

Significant Digits

Goal • Practise estimating and rounding off digits in measurements.

Introduction

Scientists frequently work with many numbers. Sometimes, such as in the distance to the Sun, they are extremely large numbers. Sometimes, such as in the size of a microbe, they are extremely small numbers. In order to help them easily read and compare many numbers, scientists use significant digits.

When scientists measure an object, they record as accurate a number as possible. This number will consist of known (or certain) digits and one or more estimated digits. Scientists refer to accurately measurable numbers as significant digits. This master will help you learn to work with significant digits.

What to Do

- Read page 605 of *SCIENCEPOWER™ 10*.
- As a class, discuss the importance of using significant digits.
- Use the guidelines before each question to help you answer it.

Questions

Guidelines for Counting Significant Digits

Look at any zeros.

- Zeros placed before other digits are not significant. For example, 0.000067 has only two significant digits. What are they? 67
- Zeros placed between digits are important. For example, how many significant digits will 2001 have? 4
- Zeros placed after other digits and behind a decimal are significant. For example, in 3.60, every number is significant. How many significant digits does 3.60 have? 3

1. Determine the number of significant digits in the following measurements:

(a) 4.357 L 4

(b) 0.005 g 1

(c) 4.0 mm 2

(d) 0.0050 N 2

(e) 4.3570 m 5

(f) 0.0501 W 3

(g) 0.0037 L 2

(h) 200 303 cm 6

(i) 4.3 kg 2

(j) 303 s 3

Name: _____

Date: _____

Significant Figures

Determine the number of significant figures in each of these numbers.

	<u>Number</u>	<u>Significant Figures</u>		<u>Number</u>	<u>Significant Figures</u>
1.	357	<u>3</u>	2.	10000	<u>1</u>
3.	51015	<u>5</u>	4.	6.060×10^{-2}	<u>4</u>
5.	0.0007	<u>1</u>	6.	4.556×10^{-9}	<u>4</u>
7.	<u>5050</u>	<u>3</u>	8.	5050.0	<u>5</u>
9.	6.8×10^3	<u>2</u>	10.	<u>0.002110</u>	<u>4</u>
11.	33.303	<u>5</u>	12.	<u>170</u>	<u>2</u>
13.	15.0×10^{-5}	<u>3</u>	14.	<u>0.7007</u>	<u>4</u>
15.	<u>0.70070</u>	<u>5</u>	16.	4206	<u>4</u>
17.	0.02 [.]	<u>1</u>	18.	10.01	<u>4</u>
19.	0	<u>0</u>	20.	0.0	<u>0</u>

Name: _____ Date: _____

Significant Figures

Addition and Subtraction

Complete the following problems and round to the correct number of significant figures.

1. $35.6 + 56.27$ = $91.87 \rightarrow 91.9$
1 dp 2 dp
2. $4.337 + 84.7128$ = $89.0498 \rightarrow 89.050$
3 dp 4 dp
3. $6.2 + 4.114$ = $10.314 \rightarrow 10.3$
4. $7.331 + 12.42$ = $19.751 \rightarrow 19.75$
5. $22.5285 + 22.14 + 4.266$ = $48.9345 \rightarrow 48.93$
6. $88.489 + 7.133 + 6.5$ = $102.122 \rightarrow 102.1$
7. $48.835 - 9.1$ = $39.735 \rightarrow 39.7$
8. $16.221 - 8.28$ = $7.941 \rightarrow 7.94$
9. $101.12 - 98.7$ = $2.42 \rightarrow 2.4$
10. $13.7 + 25.466$ = $39.166 \rightarrow 39.2$
11. $45.758 - 33.22$ = $12.538 \rightarrow 12.54$
12. $19.6 - 8.77$ = $10.83 \rightarrow 10.8$
13. $23 + 16.4 + 22.0$ = $61.4 \rightarrow 61$
14. $24.5764 - 1.9833$ = $22.5931 \rightarrow 22.5931$
15. $8.31 + 7.2 + 9.4626$ = $24.9926 \rightarrow 25.0$
16. $3.94 + 68.77 + 83.197$ = $155.907 \rightarrow 155.91$
17. $12.484 + 3.6$ = $16.084 \rightarrow 16.1$
18. $19.117 - 8.11$ = $11.007 \rightarrow 11.01$
19. $7.6924 + 9.6 - 4.888$ = $12.4044 \rightarrow 12.4$
20. $19.8 - 8.75 + 11$ = $22.05 \rightarrow 22$

Solve the Problems and Round Accordingly Using Sig. Digits.

- 1) $\overset{2}{\downarrow} 22 \times \overset{1}{\downarrow} 70 = 1540 = \underline{2000}$ 11) $\overset{(3)}{\checkmark} 4070 + \overset{(3)}{\checkmark} 56.512 = \underline{72.0}$
- 2) $\overset{3sd}{7.52} \times \overset{4sd}{2.277} = 17.12304 = \underline{17.1}$ 12) $7.78 \times 0.3 \times 320 = \underline{700}$
- 3) $\overset{2sd}{0.76} \times \overset{4sd}{24.79} = 18.8404 = \underline{19}$ 13) $5600 \div 87.7 = \underline{64}$
- 4) $0.094 \times 0.047 \times 460 = 2.03228 \rightarrow \underline{2.0}$ 14) $40 \times 900 \times 6900 = \underline{200,000,000}$
- 5) $760 \div 31.52 = 24.116757 = \underline{24}$ 15) $556 \times 0.005 = \underline{2.78}$
- 6) $0.32 \times 79.873 = 25.55936 = \underline{26}$ 16) $5600 \div 16.6 = \underline{340}$
- 7) $540 \div 97.22 = \underline{5.6}$ 17) $50 \times 91.1 \times 4100 = \underline{20,000,000}$
- 8) $4900 \div 79.24 = \underline{62}$ 18) $70 \times 0.7 = \underline{50}$
- 9) $0.039 \times 4.343 = \underline{0.17}$ 19) $47 \times 0.33 \times 608 = \underline{9400}$
- 10) $407 \div 7.0 = \underline{58}$ 20) $0.8 \times 7.394 \times 6090 = \underline{40000}$