H

Due now: If you were here Friday and didn't turn in yet, turn in your lab sheet now

Purpose:

How can we tell which digits are important?

Warmup:

Grab a textbook. Copy <u>just</u> the first sentence from <u>each</u> of the six rules on pp. 56&57
Skip a line after each rule.

1) Every nonzero digit in a reported measurement is assumed to be significant.

23.60 cm HAS THREE SIGNIFICANT DIGITS

2) Zeros appearing between nonzero digits are significant.

0.05005 HAS FOUR SIG. DIGS
1.40501 HAS SIX SIG. DIGS

3) Leftmost zeros appearing in front of nonzero digits are not significant.

0.00000003 HAS ONE SIG DIG.

4) Zeros at the end of a number and to the right of a decimal point are always significant.

1.10000 HAS SIX SIG DIGS.

5) Zeros at the rightmost end of a measurement that lie to the left of an understood decimal point are not significant.

6800 HAS TWO SIG DIGS

6) There are two situations in which measurements have INFINITE significant figures

(A) COUNTED THINGS

2 yellow socks HAS INFINITE SIG DIGS

(B) DEFINITIONS

[redacted] 12 inches is one foot

Announcements

Homework Tonight: **spinach sheet**

The quiz will be passed back at the end of the period.

When you are absent you DO make up homework and tests, you DON'T make up quizzes or labs

How to round numbers – cross off whatever you want to discard, look at ONLY the highest discarded digit; if it is 5 or greater, round up the surviving final digit.

Round these to 4 sig figs:

800.9520 garbage ≈ 801.0

0.0005000050 ≈ 0.0005000

34,594,999 ≈ 34,590,000

Here's the part of our textbook that explains how to count significant figures. Read it if you think it may help you learn this important skill. We will use this skell DAILY for many many weeks. You can't not learn it.

To determine whether a digit in a measured value is significant, you need to apply the following rules.

1. Every nonzero digit in a reported measurement is assumed to be significant. The measurements 24.7 meters, 0.743 meter, and 714 meters each express a measure of length to three significant figures.

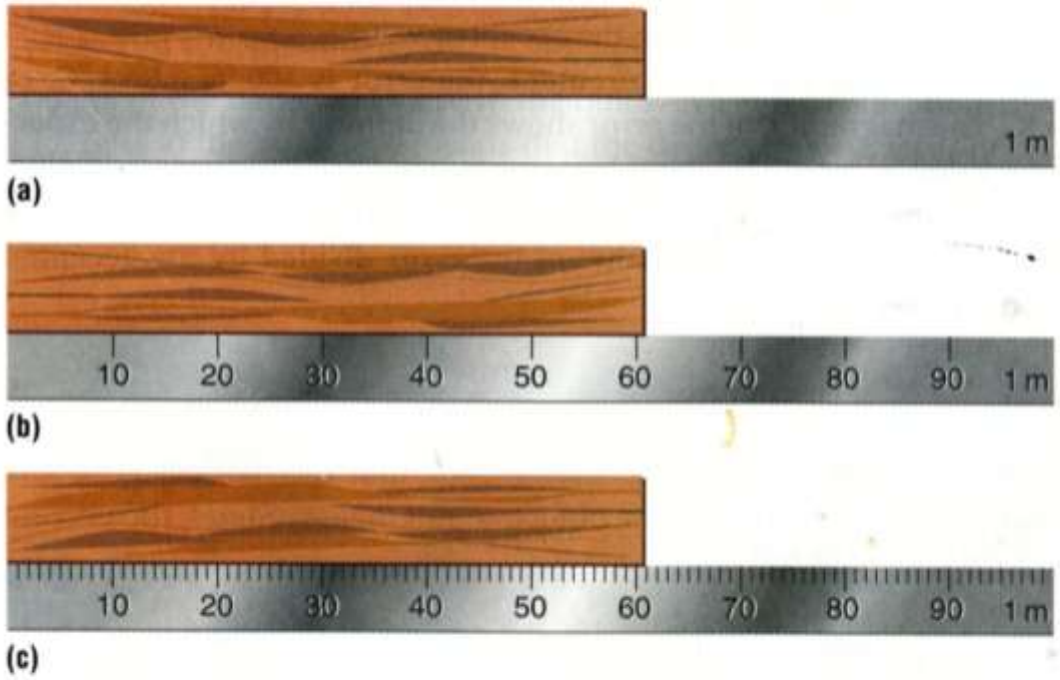

Figure 3.6

Three differently calibrated meter sticks can be used to measure the length of a board. What measurement is obtained in each case? Are there differences in the number of significant figures in the three measurements? Explain.

2. Zeros appearing between nonzero digits are significant. The measurements 7003 meters, 40.79 meters, and 1.503 meters each have four significant figures.

3. Leftmost zeros appearing in front of nonzero digits are not significant. They act as placeholders. The measurements 0.0071 meter, 0.42 meter, and 0.000 099 meter each have only two significant figures. The zeros to the left are not significant. By writing the measurements in scientific notation, you can get rid of such placeholding zeros: in this case, 7.1×10^{-3} meter, 4.2×10^{-1} meter, and 9.9×10^{-5} meter.

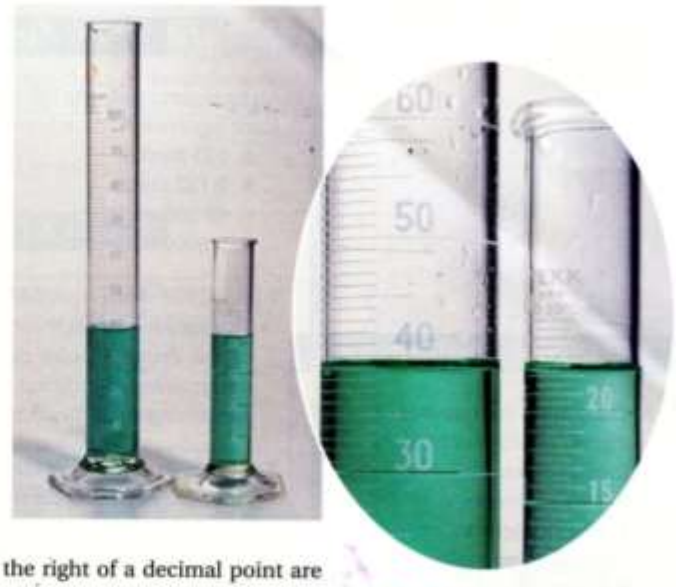

Figure 3.7
Two differently calibrated graduated cylinders are used to measure the volume of a liquid. Which cylinder would give a more precise measurement?

4. Zeros at the end of a number and to the right of a decimal point are always significant. The measurements 43.00 meters, 1.010 meters, and 9.000 meters each have four significant figures.

5. Zeros at the rightmost end of a measurement that lie to the left of an understood decimal point are not significant if they serve as placeholders to show the magnitude of the number. The zeros in the measurements 300 meters, 7000 meters, and 27 210 meters are not significant. The numbers of significant figures in these values are one, one, and four, respectively. If such zeros were known measured values, however, then they would be significant. For example, if the value of 300 meters resulted from a careful measurement rather than a rough, rounded measurement, the zeros would be significant. Ambiguity is avoided if measurements are written in scientific notation. For example, if all of the zeros in the measurement 300 meters were significant, writing the value as 3.00×10^2 meters makes it clear that these zeroes are significant.

6. There are two situations in which measurements have an unlimited number of significant figures. The first involves counting. If you carefully count that there are 23 people in your classroom, then there are exactly 23 people, not 22.9 or 23.1. This measurement can only be a whole number and has an unlimited number of significant figures, in the form of zeros understood to be to the right of the decimal point; thus, 23.000 000 ... is understood. The second situation of unlimited significant figures involves exactly defined quantities, such as those usually used within a system of measurement. When, for example, you write 60 minutes = 1 hour, these quantities have an unlimited number of significant figures; there are exactly 60 minutes in an hour, by definition. It is important to recognize when quantities are exact and to round calculated answers correctly in problems involving such values.

Significant figures

EHS CA3MIS+TY

Mr. Genest

Name ANSWERS

Date _____

visit http:genest.weebly.com

1) Convert 788 Mg to grams: 788000000

2) Convert 911.77 kg to mg: 911 770 000.

3) Circle any things below that have INFINITE significant figures.

the shoe is 38.8 cm long

there are 4 crows in the tree

the tree is 9 meters tall

Determine the number of significant figures in the following measurements. Or write 'Infinite' if there are infinite significant figures

4) 100.1 g four

5) 473 mL three

6) 0.002 m one

7) 4200 km two

8) 330 mL of Pepsi two

9) 0.11010 L five

10) 104.20 g five

11) 4 cans of Coke infinite (Because counted, Rule 6)

12) 1,700,000 km two

13) Circle any things below that have INFINITE significant figures.

one student weighs 88.5 kg and the other weighs 90.0 kg

1 meter is the same as 100 cm

1 dozen daisies is 12 daisies

East high school contains 3,449,339 bricks

There are 28 students in the room

Round each of the following to 3 significant figures.

13) 2.396 g 2.40

14) 6.333 g 6.33

15) 2.500 g 2.50

16) 3.805 g 3.81

17) 23.15 g 23.2

18) 16.2455 m 16.2

19) 93.45 cm 93.5

20) 21.15 cm 21.2

ANSWERS!

Determine the number of significant figures in the following measurements. Or write 'Infinite' if there are infinite significant figures

14) 0.00020 kg Two

15) 44 mice infinite

16) 842.0 cm four

17) 44 grams of mouse fur two

18) 640,002 m six

19) 10,000 s one

20) 190.60 g five

21) 1.0004230 g eight

21) Convert 45.66 mL to µL: 45660. µL

Round each of the following to 3 significant figures.

22) 1.2793 kg ≈1.28kg

23) 0.10625 ≈ 0.106 kPa

kPa_____

24) 0.0037486 m ≈ 0.00375 m

25) 0.01245 s ≈0.0125 s

26) 0.10652 g ≈ 0.107 g

27) 0.048449 ≈ 0.0484 ns

ns_____

28) 0.20000 L ≈0.200

29) 101.00 fs ≈ 101.

30) 0.112453 ≈ 0.112 g

g_____

39) 0.010010 L ≈ 0.0100L