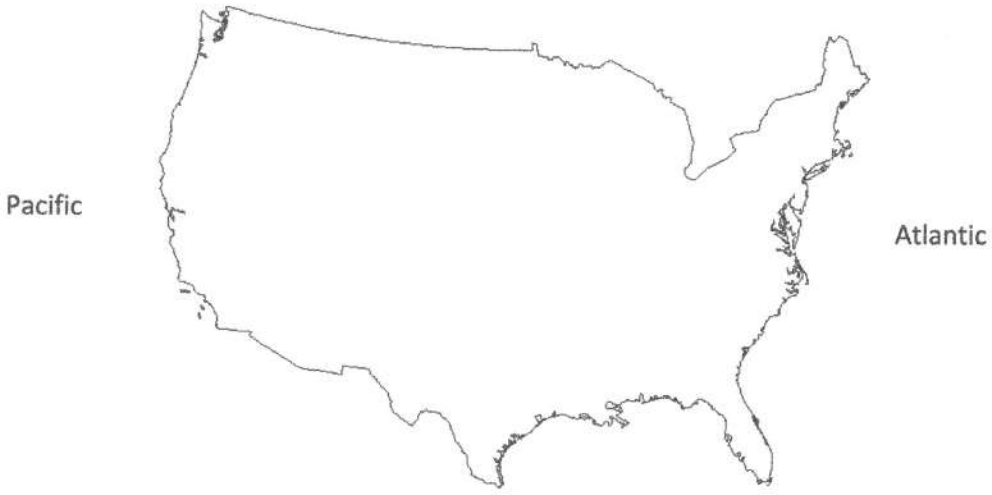
Name: _____ Date: _____ Period: _____

Unit 1: Significant Figures/Digits



Significant Digits:

Identifying the number of significant digits in each measurement.

1. 0.7888 m = _____
2. 650 L = _____
3. 45 μm = _____
4. 0.0024 g = _____
5. 1800 °C = _____
6. 4004 mm = _____
7. 1020.0 N = _____
8. 3.3×10^2 s = _____
9. 0.0030 nm = _____
10. 14.40 kg = _____
11. 6070 g = _____
12. 0.79 mm = _____
13. 1.30×10^5 kg = _____
14. 15.0 m/s = _____
15. 0.01020 mL = _____
16. 6.020×10^{24} kg = _____
17. 7.1 g = _____
18. 100 mL = _____
19. 0.10 s = _____
20. 3×10^8 m/s = _____

Multiplication / Division Rule for Significant Digits:

Complete the mathematical operation and answer with the correct number of significant digits.

21. $\frac{2.25\ m}{1.5\ s}$ = _____

22. $(1.20\ m)(29\ m)$ = _____

23. $\frac{135.1\ m}{(1.50\ s)(3.5\ s)}$ = _____

24. $\frac{26.44\ g}{2.0\ ml}$ = _____

25. $(120\ m)(0.030\ m)$ = _____

26. $1.5\ m(1.0\ m)(3\ m)$ = _____

27. $\frac{4\ kg(1200\ m)}{(7.0\ s)(0.05\ s)}$ = _____

28. $\frac{2(105.1\ m)}{(11\ s)(0.0900\ s)}$ = _____

Addition / Subtraction Rule for Significant Digits:

Complete the mathematical operation and answer with the correct number of significant digits.

29. 0.13 cm + 7.0 cm = _____

30. 15.2 s – 2.0 s = _____

31. 10.13 g + 5 g + 0.2 g = _____

32. 16.253 °C + 72 °C = _____

33. 4.4 km – 0.8 km = _____

34. 49 m + 0.31 m – 2 m = _____

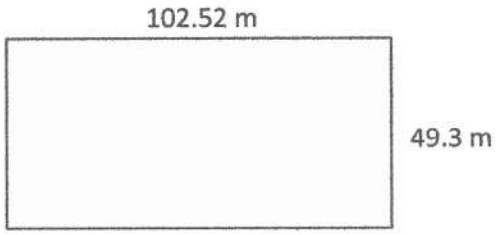
35. 201 L + 2.005 L = _____

36. 0.13 g + 7.0 g – 4 g = _____

Problem Solving:

Complete the mathematical operation and answer with the correct number of significant digits.

37. A rectangular plot of land are 102.52 m by 49.3 m. What is the perimeter of the land? What is the area?



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Unit 1: Precision and Accuracy

1) An excepted value for the acceleration due to gravity is 9.801 m/s^2. In an experiment with pendulums, you calculate that the value is 9.4 m/s^2. Should the accepted value be tossed out to accommodate your new finding?

2) Some wooden rulers do not start with 0 at the edge, but have it set in a few millimeters. How could this improve the accuracy of the ruler?

3) You find a micrometer (a tool used to measure objects to the nearest 0.01 mm) that has been badly bent. How would it compare to a new, high-quality meter stick in terms of its precision? Its accuracy?

4) Does parallax affect the precision of a measurement that you make? Explain.

5) Your friend tells you that his height is 182 cm. In your own words, explain the range of heights implied by this statement.

6) Your friend states in a report that the average time required to circle a 1.5-mile track was 65.414 s. This was measured by timing 7 laps using a clock with a precision of 0.1 s. How much confidence do you have in the results of the report? Explain.

7) A box has a length of 18.1 cm and a width of 19.2 cm and it is 20.3 cm tall.

a. What is its volume?

b. How precise is the measurement of length? Of volume?

c. How tall is a stack of 12 of these boxes?

d. How precise is the measure of the height of one box? of 12 boxes?

8) What determines the precision of a measurement? (1.2)

9) How does the last digit differ from the other digits in a measurement?

10) How long is the leaf in **Figure 1-22**? Include the uncertainty in your measurement.

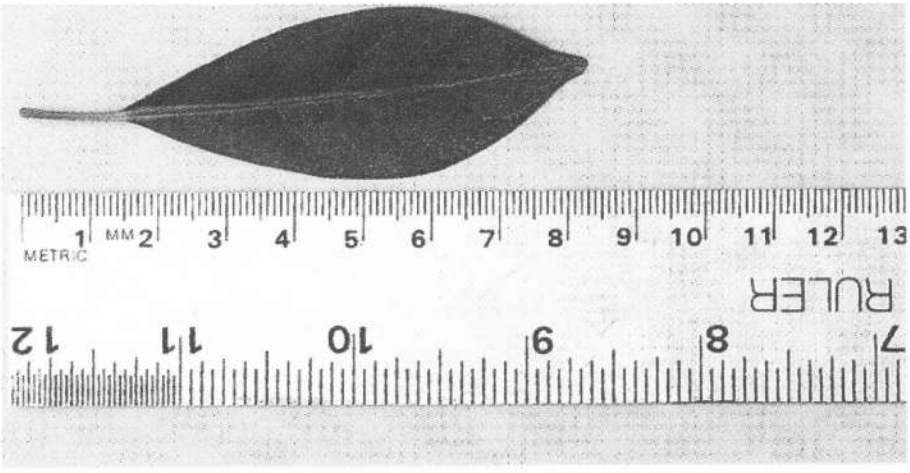

Figure 1-22

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Unit 1: Prefixes and Dimensional Analysis

Metric System – SI System Prefixes

10^n	Prefix	Symbol	Long Scale	Decimal
10^{12}	tera-	T	Trillion	1 000 000 000 000
10^{9}	giga-	G	Billion	1 000 000 000
10^{6}	mega-	M	Million	1 000 000
10^{3}	kilo-	k	Thousand	1 000
10^{0}	none	none	One	1
10^{-3}	milli-	m	Thousandth	0.001
10^{-6}	micro-	μ	Millionth	0.000 001
10^{-9}	nano-	n	Billionth	0.000 000 001
10^{-12}	pico-	p	Trillionth	0.000 000 000 001

Tera Giga Mega kilo milli micro nano pico

Prefixes 000 000 000 000 000 . 000 000 000 000

Prefixes: *Convert the prefix to scientific notion or vice versa in each measurement.*

1. 7.88 mm = _____
2. 6.50 kL = _____
3. 45 μm = _____
4. 24.0 Mg = _____
5. 180 Tg = _____
6. 404 pm = _____
7. 10.2 mN = _____
8. 3.3 μs = _____
9. 0.030 nm = _____
10. 14.4 kg = _____
11. 1.8×10^{6} m = _____
12. 2.70×10^{3} g = _____
13. 3×10^{-3} s = _____
14. 54×10^{-9} m = _____
15. 7×10^{12} m = _____
16. 6 000 000 000 g = _____
17. 0.000 005 g = _____
18. 6 500 L = _____
19. 0.000 110 s = _____
20. 3 000 000 m = _____

Dimensional Anaylsis:

Answer the following using dimensional analysis.

Example: Convert a speed of 88 feet/s to m/s. *(Conversion factor: 1 foot = 0.3048 m)*

$$\frac{88 \text{ feet}}{\text{second}} \left| \frac{0.3048 \text{ m}}{1 \text{ ft}} \right. = 27 \text{ m/s}$$

21. Convert a measurement of 12 inches to cm. *(Conversion factor: 1 inch = 2.54 cm)*

22. Convert a measrement of 120 pounds to kg. *(Conversion factor: 2.2 pounds = 1 kg)*

23. How many seconds are in one day? *(use: 60 s = 1 min, 60 min = 1 hr, 24 hrs = 1 day)*

24. Convert a speed of 100 km/hr to m/s. *(use: 1000 m = 1 km, 60 min = 1 hr, 60 s = 1 min)*

25. If the sun suddenly ceased to shine, how many seconds would it take to become dark? *(use: distance from sun to earth = 150 000 000 km, 1000 m = 1 km, speed of light = 3 x 10^8 m/s)*