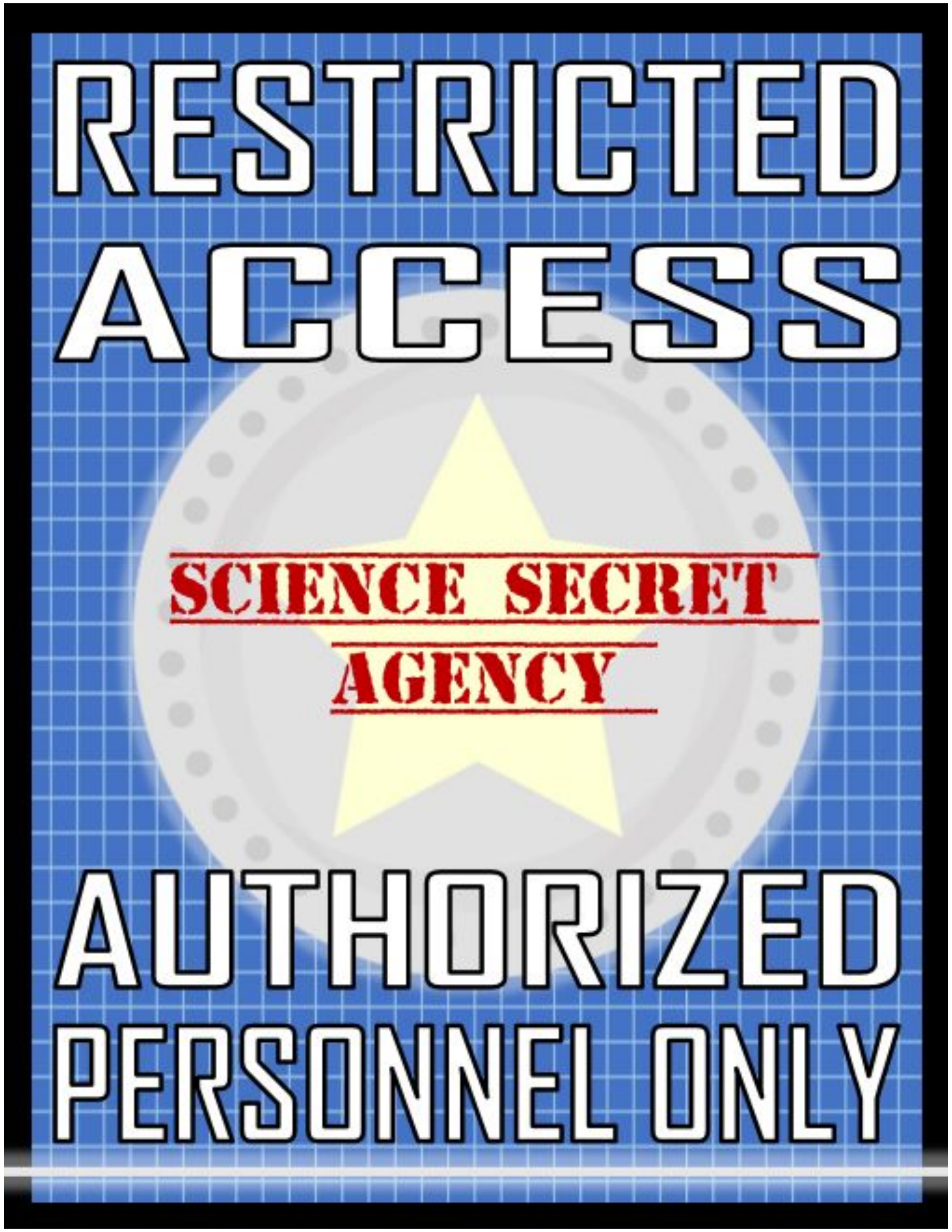


Science 7 Summer Assignment

Measurement Skills - *Science Secret Agent Skills Test*

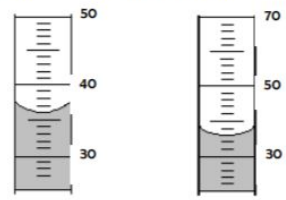
Science Secret Agent Skills Test

Agent name
Work through each skill… Report your secret message below

Measuring Liquid Volume with a Graduated Cylinder

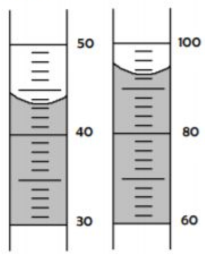
Part I: Measuring Volume Using a Graduated Cylinder

On each of the 100mL and 250 mL graduated cylinders there are markings (graduations) that indicate the volumes along the length of the cylinder. Notice there are two sets of graduations on each cylinder, a graduation for larger volumes and smaller volumes.



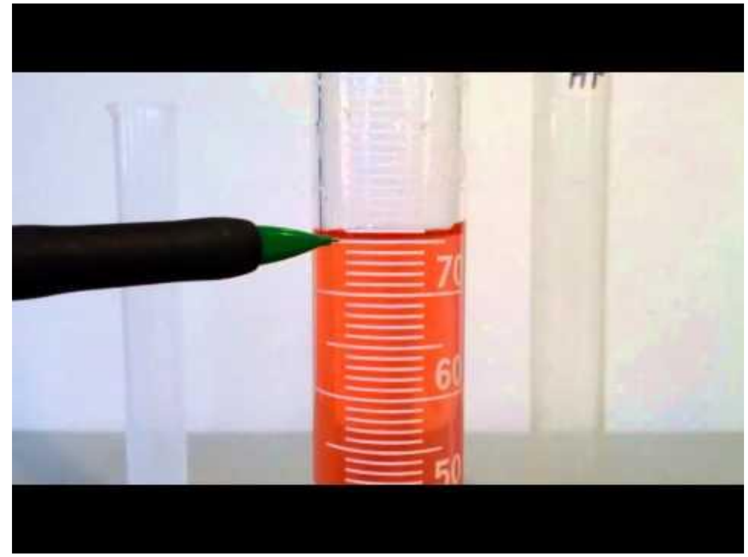
- The smallest graduations on the 100 mL graduated cylinder are in increments of 1 mL and the larger graduations are in increments of 10 mL.
- The smallest graduations on the 250 mL graduated cylinder are in increments of 2 mL and the larger graduations are in increments of 20 mL.

Numbers that express measurements always contain one or more digits we are certain of, plus one that is estimated. All of these digits, the certain ones and the estimated one, are considered to be reasonably reliable, and are called **significant figures.** For example, the readings of **36.0 mL** for both graduated cylinders above each contain three significant figures, the first two of which are certain, and the last of which is estimated.

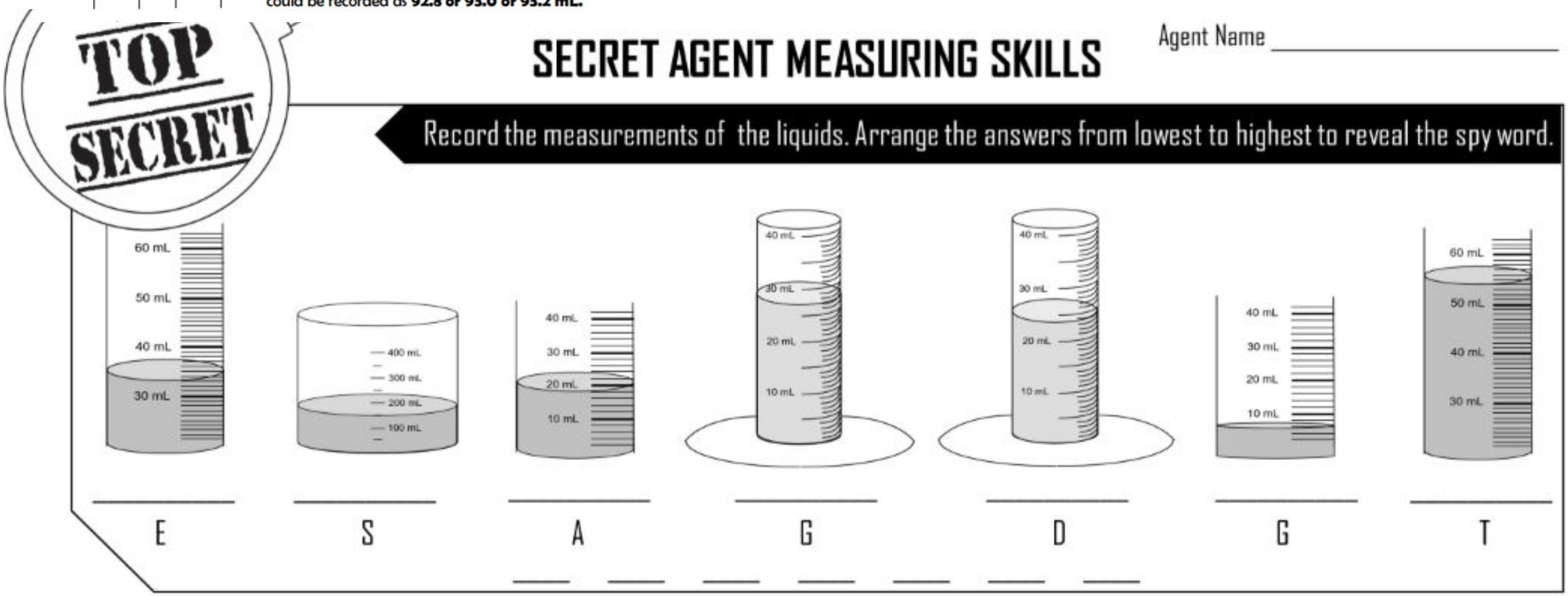


When the meniscus of the liquid lies somewhere in between graduations, the volume of liquid must be estimated. As a rule, the volumes between the smallest graduations can be further graduated into 10 parts so that the **accuracy** of the 100 mL graduated cylinder can be **estimated** to the nearest **0.1 mL** and the 250 mL cylinder can be **estimated** to the nearest **0.2 mL.**

Therefore the liquid in the 100 mL graduated cylinder could be recorded as **43.4 or 43.5 or 43.6 mL** and the liquid in the 250 mL graduated cylinder could be recorded as **92.8 or 93.0 or 93.2 mL.**



https://youtu.be/-ZDt4ax8U-A



Measuring using a Triple Beam Balance

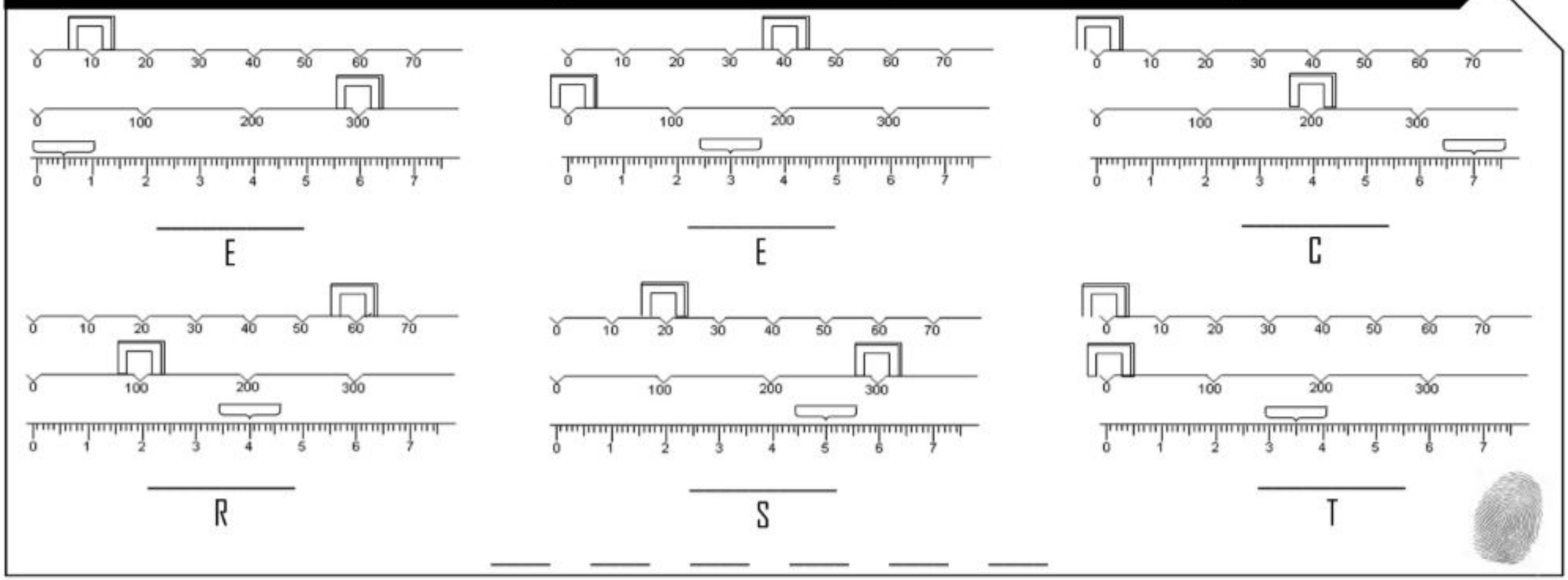
https://youtu.be/BAf6HoVK6JI

PART II: MEASURING MASS USING A TRIPLE BEAM BALANCE
Mass is a measure of the quantity of material the object contains. Measuring mass is done by comparing the mass of an unknown object to the mass of a known object. A beam balance has known masses (riders) which can be moved along the beams to determine the mass of an unknown object on the pan. Each of the beams has its own graduations. The mass of the unknown object is simply the sum of the readings on all three beams.

To start, move all of the riders to zero (far left.) Notice that the riders for the 100 g and 10 g beams must fit into notches, while the 1 g rider slides between graduations. On the far right of the balance is a zero-scale which indicates when the known masses are equal to the unknown mass. When all of the riders are on zero, the balance arm should be even with the zero-scale indicator. Notice that the 1 g beam is graduated into 0.1 g graduations.

Similar to the graduated cylinder, **the masses of objects must be estimated to one more decimal place than the smallest graduation, or 0.01 grams.** This is done by making 10 imaginary graduations between these graduations and estimating to the nearest 0.01 g.

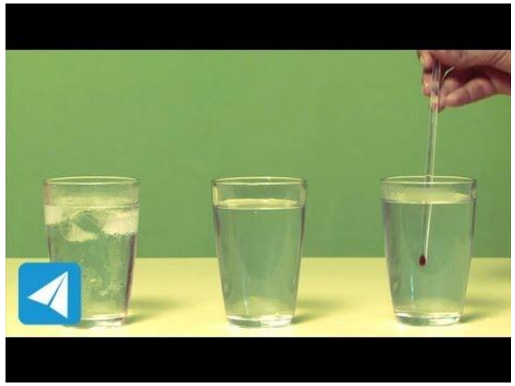
Record the measurements of each balance. Arrange the answer in order from highest to lowest to reveal the spy word.

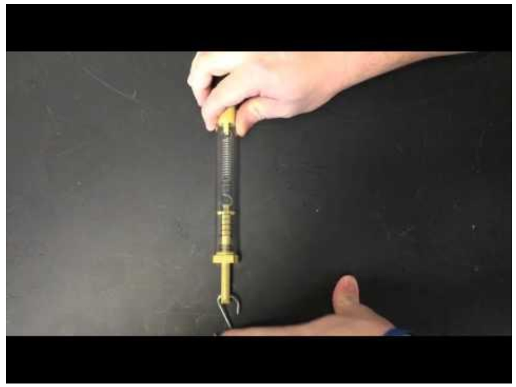


Using a Thermometer

A more accurate way to measure temperature is by using a thermometer. A thermometer is the instrument used to tell the air temperature. A thermometer is usually made up of a small, hollow glass tube. At the bottom of the tube is a bulb, which holds a liquid such as alcohol or mercury.

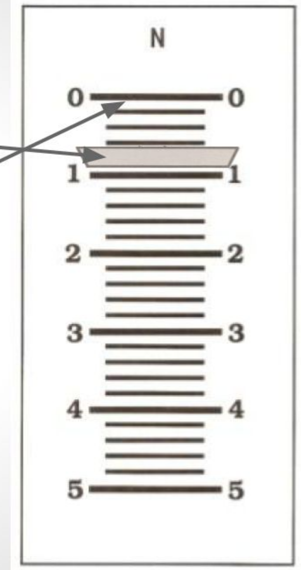
When there is an increase in heat, the liquid inside the bulb expands, pushing up into the tube. A decrease in heat lets the liquid contract, moving down the tube. A measuring scale is attached to the tube, to give an accurate measurement of heat energy.



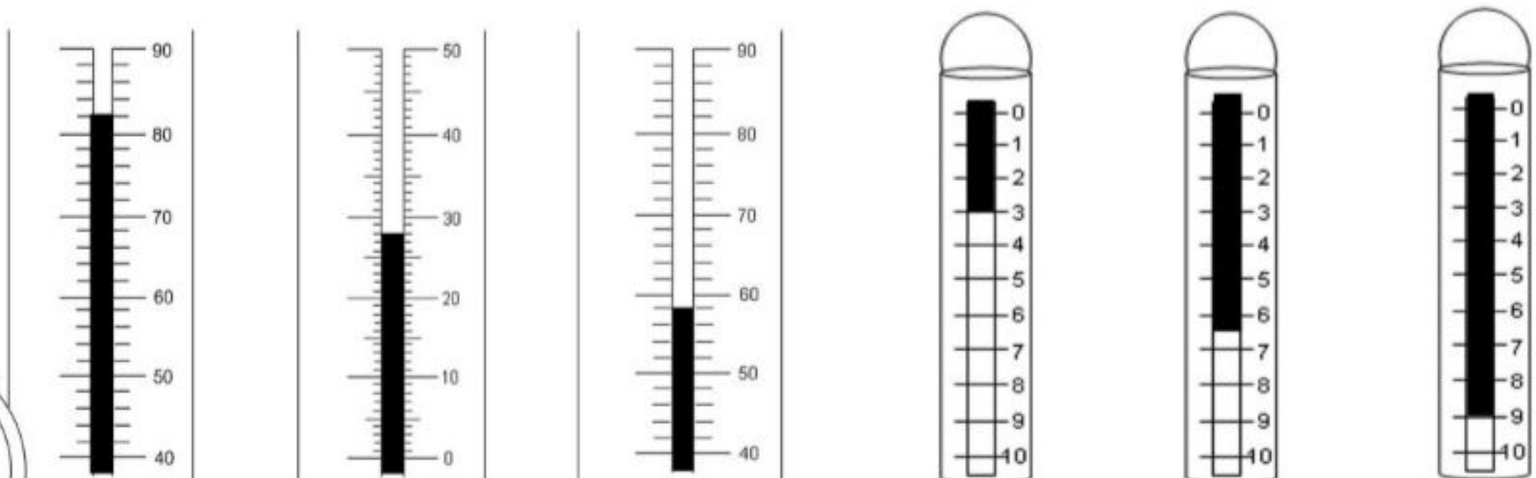


To Use a Spring Scale:

1. First, make sure the indicator lines up with the top of the zero line.
2. If it does not, use the metal tab or the nut at the top of the spring scale to adjust it.
3. Make your adjustments in small increments.
4. Frequently check your scale for accuracy while you are taking measurements.



Record the measurements of the thermometers and spring scales. Arrange the answers from highest to lowest to reveal the spy word.



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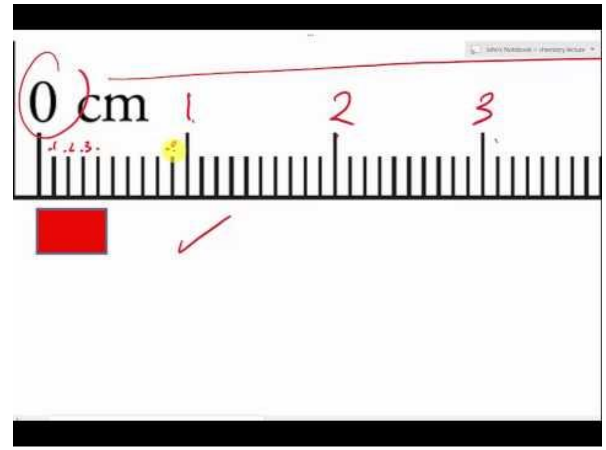
TOP SECRET

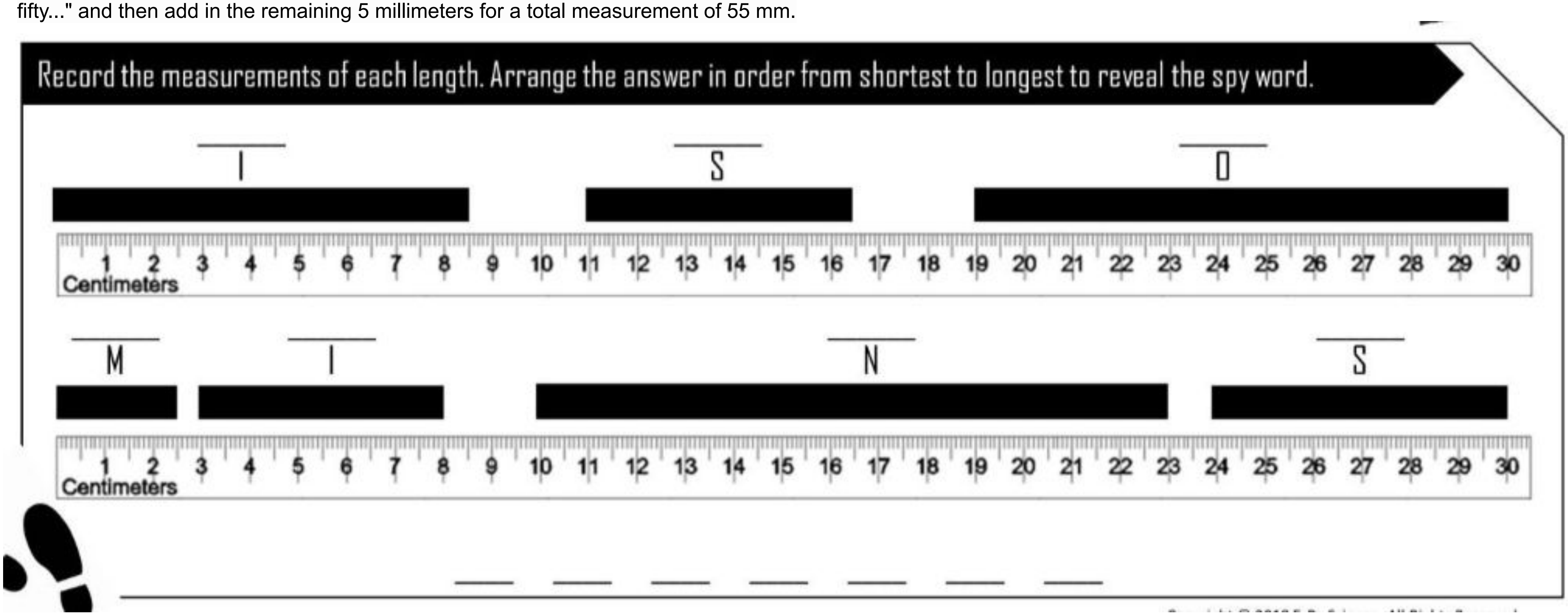
Read Your Millimeter Ruler

Now that the "zero" mark on your ruler is lined up with one edge of the object you're measuring, read along the ruler until you reach the far edge of the object being measured. Because the marks on a mm ruler are quite small and aren't numbered, it may help to put your finger, or the point of a pen or pencil, down to help you keep your eye on the correct mark. Next, count the number of millimeter marks, starting from the zero line of the ruler and continuing until you reach the mark that lined up with the far edge of your object. The number of marks equals the object's measurement in millimeters.



Converting From Centimeters to Millimeters

You don't actually need to count every single millimeter mark along the ruler – you can use the numbered centimeter marks as a shortcut. Each centimeter is equal to 10 millimeters, so if your object measures 4 centimeters long, that's equivalent to 4 × 10 = 40 millimeters. Often, your measurement in millimeters will fall between centimeter marks on the ruler. In that case, count centimeters up until the mark just before your measured object, then add in however many more millimeter marks it takes to reach the line you measured to. Once you understand that 1 centimeter is 10 millimeters, you don't need to do the multiplication to convert between these two units of measure. Just count by tens for each centimeter mark. For example, if you'd measured an object that reaches up to the 5 centimeter mark and then another 5 millimeters beyond that, instead of counting "one... two... three... four... five..." for the centimeters and then multiplying to convert them into millimeters, you can just count millimeters by tens: "ten... twenty... thirty... forty... fifty..." and then add in the remaining 5 millimeters for a total measurement of 55 mm.



Resources used for this lesson
http://www.ric.edu/faculty/PSCI103/density/Density_811.pdf
https://www.youtube.com/watch?v=-ZDt4ax8U-A
https://www.wisc-online.com/learn/natural-science/chemistry/gch302/measuring-volume-using-a-graduated-cylinder

https://www.wisc-online.com/learn/natural-science/chemistry/gch302/measuring-volume-using-a-graduated-cylinder

Name ____

Due Date Second Friday of Beginning of School

Science 7 Summer Assignment

Safety in the Science Lab - Minions Loose in the Lab

READ THIS BOX!!!!!!!!!

1. Watch the video
2. Read the story below. Work with a friend/family member to decide what The Minions have done to break a science safety rule. Then discuss with your work partner what they should have done instead.
3. Read each sentence below. After you decide what science safety rule the minions broke, write what the minions should have done instead.

You will turn 1 thing.... 1) This document

https://www.youtube.com/watch?v=3_8wpWoe9m4

Story	Questions and Answers
Gru and his minions woke up to another day in the lab. The minions couldn't wait to get started, so they headed into the lab	Kevin found a knife and used it to cut some materials when Dr. Nefario and Gru weren't looking.

without waiting for Gru or Dr. Nefario to give them directions. In the lab they found some beakers and test tubes, some of which were broken. They decided they were probably safe, so Kevin and
Dave used them to mix chemicals to try to improve Gru's freeze ray.

Kevin didn't agree with what Dave was doing, so he started shouting at Dave. Dave got up and started running through the lab, and Kevin started chasing him. The chemicals spilled, but they didn't want Dr. Nefario to find out, so they just cleaned them up themselves and kept it a secret.

Meanwhile, Stuart and Carl got to work on building a new machine for Gru. Dr. Nefario had left directions out for them, but they didn't bother reading them before they got started. They figured they would just figure it out along the way. They had been building for just a few minutes when one of the machine parts cut Carl's hand. Carl didn't tell Gru or Dr. Nefario, instead he just

Bob saw what he thought was a banana, but when he put it in his mouth, he realized it was a test tube full of yellow liquid.
Gru told Stuart to finish up his project before he left for lunch, but Stuart didn't feel like waiting, so he brought his lunch into the lab and ate it while he worked.
Phil didn't want Dr. Nefario to know that he broke the freeze ray, so he hid it under the table in the lab until he had left and then put it in the back of the shelf where no one would find it
Tim and Jerry were working on an experiment together. Jerry needed to make a copy and ended up copying his face on the copy machine. He took the copies back to Tim and they starting laughing and goofing off and never finished their experiment

showed it to Stuart. Stuart just spit on it for him and wrapped a paper towel around it.

After the minions had been working for a while, they decided it was time to have a dance party. So they cleared all the table, threw all their science equipment on the floor, and started dancing. They were all having a great time and enjoying some fruity beverages, when suddenly they realized Gru was coming. They didn't bother to clean up their equipment, and they all ran out of the lab so they wouldn't get caught.

Jorge was using a bunson burner to finish his test on a new weapon. He accidentally caught Phil's hair on fire and ended up sending Phil to the hospital.

Name ______________________________ Due Date Second Friday of Beginning of School

Science 7 Summer Assignment

Writing Your First HS Lab Report - *Changing States of Matter*

READ THIS BOX!!!!!!!!!

Use the information below to **hand write your first HS Lab Report.** At the end of this document you will find an actual lab report from one of our highschoolers for you to emulate. Yes - there are parts of this lab you will copy word for word and others you will discover the answers as you do the lab. The reason you are to hand write the lab is there is research that infers we remember best if we write it out.

You will turn 2 things ....
1) This document and 2) A picture of your handwritten HS Lab Report or the actual HS Lab Report

Purpose: The purpose of this experiment will be to observe a common change in state and to examine the effect of a variable on the rate of change. Does the amount of ice cubes that you have in the same container affect how quickly they will melt?

Hypothesis: (Choose one of the following by **bolding** the correct one)

The ice will melt at the same rate no matter how many ice cubes there are.

The more ice cubes there are, the faster they will melt.

The more ice cubes there are, the slower they will melt.

Variable to be Tested: Number of ice cubes in the same container

Other Variables that Must be Controlled: Type of cup/container (same material for each test), room temperature (make sure they are all in the same area), size of ice cubes (all the same size)

Materials:

9 ice cubes

3 cups or containers

Clock or watch

Procedure:

1) Place 3 identical cups or containers on a counter or table where you will conduct this experiment.
2) Put 1 ice cube in “Cup A.”
3) Put 3 ice cubes in “Cup B.”
4) Put 5 ice cubes in “Cup C.”
5) Record the start time of your experiment.
6) Check the cups every 5 minutes to see if the ice has melted.
7) When the ice has completely melted in a cup, record the end time for that cup.

Data:

Trial 1 ENTER DATA IN THE BLUE BOXES BELOW

Cup	Ice Cubes	Start Time	End Time	Total Time
A	1			
B	3			
C	5			

Trial 2

Cup	Ice Cubes	Start Time	End Time	Total Time
A	1			
B	3			
C	5			

Trial 3

Cup	Ice Cubes	Start Time	End Time	Total Time
A	1			
B	3			
C	5			

Averages (Add Trial 1 + Trial 2 + Trail 3 the divide by 3 (the number of trials))

Cup	Ice Cubes	AverageTotal Time
A	1	
B	3	
C	5	

Conclusions

Answer the following questions as your conclusion. Answer in full/complete sentences on your paper

1. Why was it important to use the same type of container/cup for each test?
2. Why was it important to have each cup in the same location?
3. Why was it important to make sure all of the ice cubes were the same size?
4. From your experiment, did the amount of ice in the cup effect how quickly it melted?
5. Does your data support your original hypothesis?
6. How long do you think it would take for 9 ice cubes, in the same container, to melt?
7. For what practical application could this information be useful? (How could this be used in real life?)

Example HS Lab Report

Dell 2

Cube Density Lab

Lincoln Lundgren & Jack Prince

Purpose: To calculate the density of a variety of cubes, each made of diffrent substanses, and compare results with the actual densities.

Materials
- 3 Density cubes (1 aluminum, 2 random)
- Ruler
- Digital scale - calculator (optional)

Procedure

Measure 1 side of the cube and use the volume formula for a cube ($V = s^3$). Using the digital scale, measure the mass of the cube. Using the density formula ($D = \frac{m}{v}$) calculate the Density of the cube. Finaly, Record the measurements in the chart and repeat these steps for the remaining 2 cubes.

Data

Cube type	Mass (g)	Volume (cm^3)	Density (g/cm^3)	Actual Density (g/cm^3)
Acrylic	20 g	16 cm^3	1.2g/cm^3	1.18 g/cm^3
Aluminum	45 g	16 cm^3	2.8g/cm^3	2.7 g/cm^3
Iron	127 g	16 cm^3	7.9g/cm^3	7.87 g/cm^3

Conclusion

The calculated densities were all fairly close to their real-world counterparts, which confirms that we did it correctly, the instruments are accurate, and that the cubes are in fact made of what we thought they were