N3 - Sig Figs

Target: I can use sig figs to reflect the level of uncertainty in a measurement.

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



Nonzero	ALWAYS COUNT
Integers	as SIGNIFICANT

Nonzero	ALWAYS COUNT	<u>3456</u> has
Integers	as SIGNIFICANT	4 sig figs





Leading	NEVER COUNT as	<u>0.0</u> 486 has
Zeros	SIGNIFICANT	3 sig figs







Trailing Zeros	

Trailing Zeros	
SOMETIMES COUNT as SIGNIFICANT	

Trailing Zeros	AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT	
SOMETIMES COUNT as SIGNIFICANT		

Trailing Zeros	AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT	
SOMETIMES COUNT as SIGNIFICANT	NO DECIMAL NEVER COUNT as SIGNIFICANT	

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

Trailing Zeros	AFTER A DECIMAL ALWAYS COUNT as SIGNIFICANT	9.3<u>00</u> has 4 sig figs.
SOMETIMES COUNT as SIGNIFICANT	NO DECIMAL NEVER COUNT as SIGNIFICANT	9300 has2 sig figs.

Exact	
Numborg	
numpers	

Fvact	INFINITE	
	NUMBER	
numpers	of sig figs	







How many significant figures in the following number? 100,890 L None of the above A) **B** 4 C 6 **D** 3 5 E)

How many significant figures in the following number? 100,890 L None of the above A) **B** 4 C 6 **D** 3 **E** 5





4





E None of the above







0.0054 cm

- 4 **B** 5
- **C** 3
- **D** 2



E None of the above

0.0054 cm

A
B
5
C
3
D
2



0.0056030



0.0056030



Multiplication & Division	

Multiplication & Division	Answer based on LEAST number of SIG FIGS in the problem	
	-	

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

Multiplication	Answer based on	6.38 x 2.0 =
& Division	LEAST number of	3 SF 2SF
	SIG FIGS in the	$12.76 \rightarrow 13$
	propiem	(2 sig figs)

3.24 m x 7.0 m (2 SF)





Which answer has the correct number of sig figs? 3.24 m x 7.0 m (2 SF) A 22.7 m² **B** 23 m² **C** 22.6 m²

































Addition & Subtraction	

Addition & Subtraction	Answer based on LEAST number of
	DECIMAL PLACES
	in the problem

Addition &	Answer based on	6.8 + 11.934 =
Subtraction	LEAST number of	
	DECIMAL PLACES	18.734 →
	in the problem	

Addition &	Answer based on	6.8 + 11.934 =
Subtraction	LEAST number of	1DP 3DP
	DECIMAL PLACES	18.734 →
	in the problem	

Addition &	Answer based on	6.8 + 11.934 =
Subtraction	LEAST number of	1DP 3DP
	DECIMAL PLACES	$ 18.734 \rightarrow 18.7$
	in the problem	(3 sig figs)

$\frac{\text{Which answer has the correct number of sig figs?}}{3.24 \text{ m} + 7.0 \text{ m}}$



























3 DP 2.030 mL – 1.870 mL 3 DP







3 DP 2.030 mL – 1.870 mL 3 DP





Some slightly more complicated rules...



Some slightly more complicated rules...

We will talk about this one:

• Multiple Operations

Just open the PDF or look at your Reference Sheet for these when you have to do a question about them:

- Logarithms
- Multiplying and dividing with scientific notation
- Adding and subtracting with scientific notation

Multiple Operations	Use ORDER of OPERATIONS as you go PEMDAS	2.0000(1.008) + 15.99 = x 1 st 4 SF = 2.016 + 15.99 + 2 nd 2 DP 18.006 \rightarrow 18.01 (2 DP)
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"Please Excuse My Dear Aunt Sally"

Parenthesis, Exponents, Multiplication, Division, Addition, Subtraction

	Only the numbers	$Log (2.4 \times 10^3) =$
Answers to	AFTER the	$3.3802 \rightarrow 3.38$
Logarithm	DECIMAL PLACE in	$(2 \sin fias)$
Calculations	the answer -	
	these are called	
	"the mantissa"	

	Answer based	$(2.0 \times 10^{12})/(8.330 \times 10^{8}) =$
Multiplying	on LEAST	2 SF 4SF
or Dividing	number of	= 2.40096 x10 ³ →
Scientific	SIGNIFICANT	2.4 x 10³
Notation	FIGURES in the	(2 SF)
	problem	

Adding Subtracting with Scientific Notation

 $(2.113 \times 10^4) + (9.2 \times 10^4) =$ Must have **1 DP** the **SAME** $11.313 \times 10^4 \rightarrow 11.3 \times 10^4$ **EXPONENT 1 DP** before you Put back in good sci. not. Form do the $= 1.13 \times 10^{5}$ problem

Adding Subtracting with Scientific Notation

 $(1.032 \times 10^4) + (2.672 \times 10^5) =$ Must have **Convert to same exponent** the **SAME** $(1.032 \times 10^4) + (26.72 \times 10^4)$ **EXPONENT** 2 DP before you $27.752 \times 10^4 \rightarrow 27.75 \times 10^4$ do the 2 DP Put back in good sci. not. Form problem = 2.775 x 10⁵

<u>Some Extra Practice Problems</u>



17.10 Kg

A) 3
B) 4







17.10 Kg

- **A** 3 **B** 4
- **C** 5
- **D** 2



E None of the above

3,200,000



3,200,000







Link to YouTube Video of Presentation:

https://youtu.be/L7zg83ZVQJQ