Sig Figs

Significant Figures

What are Sig Figs?

- I read in the paper that Jimmy Haslam (owner of the Browns) has a net worth 2.7 billion dollars.
- Myself and a friend bought 4 tickets for $264.30
- Assume that immediately after it was reported, I ran to Mr. Haslam with cash. Jimmy gets every penny and hasn't had another expense yet. Does that mean Jimmy Haslam now has exactly $2,700,000,264.30?
- Of course not, the paper didn't measure his net worth as exactly $2,700,000.00
- The last measured digit was the 7, all of those 0's were actually numbers that we didn't report because we didn't measure accurately enough.
- The number was rounded!

Another

- A penny has a diameter of 1.8 cm.
- If you line up 986 pennies, would you trust that it is 1774.8 cm?
- 1.8 cm x 986= 1774.8 cm
- However the final answer needs to reflect the accuracy of the initial measurement.
- In reality, it would be somewhere between 1700-1800 cm but you can't say where.

This is where sig figs come into play

- Absolutely accurate measurements are impossible!!!
- We must round somewhere
- When we do calculations with these numbers we must reflect how accurate our initial numbers were.
- Significant digits means that digit was accurately measured
- Insignificant digit means that digit was NOT accurately measured.

Rules for determining if a digit is significant

1. If it is not a zero, it is significant.123
2. If a zero is between two significant digits, it is significant. 309
3. Zeros at the end of a number with a decimal point are significant. 56.0
4. Zeros at the end of a number that do not have a decimal point are NOT significant. 82400
5. Zeros at the front of a decimal are NOT significant. .00562

Determine how many sig figs are in each number

- 734
- 100,025
- 6501000
- .00034
- 2.00034
- 527.00
- 16.01
- 18700000000000

Determine how many sig figs are in each number

- 734 — 3
- 100,025 — 6
- 6501000 — 4
- .00034 — 2
- 2.00034 — 6
- 527.00 — 5
- 16.01 — 4
- 18700000000000 — 3

Round each number to the given number of sig figs

- (2) 734
- (4) 101.025
- (3) 651500
- (5) .00334
- (4) 132.084
- (3) 527.00
- (5) 16.01
- (3) 18700

Round each number to the given number of sig figs

- (2) 734 — 730
- (4) 101.025 — 101.0
- (3) 651500 — 652000
- (5) .00334 — .0033400
- (4) 132.084 — 132.1
- (3) 527.00 — 527
- (5) 16.01 — 16.010
- (3) 18700 — 18700

How to report answers

- When multiplying or dividing.
- You can only have as many sig figs in your answer as you do in the number with the least amount of sig figs.
- 3.56 x 2.1=
- 7.476
- 7.5 (2 sig figs)

- When adding or subtracting.
- Numbers added to or subtracted from insignificant numbers are insignificant (rounded off).
- 347.58
  + 21
- 368.58
- 369

**Doing this will account for 1 point on every single test problem we do!!!!*

Practice

- 6.74 x 2.1
- 276.31 + 15.2
- 3870 / 14.2
- 249.4-52

Exemptions from sig figs

- some numbers have an infinite number of sig figs. Meaning we can ignore them in our calculations
- If a something = 1(unit), that one has an infinite number of sig figs. 1 yd = .9144 m
- many conversion factors have an infinite number of sig figs, for example 3 ft = 1 yd, 60 sec= 1 min, 100 cm = 1m.
- Not all conversion factors have an infinite number of sig figs though.
- .9144 m = 1 yd, 2.2 lbs = 1 kg.
- ***If you are ever unsure, ask me!***

A couple of problems

- If you are traveling 35 miles per hour for 2.5 hours, how far have you traveled?
- 35x2.5 = 87.5 miles = 88 miles (2 sig figs)

- If you are traveling 44 miles per hour for 13 miles, how long did it take?
- 13/44 = 0.2954545= .30 hours (2 sig figs)

Important Rule

- Only use sig figs in your answer.
- Do NOT round in the middle of the problem!!!

Scientific Notation

- some numbers so large or small that is a pain to write out normally
- for example Jimmy Haslam has $2,700,000,000
- To write in scientific notation write down all sig figs $x10^x$
- The number is always written to the ones place with a decimal
- so the above number is $\$2.7x10^9$

Quick conversions

- 6.7×10^{-7}
- 2.31×10^{5}
- 5.79×10^{3}
- 4.19×10^{-5}
- .0065
- 94,100,000
- .000000065
- 9,840

Quick conversions

- 6.7×10^{-7}
- 2.31×10^{5}
- 5.79×10^{3}
- 4.19×10^{-5}
- .0065
- 94,100,000
- .000000065
- 9,840

- .00000067
- 231000
- 5790
- .0000419
- 6.5×10^{-3}
- 9.41×10^{7}
- 6.5×10^{-8}
- 9.84×10^{3}

Scientific notation has to be used to correctly write some answers

- For example
- 1329 / 13
- = 102.23 rounded to 2 sig figs would be…
- You Have To Write This Number In Scientific Notation!
- 1.0×10^{2}

scientific notation and your calculator

- To put numbers in scientific notation in your calculator there is normally an E or EE or EXP key
- That E EE or EXP replaces the x10
- Pay attention to the way your calculator denotes scientific notation!!!
- To type 4.3×10^4, type 4.3[E]4