cancer cells.

B It produces healthy cells.

C It improves immune system function.

D It prevents many forms of illness in patients.

Strand 4: Life Science

General concepts you should know:

- Understand the basic principals of heredity.
- Identify structural and behavioral adaptations.

8.

If Jessica has light eyes (bb) and both of her parents have dark eyes (Bb), which statement is **true**?

A Jessica inherited both genes from her father.

B Jessica inherited both genes from her mother.

C Jessica inherited one recessive form of the gene from each parent.

D Jessica inherited one dominant form of the gene from each parent.

9.

Which statement about the genetic traits of humans is **true**?

A Recessive forms of genes are always visible in offspring.

B Visible traits are the same for each member of a family.

C Dominant forms of genes are always inherited from both parents.

D Visible traits depend on the dominant and recessive forms of genes from each parent.

10.

In a desert environment, cactus wrens often build their nests in cholla cacti to avoid predators. This behavior does not hurt the cacti. Which type of relationship do cactus wrens and cholla cacti demonstrate?

A competitive

B commensalism

C mutualism

D parasitism

11.

Which of the following is an example of organisms becoming dormant?

A birds flying south in the winter

B plants flowering in the summer

C trees losing their leaves in the fall

D earthworms living underground all year

Strand 5: Physical Science

General concepts you should know:

- Understand the physical and chemical properties of matter.
- Understand the relationship between force and motion.

12.

James placed a breath mint and a lump of toothpaste in a cup of water and let it sit overnight. Which statement **best** explains why the breath mint was gone the following morning, but the toothpaste was still at the bottom of the cup?

A The breath mint was less soluble than the toothpaste.

B The breath mint was more soluble than the toothpaste.

C The breath mint had a lower density than the toothpaste.

D The breath mint had a greater density than the toothpaste.

13.

Which substance would **most** neutralize an acidic food?

A dairy (pH 5–7)

B water (pH 6–7)

C citrus fruit (pH 2–3)

D baking soda (pH 8–9)

Directions: Use the Periodic Table of Elements to answer Number **14**.

14.

Which sentence about the periodic table of elements is **true**?

A All elements in period 2 are metals.

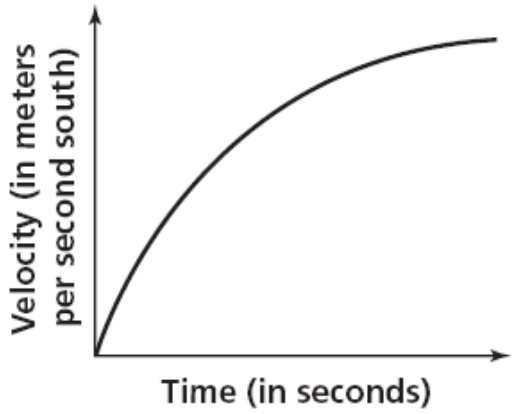
B All elements in group 18 are metals.

C Metals are found on the left side of the periodic table.

D Metals are found on the right side of the periodic table.

15.

Look at the velocity-time graph below.



According to the graph, the acceleration of the object is

A constant.

B decreasing.

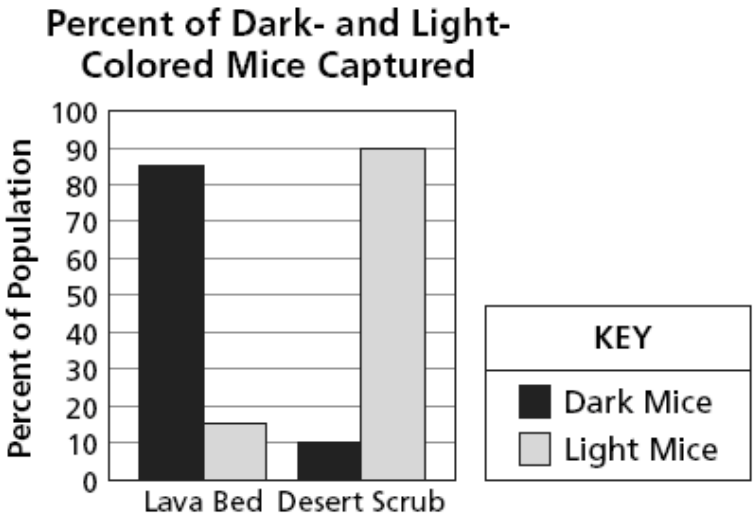
C increasing.

D zero.

The following item set addresses Strand 1 (Inquiry Process) and Strand 2 (History and Nature of Science):

Directions: Use the information below to answer Numbers **16 and 17.**

A recent study focused on the color variations of a certain species of mouse living in two neighboring habitats. Habitat 1 is a dark-colored, hardened lava bed, and habitat 2 is desert scrub with light-colored soil located at the edge of the lava bed. The graph shows the percent of dark-colored and light-colored mice captured in each habitat.



16.

Which hypothesis was **most** likely being tested in this investigation?

A Individuals of a species always stay in the same environment.

B Individuals of a species are the same size in any environment.

C Individuals of a species living in different habitats are different sizes.

D Individuals of a species living in different habitats have different colors of fur.

17.

The scientist who conducted this study claimed that the results could be used to predict color variation in other mouse populations throughout Arizona. Which statement **best** explains why this claim is questionable?

A The scientist did not include a control in this study to verify the data.

B The amount of data collected from each habitat was too small to be accurate.

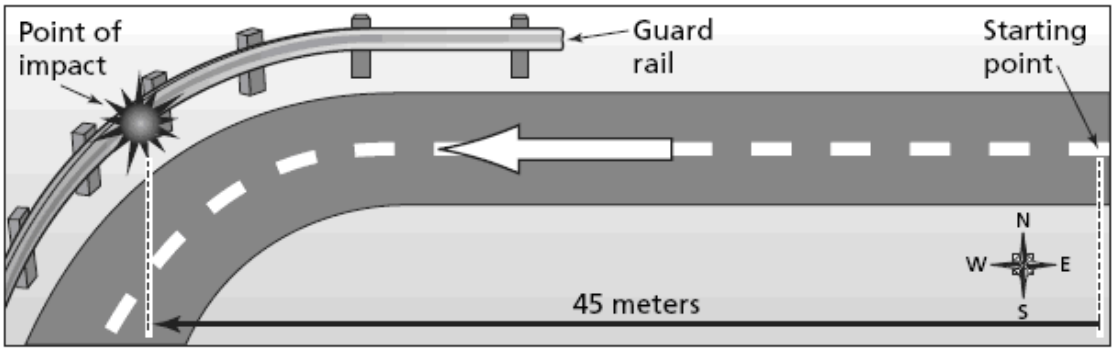
C Conclusions about mice at the study site may not accurately represent other populations in Arizona.

D Environmental conditions at the study site may be similar to environmental conditions in other parts of Arizona.

The following item set addresses Strand 2 (History and Nature of Science) and Strand 5 (Physical Science):

Directions: Use the information below to answer Numbers **18** through **20**.

Students in Ms. Barrett's science class visited a vehicle crash-test facility. The students observed four different types of vehicles crash against a guard-rail barrier at the end of a 45-meter track as shown in the diagram below. They recorded information about each crash test in the table below.



Crash Test Data and Percent Vehicle Damage

Vehicle	Vehicle Mass (in kilograms)	Distance Traveled (in meters)	Travel Time (in seconds)	Vehicle Damage (in percent)
1	1,000	45	9	15
2	1,500	45	10	20
3	2,000	45	12	42
4	2,500	45	15	65

18.

Two of Ms. Barrett's students would like to design safer automobiles when they grow up. Which subject is **least** important for an automobile designer to study?

A forces and motion

B human health and biology

C properties of rocks and minerals

D properties of metals and plastics

19.

What was the velocity ($v = d/t$) of vehicle 4 when it crashed into the guard rail?

A 0.2 meters per second west

B 0.3 meters per second west

C 3.0 meters per second west

D 5.0 meters per second west

20.

The students were told that the net applied force from the engine was the same for each vehicle tested. Based on this information, which vehicle had the **greatest** acceleration ($a = F/m$)?

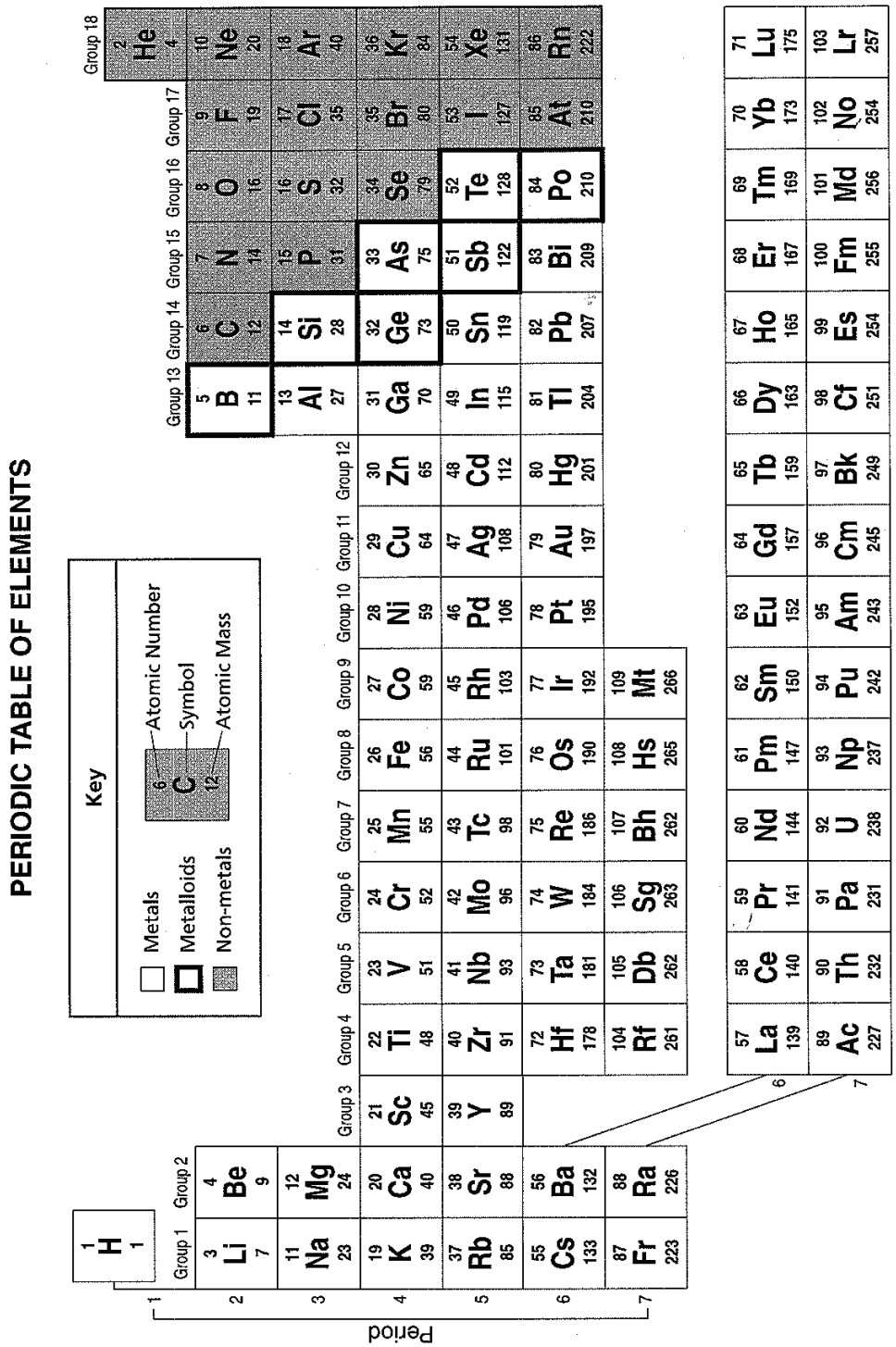
A vehicle 1

B vehicle 2

C vehicle 3

D vehicle 4

Scoring Key and Coding of Items

Science Key:		**Strand**:	**Concept**:	**PO**
Question #1:	B	1	3	3
Question #2:	D	1	2	4
Question #3:	D	1	3	6
Question #4:	D	1	4	4
Question #5:	B	2	1	3
Question #6:	B	3	1	1
Question #7:	A	3	2	4
Question #8:	C	4	2	2
Question #9:	D	4	2	3
Question #10:	B	4	4	4
Question #11:	C	4	4	5
Question #12:	B	5	1	1
Question #13:	D	5	1	2
Question #14:	C	5	1	6
Question #15:	B	5	2	5
Question #16:	D	1	1	3
Question #17:	C	2	2	4
Question #18:	C	2	1	4
Question #19:	C	5	2	1
Question #20:	A	5	2	3

Eighth Grade
AIMS Reference Sheet