

N3 - Sig Figs

Uncertainty in Measurement

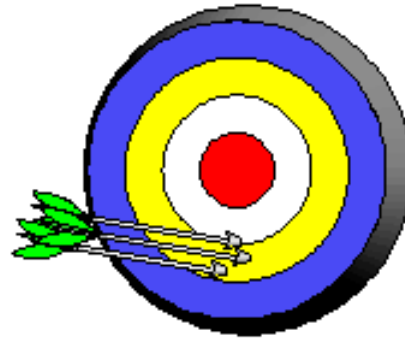
A digit that must be **estimated** is called **uncertain**.
A **measurement** always has some degree of uncertainty.

- Measurements are performed with instruments
- No instrument can read to an infinite # of decimal places

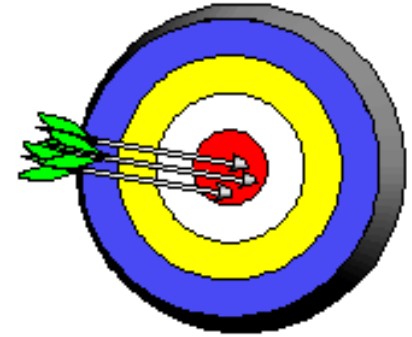
Precision and Accuracy

Accuracy refers to the agreement of a particular value with the **true** value.

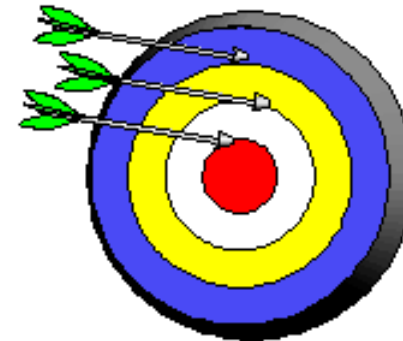
Precision refers to the degree of **agreement** among several measurements made in the same manner.



Precise but not accurate



Precise AND accurate



Neither accurate nor precise

Rules for Counting Sig Figs

Nonzero Integers		
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Rules for Counting Sig Figs

<p>Nonzero Integers</p>	<p>ALWAYS COUNT as SIGNIFICANT</p>	
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Rules for Counting Sig Figs

<p>Nonzero Integers</p>	<p>ALWAYS COUNT as SIGNIFICANT</p>	<p><u>3456</u> has 4 sig figs</p>
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Rules for Counting Sig Figs

Leading Zeros		
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Rules for Counting Sig Figs

**Leading
Zeros**

NEVER COUNT as
SIGNIFICANT

Rules for Counting Sig Figs

**Leading
Zeros**

NEVER COUNT as
SIGNIFICANT

0.0**486** has
3 sig figs

Rules for Counting Sig Figs

Captive Zeros		
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Rules for Counting Sig Figs

<p>Captive Zeros</p>	<p>ALWAYS COUNT as SIGNIFICANT</p>	
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Rules for Counting Sig Figs

<p>Captive Zeros</p>	<p>ALWAYS COUNT as SIGNIFICANT</p>	<p>16.<u>0</u>7 has 4 sig figs.</p>
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Rules for Counting Sig Figs

Trailing Zeros		

Rules for Counting Sig Figs

<p>Trailing Zeros</p>		
<p><i>SOMETIMES COUNT</i> as SIGNIFICANT</p>		

Rules for Counting Sig Figs

<p>Trailing Zeros</p>	<p>AFTER A DECIMAL <i>ALWAYS COUNT</i> as SIGNIFICANT</p>	
<p><i>SOMETIMES COUNT</i> as SIGNIFICANT</p>		

Rules for Counting Sig Figs

<p>Trailing Zeros</p>	<p>AFTER A DECIMAL <i>ALWAYS COUNT</i> as SIGNIFICANT</p>	
<p><i>SOMETIMES COUNT</i> as SIGNIFICANT</p>	<p>NO DECIMAL <i>NEVER COUNT</i> as SIGNIFICANT</p>	

Rules for Counting Sig Figs

<p>Trailing Zeros</p>	<p>AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT</p>	<p>9.3<u>00</u> has 4 sig figs.</p>
<p><i>SOMETIMES COUNT</i> as SIGNIFICANT</p>	<p>NO DECIMAL NEVER COUNT as SIGNIFICANT</p>	

Rules for Counting Sig Figs

<p>Trailing Zeros</p>	<p>AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT</p>	<p>9.3<u>00</u> has 4 sig figs.</p>
<p><i>SOMETIMES COUNT</i> as SIGNIFICANT</p>	<p>NO DECIMAL NEVER COUNT as SIGNIFICANT</p>	<p>93<u>00</u> has 2 sig figs.</p>

Rules for Counting Sig Figs

<p>Exact Numbers</p>		
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Rules for Counting Sig Figs

<p>Exact Numbers</p>	<p>INFINITE NUMBER of sig figs</p>	
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Rules for Counting Sig Figs

<p>Exact Numbers</p>	<p>INFINITE NUMBER of sig figs</p>	<p>1in = 2.54cm 12in = 1ft</p>
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How many significant figures in the following number?

1.0070 m

A 3

B 2

C 5

D 6

E 4

How many significant figures in the following number?

1.0070 m

A 3

B 2

C 5

D 6

E 4

How many significant figures in the following number?

17.10 Kg

- A** 3
- B** 4
- C** 5
- D** 2
- E** None of the above

How many significant figures in the following number?

17.10 Kg

- A** 3
- B** 4
- C** 5
- D** 2
- E** None of the above

How many significant figures in the following number?

100,890 L

- A** None of the above
- B** 4
- C** 6
- D** 3
- E** 5

How many significant figures in the following number?

100,890 L

A None of the above

B 4

C 6

D 3

E **5**

How many significant figures in the following number?

3.29×10^3 sec



4



1



3



5



None of the above

How many significant figures in the following number?

3.29×10^3 sec



4



1



3



5



None of the above

How many significant figures in the following number?

0.0054 cm

- A** 4
- B** 5
- C** 3
- D** 2
- E** None of the above

How many significant figures in the following number?

0.0054 cm



4



5



3



2



None of the above

How many significant figures in the following number?

3,200,000

A 2

B 7

C 5

D 4

E 3

How many significant figures in the following number?

3,200,000

A 2

B 7

C 5

D 4

E 3

How many significant figures in the following number?

0.0056030

A 2

B 7

C 5

D 4

E 3

How many significant figures in the following number?

0.0056030

A 2

B 7

C **5**

D 4

E 3

Rules for Using Sig Figs

Multiplication & Division		
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Rules for Using Sig Figs

<p>Multiplication & Division</p>	<p>Answer based on LEAST number of SIG FIGS in the problem</p>	
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Rules for Using Sig Figs

Multiplication & Division	Answer based on LEAST number of SIG FIGS in the problem	6.38 x 2.0 = 12.76 →
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Rules for Using Sig Figs

Multiplication & Division	Answer based on LEAST number of SIG FIGS in the problem	6.38 x 2.0 = <i>3 SF 2SF</i> 12.76 → 13 <i>(2 sig figs)</i>
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Which answer has the correct number of sig figs?

$$3.24 \text{ m} \times 7.0 \text{ m}$$

2 SF

A 22.7 m^2

B 23 m^2

C 22.6 m^2

Which answer has the correct number of sig figs?

$$3.24 \text{ m} \times 7.0 \text{ m}$$

2 SF

A 22.7 m^2

B 23 m^2

C 22.6 m^2

Which answer has the correct number of sig figs?

$$100.0 \text{ g} \div 23.7 \text{ cm}^3 \quad \text{3 SF}$$

- A** 4.22 g/cm³
- B** 4.219 g/cm³
- C** 4.2 g/cm³

Which answer has the correct number of sig figs?

$$100.0 \text{ g} \div 23.7 \text{ cm}^3 \quad \text{3 SF}$$

A *4.22 g/cm³*

B 4.219 g/cm³

C 4.2 g/cm³

Which answer has the correct number of sig figs?

1 SF 0.02 cm x 2.371 cm

A 0.04742 cm²

B 0.047 cm²

C 0.05 cm²

Which answer has the correct number of sig figs?

1 SF 0.02 cm x 2.371 cm

A 0.04742 cm²

B 0.047 cm²

C *0.05 cm²*

Which answer has the correct number of sig figs?

2 SF $710 \text{ m} \div 3.0 \text{ s}$ **2 SF**

- A** 240 m/s
- B** 236.6 m/s
- C** 236 m/s

Which answer has the correct number of sig figs?

2 SF 710 m ÷ 3.0 s **2 SF**

A *240 m/s*

B 236.6 m/s

C 236 m/s

Rules for Using Sig Figs

Addition & Subtraction		
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Rules for Using Sig Figs

**Addition &
Subtraction**

**Answer based on
LEAST number of
DECIMAL PLACES
in the problem**

Rules for Using Sig Figs

**Addition &
Subtraction**

**Answer based on
LEAST number of
DECIMAL PLACES
in the problem**

$$6.8 + 11.934 =$$
$$18.734 \rightarrow$$

Rules for Using Sig Figs

**Addition &
Subtraction**

**Answer based on
LEAST number of
DECIMAL PLACES
in the problem**

$$\begin{array}{r} 6.8 + 11.934 = \\ \text{1DP} \quad \quad \text{3DP} \\ 18.734 \rightarrow \end{array}$$

Rules for Using Sig Figs

**Addition &
Subtraction**

**Answer based on
LEAST number of
DECIMAL PLACES
in the problem**

$$\begin{array}{r} 6.8 + 11.934 = \\ \text{1DP} \quad \quad \quad \text{3DP} \\ 18.734 \rightarrow 18.7 \\ \text{(3 sig figs)} \end{array}$$

Which answer has the correct number of sig figs?

$3.24 \text{ m} + 7.0 \text{ m}$ 1 DP

A 10.24 m

B 10.2 m

C 10 m

Which answer has the correct number of sig figs?

$3.24 \text{ m} + 7.0 \text{ m}$ **1 DP**

A 10.24 m

B *10.2 m*

C 10 m

Which answer has the correct number of sig figs?

2 DP

0.02 cm + 2.371 cm

A

2.4 cm

B

2.391 cm

C

2.39 cm

Which answer has the correct number of sig figs?

2 DP 0.02 cm + 2.371 cm

A 2.4 cm

B 2.391 cm

C *2.39 cm*

Which answer has the correct number of sig figs?

3 DP

2.030 mL – 1.870 mL

3 DP

- A** 0.16 mL
- B** 0.160 mL
- C** 0.1600 mL

Which answer has the correct number of sig figs?

3 DP

2.030 mL – 1.870 mL

3 DP

A 0.16 mL

B *0.160 mL*

C 0.1600 mL