SIGNIFICANT FIGURES

Name _____

A measurement can only be as accurate and precise as the instrument that produced it. A scientist must be able to express the accuracy of a number, not just its numerical value. We can determine the accuracy of a number by the number of significant figures it contains.

1) All digits 1-9 inclusive are significant.
   Example: 129 has 3 significant figures.
2) Zeros between significant digits are always significant.
   Example: 5,007 has 4 significant figures.
3) Trailing zeros in a number are significant only if the number contains a decimal point.
   Example: 100.0 has 4 significant figures.
   100 has 1 significant figure.
4) Zeros in the beginning of a number whose only function is to place the decimal point are not significant.
   Example: 0.0025 has 2 significant figures.
5) Zeros following a decimal significant figure are significant.
   Example: 0.000470 has 3 significant figures.
   0.47000 has 5 significant figures.

Determine the number of significant figures in the following numbers.

1. 0.02 _____
2. 0.020 _____
3. 501 _____
4. 501.0 _____
5. 5,000 _____
6. 5,000. _____
7. 6,051.00 _____
8. 0.0005 _____
9. 0.1020 _____
10. 10,001 _____

Determine the location of the last significant place value by placing a bar over the digit. (Example: $1.70\bar{0}$)

1. 8040 _____
2. 0.0300 _____
3. 699.5 _____
4. 2.000×10^2 _____
5. 0.90100 _____
6. 90,100 _____
7. 4.7×10^{-8} _____
8. 10,800,000. _____
9. 3.01×10^{21} _____
10. 0.000410 _____

CALCULATIONS USING SIGNIFICANT FIGURES

Name _____

When multiplying and dividing, limit and round to the least number of significant figures in any of the factors.

Example 1: 23.0 cm x 432 cm x 19 cm = 188,784 cm^3

The answer is expressed as 190,000 cm^3 since 19 cm has only two significant figures.

When adding and subtracting, limit and round your answer to the least number of decimal places in any of the numbers that make up your answer.

Example 2: 123.25 mL + 46.0 mL + 86.257 mL = 255.507 mL

The answer is expressed as 255.5 mL since 46.0 mL has only one decimal place.

Perform the following operations expressing the answer in the correct number of significant figures.

1. 1.35 m x 2.467 m = _____
2. 1,035 m^2 + 42 m = _____
3. 12.01 mL + 35.2 mL + 6 mL = _____
4. 55.46 g – 28.9 g = _____
5. .021 cm x 3.2 cm x 100.1 cm = _____
6. 0.15 cm + 1.15 cm + 2.051 cm = _____
7. 150 L^3 + 4 L = _____
8. 505 kg – 450.25 kg = _____
9. 1.252 mm x 0.115 mm x 0.012 mm = _____
10. 1.278×10^3 m^2 + 1.4267×10^2 m = _____

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MATH HANDBOOK TRANSPARENCY MASTER 3

Significant Figures

Use with Appendix B, Significant Figures

Rules for Significant Figures

1 All nonzero figures are significant.

721 mm — *3 significant figures*

2 When a zero falls between nonzero digits, that zero is significant.

106 K — *3 significant figures*

3 When a zero falls after the decimal point and after a significant figure, that zero is significant.

1.50 L — *3 significant figures*

4 When a zero is used merely to indicate the position of the decimal, that zero is *not* significant.

1 210 m — *3 significant figures*

0.0**53** m — *2 significant figures*

5 All counting numbers and exact numbers are treated as if they have an infinite number of significant figures.

10 pairs — *infinite number of significant figures*

Name _____ Date _____ Class _____

MATH HANDBOOK TRANSPARENCY WORKSHEET 3

Significant Figures

Use with Appendix B, Significant Figures

1. For each of the measurements in the table below, determine if the underlined number is significant or not significant. Place a check mark in the appropriate box and in the box under the rule that you used to make your determination.

Measurement	Significant	Not Significant	Rule				
			1	2	3	4	5
a. 30<u>3</u>8 m							
b. 1.5<u>6</u>1 L							
c. 0.<u>0</u>74 mm							
d. 505<u>0</u> s							
e. 3.<u>0</u>07 km							
f. 6.1<u>0</u>°C							
g. 82<u>1</u>.0 g							
h. <u>0</u>.560 g							

2. Determine the number of significant figures in each of the following measurements.

a. 56 m _____

b. 1104 mL _____

c. 15 pairs _____

d. 0.20 mol _____

e. 105 000 mm _____

f. 6.02 L _____

g. 0.176 kPa _____

h. 819 000.0 g _____

i. 4.030 m^3 _____

j. 0.005 42 s _____

k. 49 000 km _____

l. 7.81 kg _____

m. 7.01 m/s _____

n. 0.0021 m _____

o. 30 015 g _____

p. 90 km _____

q. 12.0 cm _____

r. 0.0305 kPa _____

s. 50 gross _____

t. 83.90 m/s^2 _____

u. 0.100 50 cg _____

v. 0.0510 kg _____

w. 6.12×10^5 mm _____

x. 4.01×10^2 s _____

y. $60\,000 \times 10^3$ g _____

z. 1.000×10^2 kPa _____

Significant Figures Practice Worksheet

How many significant figures do the following numbers have?

1) 1234 _____

2) 0.023 _____

3) 890 _____

4) 91010 _____

5) 9010.0 _____

6) 1090.0010 _____

7) 0.00120 _____

8) 3.4×10^{4} _____

9) 9.0×10^{-3} _____

10) 9.010×10^{-2} _____

11) 0.00030 _____

12) 1020010 _____

13) 780. _____

14) 1000 _____

15) 918.010 _____

16) 0.0001 _____

17) 0.00390 _____

18) 8120 _____

19) 7.991×10^{-10} _____

20) 72 _____