JHS Chemistry Department
Significant Figures and Measurements

Introduction:
Scientists do a lot of measuring. When scientists use an instrument (such as a ruler, graduated cylinder, or balance) to measure something, it is important to take full advantage of the instrument. However, they can't cheat and record a better measurement than the instrument is capable of. There is an understanding among scientists of the proper way to record valid measurements from any instrument. When you are the scientist, you must record data this way. When you are reading other scientists' work, you must assume they recorded their data this way.

Introduction Question:
Using the introduction, write one important fact about scientists measuring in the laboratory.

Part 1: Measuring
Measure your strand of paper clips using each of the 4 rulers provided. After you measure each, have a second member of your group complete a second trial.

Ruler 1		**Ruler 2**	
Trial 1	Trial 2	Trial 1	Trial 2
8cm		9.1cm	
Ruler 3		**Ruler 4**	
Trial 1	Trial 2	Trial 1	Trial 2
22.5cm		22.21cm	

Part 2: Analysis
1. What place in the measurement can you be absolutely certain of while using **Ruler 1**?

"tens"

2. What place in the measurement can you be absolutely certain of while using **Ruler 3**?

"ones"

3. Using **Ruler 2**, Tony recorded a measurement of 23 cm. Explain why this was an invalid measurement.

it is marked to the "ones" so "tenths" need to be estimated & recorded.

4. Tara correctly recorded the length of a test tube as 5.0 cm. Which ruler from **Part 1** was Tara using? Explain.

Ruler #2 OR #3

5. Which of the rulers do you feel is most limited? Why do you believe so?

Ruler #1 Least markings

6. Which ruler would you use while measuring the area needed for a couch? Why?

2 or #3 (maybe #1 ??) area for a couch could be an approximate value

7. Did all the members of your group agree on each values in Part 1? Why do you believe you agreed or disagreed?

yes → same markings

(OR)

no → different estimations

Read the following passage about a world record-breaking runner, as well as a video of Triple Crown horse winner, American Pharaoh. Answer the questions that follow.

Ethiopian Genzebe Dibaba ran the fastest 1,500-meters of any woman in history. What makes this feat even more xtraordinary is that the record Dibaba broke was nearly 22 years old and many people thought it would never fall.

Dibaba's time of 3:50.07 in Monaco on July 17, 2015—beating China's Qu Yunxia's world record of 3:50.46—was only the second time below 3:44 since 1997. It raises a new question about the limits of male and female runners in the mile and the "metric mile," distances whose records, before Dibaba's breakthrough, had all been stuck since the 1990s.

Questions

1. The world record runner, Dibaba, ran 1,500 meters in 3:50.07. The original record was 3:50.46. What makes the values of the runner's times different? Why are those values significant?

the "thousandth" & "ten thousandth's" places are different

more recorded digits = more significant!

2. Compare the number of significant decimal places between the runners and American Pharaoh.

faster races more decimals recorded!

3. Watch the following Triple Crown racing link, be sure to note the times. Had the Triple Crown race been closer, could you foresee an issue with the recorded values of the horses' final times? Why or why not?

American Pharaoh Triple Crown Race:

http://search.tb.ask.com/search/video.jhtml?searchfor=triple+crown+race+&p2=^BNH^xdm379^YYA^us&n=781baeaf&ss=sub&st=sb&ptb=E763D6AB-C545-47F4-8604-A6CE11EEC00E&si=transit-info-direct-US&tpr=sbt