SIGNIFICANT FIGURES

KEY

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.

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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 __1__
2. 0.020 __2__
3. 501 __3__
4. 501.0 __4__
5. 5,000 __1__

6. 5,000. __4__
7. 6,051.00 __6__
8. 0.0005 __1__
9. 0.1020 __4__
10. 10,001 __5__

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

1. 8040 — 80$\bar{4}$0
2. 0.0300 — 0.030$\bar{0}$
3. 699.5 — 699.$\bar{5}$
4. 2.000 x 10² — 2.00$\bar{0}$ x10²
5. 0.90100 — 0.9010$\bar{0}$

6. 90,100 — 90,$\bar{1}$00
7. 4.7 x 10⁸ — 4.$\bar{7}$ x10⁻⁸
8. 10,800,000. — 10,800,00$\bar{0}$.
9. 3.01 x 10²¹ — 3.0$\bar{1}$ x10²¹
10. 0.000410 — 0.00041$\bar{0}$

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 cm³
>
> The answer is expressed as 190,000 cm³ 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 = _____ 3.33 m²

2. 1,035 m² ÷ 42 m = _____ 25 m

3. 12.01 mL + 35.2 mL + 6 mL = _____ 53 mL

4. 55.46 g – 28.9 g = _____ 26.6 g

5. .021 cm x 3.2 cm x 100.1 cm = _____ 6.7 cm³

6. 0.15 cm + 1.15 cm + 2.051 cm = _____ 3.35 cm

7. 150 L³ ÷ 4 L = _____ 40 L²

8. 505 kg – 450.25 kg = _____ 55 kg

9. 1.252 mm x 0.115 mm x 0.012 mm = _____ 0.0017 mm³

10. 1.278 x 10³ m² ÷ 1.4267 x 10² m = _____ 8.958 m

10

MATH HANDBOOK TRANSPARENCY MASTER **3**

Significant Figures

Rules for Significant Figures

❶ All nonzero figures are significant.

721 mm   *3 significant figures*

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

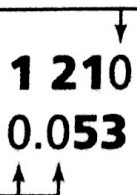**106** K   *3 significant figures*

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

1.50 L   *3 significant figures*

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

1 210 m   *3 significant figures*
0.053 m   *2 significant figures*

❺ 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

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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. 3<u>0</u>38 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. 821.<u>0</u> g	✓		✓				
h. <u>0</u>.560 g		✓				✓	

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

a. 56 m _____ 2

b. 1104 mL _____ 4

c. 15 pairs _____ ∞

d. 0.20 mol _____ 2

e. 105 000 mm _____ 3

f. 6.02 L _____ 3

g. 0.176 kPa _____ 3

h. 819 000.0 g _____ 7

i. 4.030 m^3 _____ 4

j. 0.005 42 s _____ 3

k. 49 000 km _____ 2

l. 7.81 kg _____ 3

m. 7.01 m/s _____ 3

n. 0.0021 m _____ 2

o. 30 015 g _____ 5

p. 90 km _____ 1

q. 12.0 cm _____ 3

r. 0.0305 kPa _____ 3

s. 50 gross _____ ∞

t. 83.90 m/s^2 _____ 4

u. 0.100 50 cg _____ 5

v. 0.0510 kg _____ 3

w. 6.12×10^5 mm _____ 3

x. 4.01×10^2 s _____ 3

y. $60\ 000 \times 10^3$ g _____ 1

z. 1.000×10^2 kPa _____ 4

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Solutions to the Significant Figures Practice Worksheet

1)
2)
3)
4)
5)
6)
7)
8)
9)
10)
11)
12)
13)
14)
15)
16)
17)
18)
19)
20)