

Name _____ Date _____

AP CHEMISTRY

Period _____

RULES FOR SIGNIFICANT FIGURES (SigFigs)

	Rule	Examples	
1	Nonzero digits are always significant. (counting numbers 1 to 9)	4.55 grams 9821 seconds 0.15 mL 7.551 °C	<i>3-sigfigs</i> <i>4-sigfigs</i> <i>2-sigfigs</i> <i>4-sigfigs</i>
2	All zeros between other significant digits are also significant.	102 daltons 7.033 L 9.80501 g/mol 40.04 g	<i>3-sigfigs</i> <i>4-sigfigs</i> <i>6-sigfigs</i> <i>4--sigfigs</i>
3	Zeros to the right of a nonzero digit, but to the left of an understood decimal point are not significant, unless specifically indicated as significant.	4500 moles 96,500 coulombs 300,000 m/s 12,570 ft	<i>2-sigfigs</i> <i>3-sigfigs</i> <i>1-sigfigs</i> <i>4-sigfigs</i>
4	All zeros to the right of a decimal point but to the left of a nonzero digit are not significant	0.0123 0.00045 0.005969 0.002	<i>3-sigfigs</i> <i>2-sigfigs</i> <i>4-sigfigs</i> <i>1-sigfigs</i>
5	All zeros to the right of a decimal point and to the right of a nonzero digit are significant	12.2500 g 0.870 mol 4.00 mL 0.01230	<i>6-sigfigs</i> <i>3-sigfigs</i> <i>3-sigfigs</i> <i>4-sigfigs</i>
6	Only the first part a of a number written in scientific notation is significant, not the exponent.	6.02×10^{23} $2.1 \times 10^{-9} \text{ M}$ $9.051 \times 10^{-2} \text{ mol}$ $1.54 \times 10^5 \text{ kJ/mol}$	<i>3-sigfigs</i> <i>2-sigfigs</i> <i>4-sigfigs</i> <i>3-sigfigs</i>
7	Counted numbers and conversion factors are considered to be infinitely significant.	16 beakers 4 electron pairs 12 inches in a foot 1000 mm in a meter	<i>no sigfigs in any of these numbers - they are not measurements</i>

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RULES FOR CALCULATING WITH SIGNIFICANT FIGURES

	Rule	Examples
1	<p>Multiplication & Division</p> <p>Round the answer to the least number of sigfigs that are in the problem.</p>	<p>$\frac{8.904 \text{ g}}{1.08 \text{ mL}} = 2.24 \text{ g/mL}$ 3 sigfig answer</p> <p>$0.52 \text{ mol/L} \cdot 13.5 \text{ mL} = 7.0 \text{ mmol}$ 2 sigfig answer</p> <p>$35 \text{ cm} \times 158 \text{ cm} = 5500 \text{ cm}^2$ 2 sigfig answer</p>
2	<p>Addition & Subtraction</p> <p>Round the answer to the least number of decimal places that are in the problem.</p>	<p>$1.01 + 16.03 = 17.04$ each has 2 decimal places</p> <p>$125.8 - 52 = 74$ least number is no decimal places</p> <p>$95.57 + 32.1 = 127.7$ least number is 1 decimal place</p>
3	<p>Other Functions</p> <p>Squares, cubes, roots, trig functions (sine, cosine, tangent, etc) follow the rule for multiplying and dividing.</p>	<p>$(16.5 \text{ m})^2 = 272 \text{ m}^2$ 3 sigfig answer</p> <p>$\cos(43^\circ) = 0.73$ 2 sigfig answer *trig functions are not used in AP Chemistry</p> <p>$\sqrt{0.00159} = 0.399$ 3 sigfig answer</p> <p>$(5.814 \times 10^{-8})^3 = 1.965 \times 10^{-22}$ 4 sigfig answer</p>
4	<p>Logarithms & Exponentials</p> <p>The sigfigs are the number of digits in the decimal place of the logarithm or exponent</p>	<p>$-\log(2.22 \times 10^{-10}) = 9.654$ start counting sigfigs after the decimal in the answer 3 sigfig answer</p> <p>$10^{-6.12} = 7.6 \times 10^{-7}$ start counting sigfigs after the decimal in the exponent 2 sigfig answer</p>

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SIGNIFICANT FIGURES WS#1

Report the number of significant figures (sigfigs) in each measurement. Write the rule number or numbers that apply to each problem. The first one is done for you as an example.

1	306.2 g	4 s.f., rules #1,2
2	48 cm	
3	0.329 m	
4	83.952 °C	
5	3700 mm	
6	400.0 cm ³	
7	71.60 g	
8	0.00432 mm	
9	10.0 kg	
10	6.224 m	
11	82.000 s	
12	100 psi	
13	0.008460 A	
14	9.005 V	
15	.05 W	
16	1.111 s	
17	32000 cm	
18	3 kPa	

19	1013 mbar	
20	8.1056 mol	
21	4158.0 sec	
22	0.12500 g	
23	248 µg	
24	6 mol/L	
25	pH 2.1	
26	12.01 mol	
27	6520 mi	
28	1.598 lb	
29	273 K	
30	10110 °C	
31	158,000.0 mm	
32	158,000 mm	
33	0.00058 h	
34	0.2588 x 10 ⁻³ g	
35	6.02 x 10 ²³ atoms	
36	12 eggs	

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SIGNIFICANT FIGURES WS#2**Report the number of significant figures (sigfigs) in each measurement.**

1	91.60 ft 4 s.f. ,
2	1500 u
3	6 220 000 m/s
4	1200 ft
5	5000 Ω
6	777.0 cm
7	0.00100 min
8	101 dalmatians
9	0.00554 g
10	5.55 V
11	0.00557 oz
12	12.00 h
13	6.2×10^4 kg
14	451 yd
15	0.0052 in
16	9.00×10^{-3}
17	60,110 lb
18	0.10001 kg

19	25.227 A
20	1.111 rad
21	0.01200 $^{\circ}\text{C}$
22	75.5 mi/h
23	20.1 μm
24	9 700 km
25	0.0458 farad
26	1500 watts
27	3.00×10^{10} cm/s
28	1.090070 ft·lb
29	5.8080 bar
30	52.00 g/mol
31	144 beakers
32	615.8 amperes
33	1,000,000 parsec
34	100 AU
35	34 Fords
36	8.000×10^{-3} joule

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SIGNIFICANT FIGURES WS#3

Report the number of significant figures (sigfigs) in each measurement.

1	0.002586 K 4 s.f.	19	0.2289 g
2	82 cm	20	0.394 s
3	2000 mi	21	0.0055 lb
4	100.66 m	22	5,000 rpm
5	71.60 ft	23	1300 seedlings
6	101.7 MHz	24	5.0050 kg
7	1.00200 m	25	94.00 s
8	.00430 years	26	247 sophomores
9	0.0001 km	27	1.0101010 henries
10	306.2 g	28	0.002×10^6 m
11	13.907 ft-lb	29	40 sq mi
12	82.000 dram	30	22.98976928 g/mol
13	3700 in	31	261 g/mol
14	55 molecules	32	0.50050 cc
15	10,100,010 mi	33	1×10^3 mL
16	12.01 amu	34	1.2×10^9 Chinese
17	4.55×10^6 m	35	56,007.00 mi
18	19.56 lb	36	6.00 mol/L

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SIGNIFICANT FIGURES IN CALCULATIONS WS#4

Calculate each problem.

Record the answer to the proper number of significant figures (sigfigs).

Record the answer's unit.

The first example is completed for you.

	PROBLEM	ANSWER to the proper SigFigs	UNIT
E	$\frac{112 \text{ mi}}{2.1 \text{ h}} =$ 53.333333333	53 <i>(note that there are two sigfigs in this answer.)</i>	mi/h
1	$153 \text{ cm} * 51 \text{ cm} * 486 \text{ cm} =$		
2	$\frac{8501 \text{ g}}{111 \text{ mL}} =$		
3	$\frac{48 \text{ g}}{4 \text{ mol}} =$		
4	$.0155 \text{ m} * .0089 \text{ m} =$		
5	$120 \text{ V} * 4.2 \text{ A} =$		
6	$2.71 \text{ g/cm}^3 * 3.557 \text{ cm}^3 =$		
7	$3.001 \text{ L} * 3.001 \text{ atm} =$		
8	$44.01 \text{ g/mol} * 2.00 \text{ mol} =$		
9	$891 \text{ N/cm}^3 * 35.00 \text{ cm}^2 =$		
10	$\frac{(50 \text{ N} * 0.00158 \text{ cm})}{1.258 \text{ sec}} =$		

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SIGNIFICANT FIGURES WS #5

Calculate each problem.

Record the answer to the proper number of significant figures (sigfigs).

Record the answer's unit.

The first example is completed for you.

	PROBLEM	ANSWER to the proper SigFigs	UNIT
E	$\frac{8.705 \text{ g}}{0.171 \text{ mL}} = 50.90643275$	50.9 <i>(note that there are three sigfigs in this answer.)</i>	g/mL
1	$0.0251\text{g} \times 1 \text{ cm} \times 4.22 \text{ V} =$		
2	$\frac{6.11 \text{ g}}{1.011 \text{ mL}} =$		
3	$\frac{48 \text{ g}}{0.004 \text{ mol}} =$		
4	$\frac{0.00188 \text{ m}}{0.0089 \text{ m}^2} =$		
5	$12.0 \text{ V} \times 4.2 \text{ A} =$		
6	$2.751 \text{ g/cm}^3 \times 3.557 \text{ cm} =$		
7	$3.10 \text{ L} \times 3.001 \text{ atm} =$		
8	$4400 \text{ g/mol} \times 2.050 \text{ mol} =$		
9	$10900 \text{ J} \times 35.00 \text{ s} =$		
10	$\frac{(51 \text{ kPa} \times 0.00158 \text{ K})}{1.258 \text{ K}} =$		