

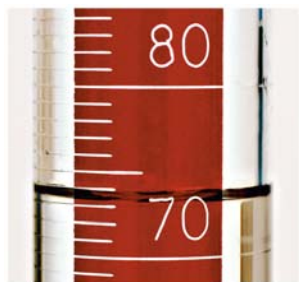
## FAQs for UNIT 1 EXAM (Doing Science)

1. What does the test cover?  
All the material in the Unit 1 study guide and homework.
2. How is it structured?  
There are 15 multiple choice questions and 4 free response questions. The test is worth 100 points.
3. What can I use on the test?  
I will give you a periodic table. You may use a calculator on the free response section only (no calculator on multiple choice). No notes or books on any part of the test.
4. What is on the multiple choice section?  
Concepts like scientific method, uncertainty in measurements and calculations, Avogadro's hypothesis, and the mole concept. Read each question carefully.
5. What is on the free response section?  
Calculations. Show your setups in detail, with units at every step as well as in the answer, and round the answer to the correct number of sigfigs. **No setup = no credit**, even if the answer is correct.
6. What is the best way to study for your test?  
Review the homework (Cornell format really helps here), review the summary you made of the study guide, and do the practice test.

## PRACTICE TEST for UNIT 1 EXAM

1. A student studies a burning candle and records his observations, some of which are shown in the list at right. Which items are direct observations and which are really interpretations of what he saw?
  1. *candle is cylindrical, ~ 6" tall, ~1" in diameter*
  2. *candle made of wax*
  3. *when lit, burns w/ a blue & yellow flame*
  4. *heat produced while burning*
  5. *candle gets shorter as it burns*
  6. *melted wax pools at base of flame and runs down side*
2. The student proposes that the candle gets shorter because the wax is burned to produce carbon dioxide and water vapor.
  - a. The student's idea is best described as
    - i. an observation
    - ii. a hypothesis
    - iii. a law
    - iv. an experiment
    - v. a theory or model
  - b. Propose a way for the student to test his idea.
3. What is the difference between a hypothesis, a scientific law, and a theory/model?
4. Identify each of the following ideas about ocean waters as an observation, a law, or a theory/model:
  - a. All coastal areas experience two high tides and two low tides each day.
  - b. Ocean tides are caused mainly by the gravitational attraction of the moon.
  - c. Yesterday, high tide in San Francisco Bay occurred at 2:43 am and 3:07 pm.
  - d. Tides are higher at the full moon and new moon than at other times of the month.

5. Record the reading on each instrument to the appropriate number of sigfigs. Include the unit.



a. volume



b. temperature



c. volume



d. mass

6. Round each calculation to the correct number of sigfigs, and add the appropriate unit to the answer.

a.  $22.9898\text{ g} + 1.00794\text{ g} + 12.011\text{ g} + 3(15.9994\text{ g}) = 84.00694$

b.  $23.62\text{ mL} \times \frac{0.000518\text{ g}}{\text{mL}} = 0.01223516$

c.  $35.73\text{ mL} - 22.064\text{ mL} = 13.666$

d.  $\frac{5230\text{ g}}{385\text{ mL}} = 13.58441558$

e.  $235\text{ g} \times \frac{4.184\text{ J}}{\text{g } ^\circ\text{C}} \times 5.8^\circ\text{C} = 5702.792$

7. a. State Avogadro's hypothesis.

b. Imagine 2 balloons of identical volume at the same temperature and pressure, one filled with carbon dioxide and one filled with helium. The helium weighs 0.45 g and the carbon dioxide weighs 4.9 g. Which balloon contains more gas molecules?

c. Why is the mass of carbon dioxide gas greater than the mass of helium gas?

d. What is the relative mass of carbon dioxide, compared to helium?

8. a. Use the periodic table to determine the relative mass of each element, compared to carbon.

i. Cr    ii. Li    iii. I

b. Find an element that is

i. about three times as heavy as oxygen (O)

ii. about 0.25 time as heavy as Br

iii. about three times as heavy as Mg

iv. about 1/3 as heavy as Al

9. a. How many particles are in a mole?

b. What is this number called?

10. Perform each calculation and round appropriately. Be sure to include units!

a. Calculate the molar mass of

i.  $\text{K}_2\text{SO}_4$     ii.  $\text{C}_2\text{H}_5\text{OH}$     iii.  $\text{NH}_4\text{NO}_3$

b. Find the mass of

i. 2.48 mol Cu    ii. 0.063 mol Au    iii. 0.0500 mol  $\text{SO}_2$

c. How many moles are in

i. 23.60 g Ne    ii. 1.48 g Ca    iii. 7.3 g  $\text{CH}_4$

d. Calculate the number of atoms in

i. 1.8 mol Ar    ii. 0.0635 mol Fe    iii. 0.00150 mol Pb

## ANSWERS to Practice Exam for Unit 1

- #1 & 6 are interpretations; student has assumed candle is wax and liquid is melted wax.
- hypothesis; capture whatever is produced by the burning candle and use the splint test to check for carbon dioxide
- A hypothesis is a tentative explanation for a specific observation or set of observations; a law summarizes past observations and predicts future ones without explaining them; a theory or model is a well-supported explanation of a broad set of observations and/or laws.
- a. law   b. theory   c. observation   d. law
- a. 73.2 mL   b. 88.7 °C   c. 4.50 mL   d. 0.873 g
- a. 84.007 g   b. 0.0122 g   c. 13.67 mL   d. 13.6 g/mL   e. 5700 J
- a. Equal volumes of gases at the same temperature & pressure contain equal numbers of molecules.  
b. They contain the same number of gas molecules (equal volumes at same temperature & pressure).  
c. A molecule of carbon dioxide weighs more than a molecule of helium.  
d.  $\frac{4.9\text{g}}{0.45\text{g}} = 11$  (A carbon dioxide molecule is 11 times as heavy as a helium molecule)
- a. i.  $\frac{52.00}{12.011} = 4.329$    ii.  $\frac{6.941}{12.011} = 0.5779$    iii.  $\frac{126.90}{12.011} = 10.565$   
b. i. Ti   ii. Ne   iii. Ge   iv. Be
- a.  $6.02 \times 10^{23}$    b. Avogadro's number
- a. i. 174.26 g/mol   ii. 46.07 g/mol   iii. 80.05 g/mol  
b. i. 158 g   ii. 12 g   iii. 3.20 g  
c. i. 1.169 mol   ii. 0.0369 mol   iii. 0.46 mol  
d. i.  $1.1 \times 10^{24}$  atoms   ii.  $3.82 \times 10^{22}$  atoms   iii.  $9.03 \times 10^{20}$  atoms