

THE 100+ SERIES™

Grades
5-12

PHYSICAL SCIENCE

Essential Practice for Key Science Topics



- Great extension activities for physics and chemistry units
- Correlated to standards
- Comprehensive array of physical science topics
- Fascinating puzzles and problems

The Scientific Method

Arrange the steps of the scientific method in the proper order.

- _____ Research the problem.
- _____ Observe and record.
- _____ Make a hypothesis.
- _____ Identify the problem.
- _____ Arrive at a conclusion.
- _____ Test the hypothesis.



Match each term with the correct definition.

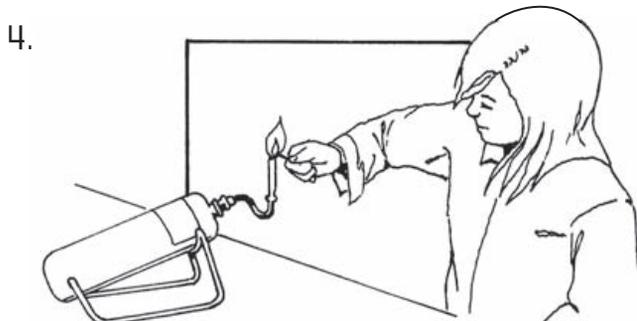
- | | |
|---------------------|--|
| _____ 1. hypothesis | A. organized process used to test a hypothesis |
| _____ 2. control | B. an educated guess about the solution to a problem |
| _____ 3. variable | C. observations and measurements recorded during an experiment |
| _____ 4. experiment | D. a judgment based on the results of an experiment |
| _____ 5. conclusion | E. a logical explanation for events that occur in nature |
| _____ 6. theory | F. used to show that the result of an experiment is really due to the condition being tested |
| _____ 7. data | G. factor that changes in an experiment |

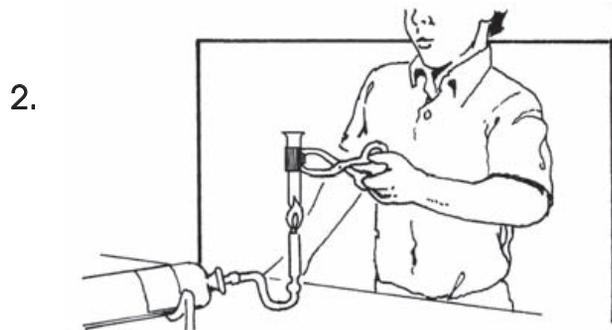


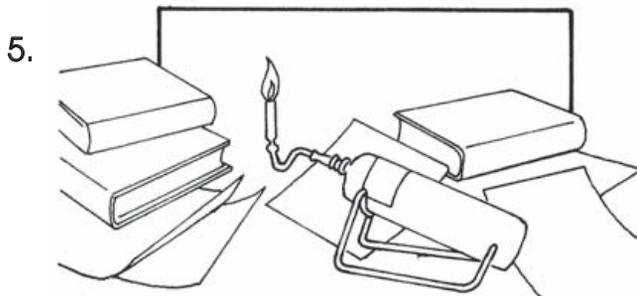
Safety in the Laboratory

Identify what is wrong in each laboratory situation.









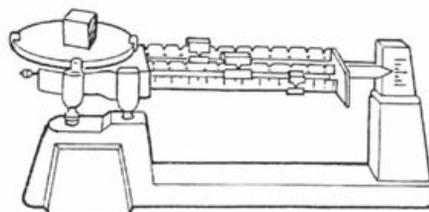
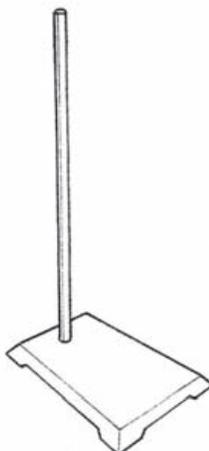
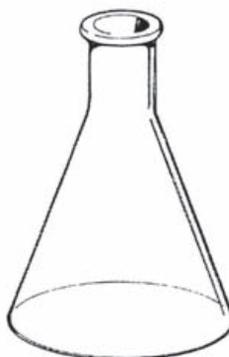
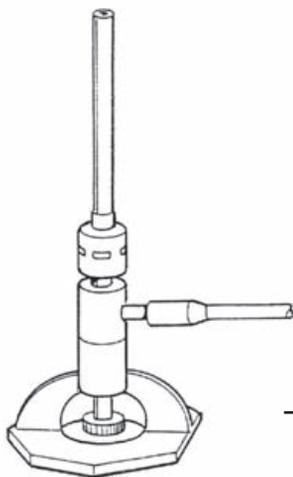




Name _____

Laboratory Equipment

Write the name of each lab instrument or piece of equipment.



balance
Erlenmeyer flask
ring stand
tongs

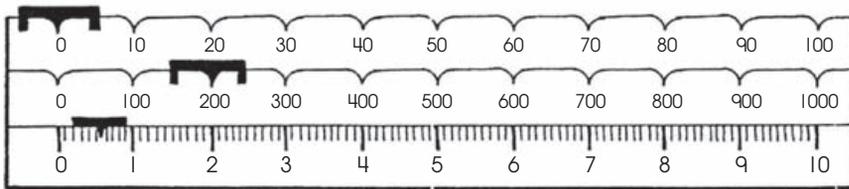
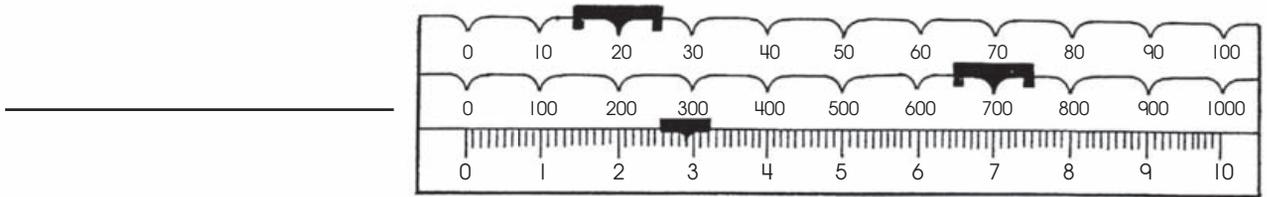
beaker
funnel
test tube

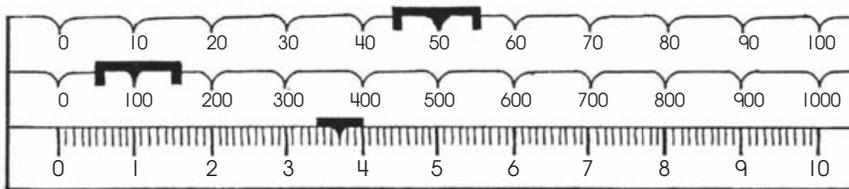
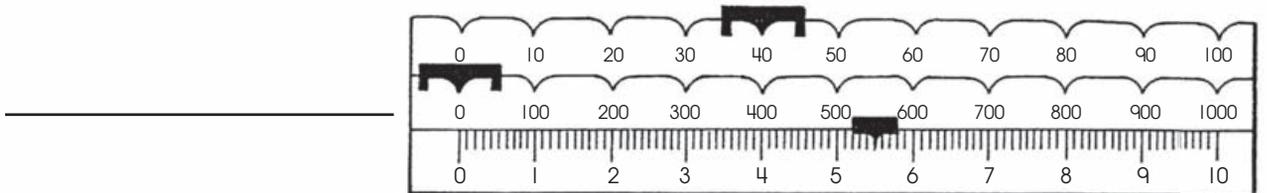
Bunsen burner
graduated cylinder
test tube clamp

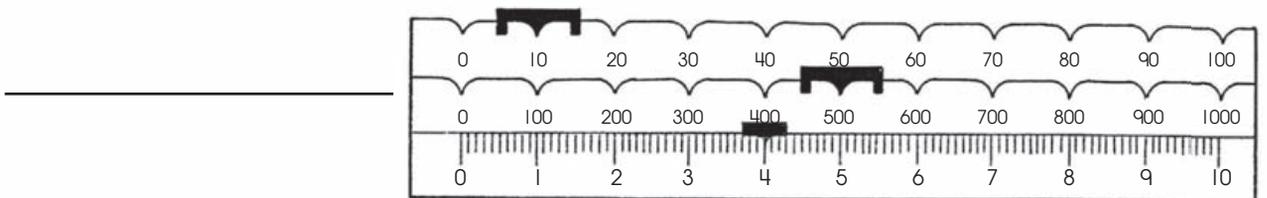
Name _____

Using the Balance

Identify the mass shown on each balance.



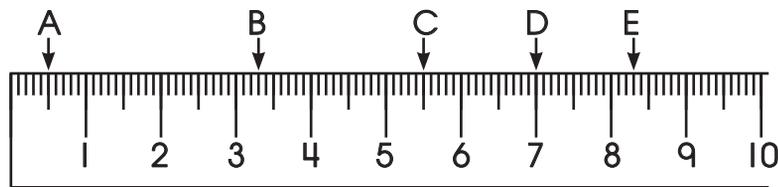




Name _____

Measuring Length

Identify the lengths marked on the centimeter ruler.



cm

mm

- | | | |
|----|-------|-------|
| A. | _____ | _____ |
| B. | _____ | _____ |
| C. | _____ | _____ |
| D. | _____ | _____ |
| E. | _____ | _____ |

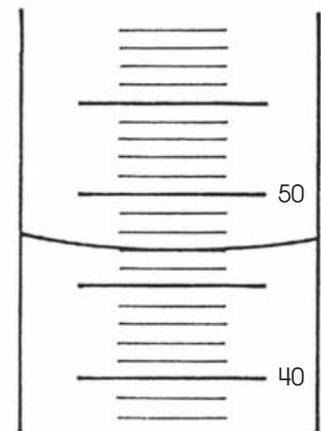
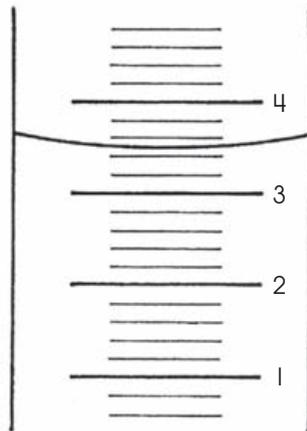
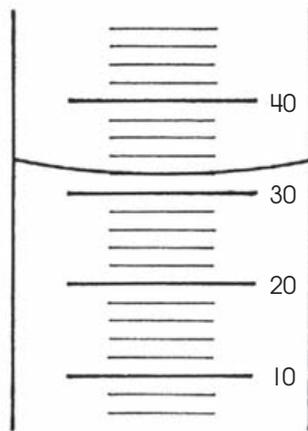
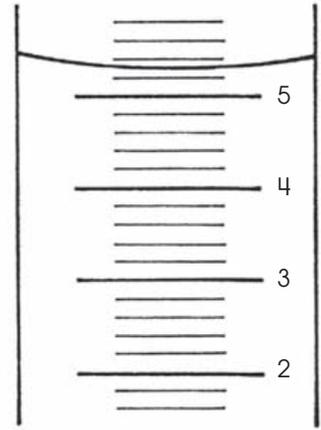
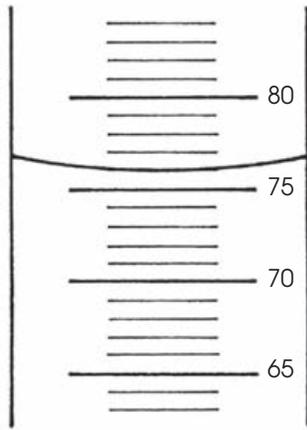
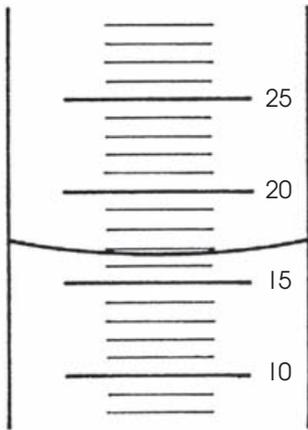
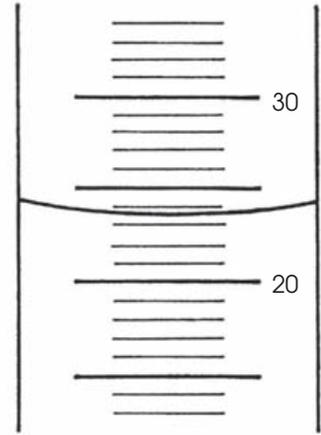
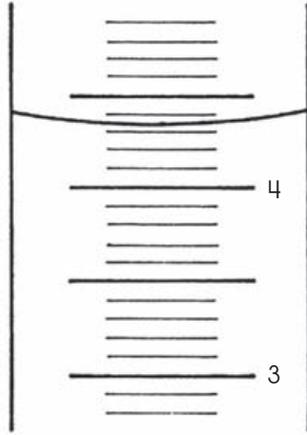
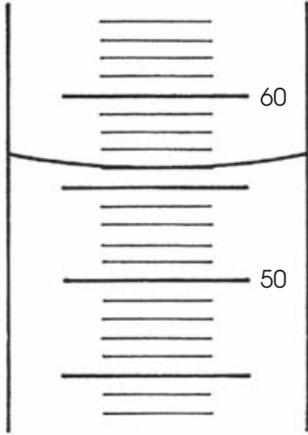
Measure each line with a centimeter ruler.

- _____
- _____
- _____
- _____
- _____
- _____
- _____

Name _____

Measuring Liquids

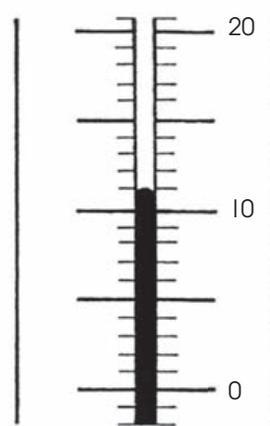
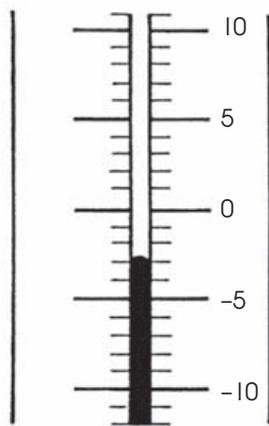
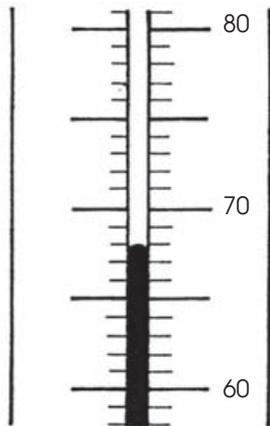
Identify the volume indicated on each graduated cylinder. The unit of volume is mL.



Name _____

Reading Thermometers

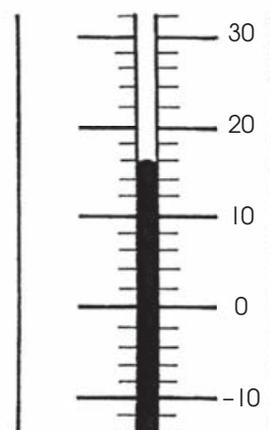
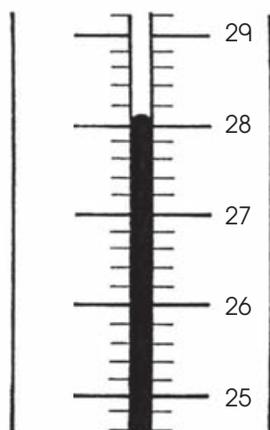
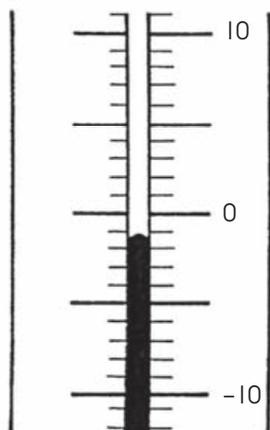
Identify the temperature indicated on each thermometer. The unit is °C.



1. _____

4. _____

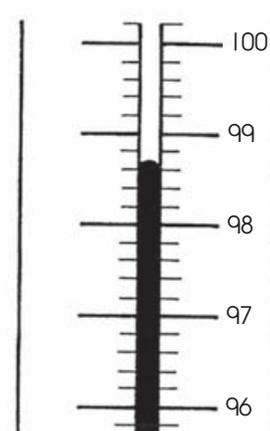
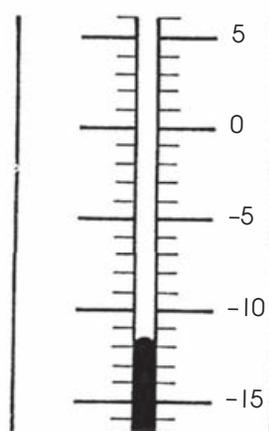
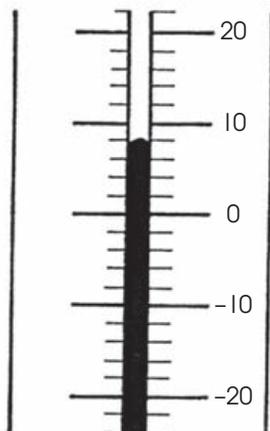
7. _____



2. _____

5. _____

8. _____



3. _____

6. _____

9. _____

Metrics and Measurement

Scientists use the metric system of measurement, which is based on the number 10. It is important to be able to convert from one unit to another.

kilo-	hecto-	deca-	Basic Units	deci-	centi-	milli-
(k)	(h)	(da)	gram (g)	(d)	(c)	(m)
1000	100	10	liter (L)	0.1	0.01	0.001
10^3	10^2	10^1	meter (m)	10^{-1}	10^{-2}	10^{-3}

Using the chart above, we can determine how many places to move the decimal point and in what direction by counting the places from one unit to the other.

Example: Convert 5 mL to L.

Answer: To go from milli (m) to the basic unit (liters), count on the above chart three places to the left. Move the decimal point three places to the left and 5 mL becomes 0.005 L.

Convert each measurement.

1. 35 mL = _____ dL

6. 4,500 mg = _____ g

2. 950 g = _____ kg

7. 25 cm = _____ mm

3. 275 mm = _____ cm

8. 0.005 kg = _____ dag

4. 1.0 L = _____ kL

9. 0.075 m = _____ cm

5. 1.0 mL = _____ L

10. 15 g = _____ mg

Unit Conversions and Factor-Label Method

Another method of converting from one unit to another involves multiplying by a conversion factor. A **conversion factor** is a fraction that is equal to one. For example, 60 seconds is equal to 1 hour. Therefore, $60 \text{ sec.}/1 \text{ hr.}$ or $1 \text{ hr.}/60 \text{ sec.} = 1$. When you multiply by the number 1, the value of the number is not changed, although the units may be different.

Example: How many milligrams are in 20 kilograms?

Use the following relationships:

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

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

1. Start with the original number and unit.
2. Multiply by a unit factor with the unit to be discarded on the bottom and the desired unit on top.
3. Cancel units.
4. Perform numerical calculations.

$$20 \text{ kg} \times \frac{1000 \text{ g}}{1 \text{ kg}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 20,000,000 \text{ or } 2 \times 10^7 \text{ mg}$$

Perform each conversion using unit factoring.

- | | |
|--------------------------|--|
| 1. 500 mL = _____ L | 11. 4.2 L = _____ mL |
| 2. 25 cg = _____ g | 12. 0.35 km = _____ m |
| 3. 400 mg = _____ kg | 13. 2.3 L = _____ mL |
| 4. 30 cm = _____ mm | 14. 4.5 yd. = _____ in. |
| 5. 3500 sec. = _____ hr. | 15. 50 mm = _____ km |
| 6. 1.25 L = _____ mL | 16. 150 mg = _____ g |
| 7. 15 m = _____ mm | 17. 150 kg = _____ g |
| 8. 0.75 L = _____ mL | 18. 23 mL = _____ L |
| 9. 6.4 kg = _____ g | 19. 0.156 g = _____ mg |
| 10. 7,200 m = _____ km | 20. 2 yr. = _____ sec.
(Assume 1 year = 365 days) |

Name _____

Using Correct Units

For each of the following commonly used metric measurements, identify its symbol. Then, use the symbols to complete each sentence.

_____ milliliter _____ milligram _____ liter _____ centimeter
_____ kilogram _____ millimeter _____ kilometer _____ gram
_____ meter _____ millisecond _____ microgram _____ nanometer

- Colas may be purchased in one- or two-_____ bottles.
- The mass of a bowling ball is 7.25 _____.
- The length of the common housefly is about 1 _____.
- The mass of a paper clip is about 1 _____.
- One teaspoon of cough syrup has a volume of 5 _____.
- The speed limit on the highway is usually 106.6 _____/h or 29.6 _____/s.
- The length of the small intestine in a man is about 6.25 _____.
- Viruses such as AIDS, polio, and flu range in length from 17 to 1,000 _____.
- Adults require at least 1,000 _____ of calcium to meet the US RDA.
- In a vacuum, light can travel 300 km in 1 _____.
- The mass of a proton is 1.67×10^{-18} _____.
- Blue light has a wavelength of about 500 _____.
- One mole of oxygen gas at STP occupies 22.4 _____.
- Myoglobin, a protein that stores oxygen, has a mass of 2.98×10^{-14} _____.
- Buttery popcorn contained in a large 1-_____ bowl has a mass of about 50 _____ of fat and about 650 calories.
- The dying comet fragments that continue to batter Jupiter travel at speeds of about 58,117 _____ / _____, or 130,000 miles per hour.
- The human heart has a mass of about 1.05 _____.
- Stand with your arms raised out to your side. The distance from your nose to your outstretched middle finger is about 1 _____.
- The body mass of a flea is about 0.5 _____, and it can jump about 20 _____ high.
- On a statistical basis, smoking a single cigarette lowers your life expectancy by 642,000 _____, or 10.7 minutes.