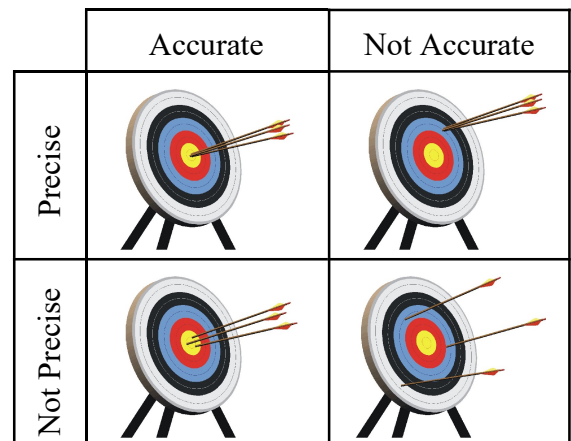


# Test Review No 1

**Nature of Science.** Science seeks answers to questions about the world around us, much like you do everyday. Scientists take additional steps to verify their conclusions that most of us don't take in our daily lives. Scientists carefully build on the conclusions of researchers who came before them. Because the body of knowledge has grown so large, it is necessary for scientists to specialize in specific branches of science such as *life science*, *physical science*, and *earth science*. Some scientists specialize in applying the knowledge that others have acquired. They develop the **technology** we enjoy each day. Others concentrate on acquiring new knowledge. They develop the **laws** and **theories**, or explanations that we study when trying to learn science.

**Scientific Method.** The scientific method is a systematic approach to solving problems. Observation or data collection occurs at all points in the scientific method. Initial observations raise questions, for which scientists propose explanations or **theories**. The work of the scientist proceeds in an orderly fashion through a series of steps: [1] Observations lead to a **question**; [2] Scientists form a **hypothesis** or a testable prediction that fits with the theory; [3] An **experiment** is done to test the hypothesis. An experiment must be controlled. A **control** is a standard for comparison. This means the test group is identical to the control group in all respects except for the variable being tested. [4] After an experiment a **conclusion** can be formed as to whether or not the hypothesis is supported.

**Accuracy and Precision.** **Accuracy** is how close a measurement is to an actual or accepted value. **Precision** refers to the repeatability of a measurement. It also refers to the number of decimal places of a measurement. The difference is well illustrated by the table to the right, which shows the possible outcomes when trying to shoot a bulls-eye with an arrow. The table below shows the times recorded on your watch and that of a friend's for a factory lunch whistle that blows at noon.



Your watch is pretty accurate, but it is not precise. Your friend's watch is very precise, but it is not accurate.

Day	Time	
	Yours	Your Friend's
Monday	12:01 pm	12:10 pm
Tuesday	11:59 am	12:10 pm
Wednesday	12:01 pm	12:10 pm
Thursday	11:58 am	12:10 pm
Friday	12:03 pm	12:10 pm

**Metric Units and Prefixes.** The metric system uses a system of prefixes to show fractions and multiples of the basic units. The basic units are meters (m) to measure distance, grams (g) to measure mass, and liters (L) to measure volume. Some of the important prefixes are shown to the right.

An easy way to convert among metric units is to list factors of 10 from high to low, including the prefixes. Then when you do a conversion, the list shows you how many places and in what direction to move the decimal. The arrow under the table to the right shows how to convert from deci to centi.

Kilo (k)	=	1,000	=	$10^3$
Deci (d)	=	0.1	=	$10^{-1}$
Centi (c)	=	0.01	=	$10^{-2}$
Milli (m)	=	0.001	=	$10^{-3}$
micro ( $\mu$ )	=	0.000001	=	$10^{-6}$
nano (n)	=	0.000000001	=	$10^{-9}$
pico (p)	=	0.000000000001	=	$10^{-12}$

$10^3$	$10^2$	$10^1$	1	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-4}$	$10^{-5}$	$10^{-6}$	$10^{-7}$	$10^{-8}$	$10^{-9}$	$10^{-10}$	$10^{-11}$	$10^{-12}$
k	-	-	none	d	c	m	-	-	$\mu$	-	-	n	-	-	p



**Answer the questions below by circling the number of the correct response**

1. Which of the following questions might be able to be answered by science? (1) Does life exist anywhere else in the universe? (2) Does pasta taste better than rice? (3) Do roses smell good? (4) Is math hard?
2. In which branch of science is the study of chemistry and physics placed? (1) life science (2) physical science (3) earth science (4) none of these
3. Which of the following is a standard for comparison? (1) a hypothesis (2) an experiment (3) a control (4) a conclusion
4. A scientist tested the hypothesis that rats become aggressive when they are crowded together by counting the number of fights per rat that occurred in a week in a crowded cage. How can this experiment be made into a controlled experiment? (1) Compare the crowded rats to less crowded rats. (2) Compare the experimental group of rats to friendlier rats. (3) Count the number of friendly encounters between rats too. (4) Train the rats to control their aggressive tendencies.
5. An experiment is successful only if (1) its hypothesis is correct, (2) its hypothesis is incorrect, (3) it results in a new scientific law, (4) it indicates clearly whether or not its hypothesis is supported.
6. Which is not an acceptable technique for solving scientific problems? (1) hypothesis formation (2) observation (3) experimentation (4) rationalization
7. A scientist wanted to determine if plants grow better when they are talked to regularly. The scientist placed a tape recording of people talking in a room where plants were growing and measured their growth every day for a month. What is missing in this experiment? (1) a hypothesis (2) a test variable (3) a control (4) observations
8. Which of the following lists some of the key steps of the scientific method in the correct order? (1) experiment, hypothesis, conclusion (2) hypothesis, experiment, conclusion (3) conclusion, experiment, hypothesis (4) experiment, conclusion, hypothesis
9. Which of the following refers to the repeatability of a measurement? (1) accuracy (2) estimation (3) error (4) precision.
10. Which of the following represents the most precise set of measurements of a 2.49 g nugget of gold? (1) 2.75 g, 2.75 g, and 2.75 g (2) 2.48 g, 2.55 g, and 2.45 g (3) 2.75 g, 2.49 g, and 2.35 g (4) 2.47 g, 2.49 g, and 2.51 g
11. Which of the following is largest? (1) 25 ps (2) 25  $\mu$ s (3) 25 ds (4) 25 cs
12. Which of the following is the smallest? (1) 83  $\mu$ L (2) 83 nL (3) 83 cL (4) 83 kL
13. Which is the equivalent of 750. joules? (1) 0.750 kJ (2) 7.50 kJ (3) 75.0 kJ (4) 750. kJ
14. Which of the following could represent an object's mass? (1) 2.54 cm (2) 9.50 L (3) 8.46 kg (4) 0.95 ps
15. Which is the equivalent of 1250. microliters? (1) 1.250 L (2) 1.250 kL (3) 1.250 cL (4) 1.250 mL
16. Which of the following could represent the space an object occupies? (1) 3.4 cm (2) 4.2 L (3) 4.6 kg (4) 6.3 ps
17. Which is the equivalent of 0.500 ks? (1) 500. s (2) 50.0 s (3) 0.000500 s (4) 5.00 s
18. How many millimeters are in 2,450 nm?
19. How many microliters are in 0.049 dL?
20. How many centiseconds are in 25,000 ps?

5. 4	10. 1	15. 4	20. 0.0000025 cs
4. 1	9. 4	14. 3	19. 4,900 $\mu$ L
3. 3	8. 2	13. 1	18. 0.00245 mm
2. 2	7. 3	12. 2	17. 1
1. 1	6. 4	11. 3	16. 2

**Answers**