

SOLUTIONS AND TESTS FOR
EXPLORING CREATION WITH
**PHYSICAL
SCIENCE**

3rd EDITION

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Dincher



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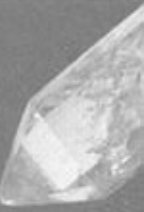
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THE HISTORY OF SCIENCE— SEARCH FOR THE TRUTH

SOLUTIONS TO THE STUDY GUIDE FOR MODULE I



1. Match the word with its definition.

- | | | |
|-----------------------------|---|--|
| a. Quantitative observation | — | Tentative explanation for an observation |
| b. Qualitative observation | — | A well-supported, in-depth explanation of a broad range of phenomena |
| c. Hypothesis | — | Observations made using 5 senses |
| d. Variable | — | Observations made using numbers or measurements |
| e. Scientific Theory | — | Conclusions based on observations, previous knowledge, and available information |
| f. Inference | — | Any factor that changes in an experiment |

2. You can graph quantitative data because data involve numbers or measurements which can be graphed. How something looks, feels, or smells cannot be graphed.

3. a. *centi-* means 0.01
 b. *milli-* means 0.001
 c. *kilo-* means 1,000

4. In the metric system:
 - a. mass is measured in kilograms (kg) (Grams is also accepted.)
 - b. length is measured in meters (m)
 - c. solid volume is measured cubic meters (m³)
 - d. liquid volume is measured in liters (L)
5. A conversion factor shows the relationship between one unit and another. An example is 0.01 m = 1 cm (there can be many others—use Table 1.2 to check). The reason conversion factors are helpful in physical science is because all conversion factors equal 1 so you can easily convert between units.
6. c. To convert from centimeters to meters, you would want centimeters in the denominator and meters in the numerator, so centimeters cancel out. Therefore you should write your conversion factor as 1 m/100 cm.
7. b. In km, the “m” stands for meter.
8. a. 1 kW = 1,000 W since “k” stands for *kilo-* or 1000.
9. First find the conversion factor. According to Table 1.2 the prefix *centi-* means 0.01. So, we write the relationship, keeping the 1 with cm (since it is the prefix unit) and putting the definition of *centi-* with the base unit:

$$1 \text{ cm} = 0.01 \text{ m}$$

Now you can start the problem. Always start a problem by writing down what you know (or are given in the problem) and write it in fraction form (place over 1):

$$\frac{1.3 \text{ m}}{1}$$

Since we want to end up with m, we must place cm of our conversion factor on the bottom, so it cancels out. The problem looks like:

$$\frac{1.3 \text{ m}}{1} \times \frac{1 \text{ cm}}{0.01 \text{ m}} = 130 \text{ cm}$$

Given	Conversion	Wanted
Unit	Factor	Unit

Thus, 1.3 m = 130 cm.

10. First find the conversion factor. According to Table 1.2 the prefix *kilo-* means 1,000. So, we write the relationship, keeping the 1 with kg (since it is the prefix unit) and putting the definition of *kilo-* with the base unit:

$$1 \text{ kg} = 1,000 \text{ g}$$

Now you can start the problem. Always start a problem by writing down what you know (or are given in the problem) and write it in fraction form (place over 1):

$$\frac{75 \text{ kg}}{1}$$

Since we want to end up with g, we must place kg of our conversion factor on the bottom, so it cancels out. The problem looks like:

$$\frac{75 \text{ kg}}{1} \times \frac{1,000 \text{ g}}{1 \text{ kg}} = 75,000 \text{ g}$$

Given	Conversion	Wanted
Unit	Factor	Unit

Thus, $75 \text{ kg} = 75,000 \text{ g}$.

11. In this case the conversion factor is given...

$$1 \text{ in} = 2.54 \text{ cm}$$

Now you can start the problem. Always start a problem by writing down what you know (or are given in the problem) and write it in fraction form (place over 1):

$$\frac{100.0 \text{ cm}}{1}$$

Since we want to end up with in, we must place cm of our conversion factor on the bottom, so it cancels out. The problem looks like:

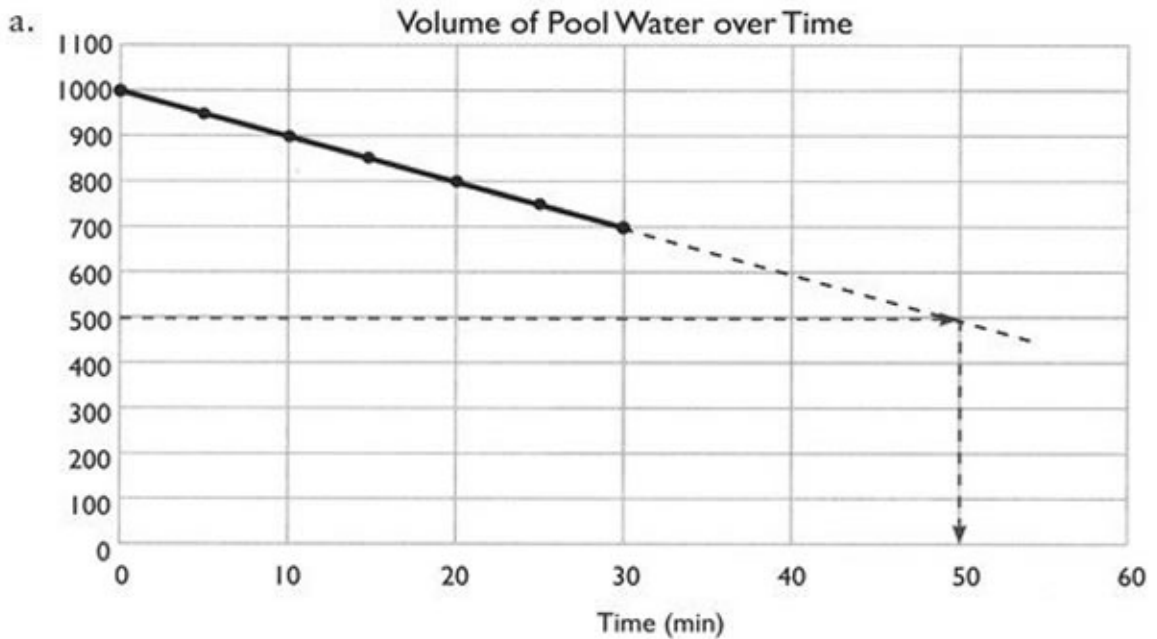
$$\frac{100.0 \text{ cm}}{1} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = 39.4 \text{ in}$$

Given	Conversion	Wanted
Unit	Factor	Unit

Thus, $100.0 \text{ cm} = 39.4 \text{ in}$. Note that I rounded the answer. The actual answer was 39.370078740, but there are simply too many digits in that number. When you take chemistry, you will learn about significant figures, a concept that tells you where to round numbers off. For right now, don't worry about it. If you rounded at a different spot, that's fine.

12. Student graphs should look something like (Titles may be different and bottom scale may not extend to 60 min. Student graph should have a title and labeled axes

with units. This graph shows how a student can extrapolate to find the answer to part c.)...



- b. As the time increased, the volume decreased. So the line in the graph shows an inverse or indirect relationship.
- c. Half the water (500 L) will be left in the pool after 50 minutes have passed. (Extrapolate the line and then follow horizontally from 500 L to the dotted line and then down to the time.) The pool should be empty in $2 \times 50 \text{ min} =$ 100 minutes (1 hour, 40 minutes).



TESTS

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