Section

1-2

HOLT PHYSICS

Math Skills

Measurements in Experiments

Power	Prefix	Abbreviation
10^{-18}	atto-	a
10^{-15}	femto-	f
10^{-12}	pico-	p
10^{-9}	nano-	n
10^{-6}	micro-	μ
10^{-3}	milli-	m
10^{-2}	centi-	c

Power	Prefix	Abbreviation
10^{-1}	deci-	d
10^{1}	deka-	da
10^{3}	kilo-	k
10^{6}	mega-	M
10^{9}	giga-	G
10^{12}	tera-	T
10^{15}	peta-	P
10^{18}	exa-	E

1. How many picoseconds are there in 1 Ms? 10^{18}

2. How many micrograms make 1 kg? 10^{9}

3. How many nanometers are there in 1 cm? 10^{7}

4. Rewrite the following quantities in scientific notation without prefixes.

a. 3582 gigabytes 3.582×10^{12}

b. 0.0009231 milliwatts 9.231×10^{-7}

c. 53657 nanoseconds 5.3657×10^{-5}

d. 5.32 milligrams 5.32×10^{-3}

e. 88900 megahertz 8.89×10^{10}

f. 0.00000083 centimeters 8.3×10^{-9}

5. Rewrite the following quantities in units with SI prefixes.

a. 36582472 g 36.582472 Mg

b. 0.000000452 m 452 nm

c. 53236 V $.053236 \text{ MV}$

d. 4.62×10^{-3} s 4.62 ms

6. Express the measurement 4.29478416 kg with 8, 6, 4, and 2 significant figures.

4.2947842 (8)   4.295 (4)

4.29478 (6)   4.3 (2)

Section

1-3

HOLT PHYSICS

Math Skills

The Language of Physics

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1. Calculate the following products and quotients without using a calculator.

a. $(3.0 \times 10^5) \times (2.0 \times 10^3)$ 6.0×10^8

b. $(3.0 \times 10^5) \div (2.0 \times 10^3)$ 1.5×10^2

c. $(3.0 \times 10^2) \div (2.0 \times 10^5)$ 1.5×10^{-3}

d. $(3.0 \times 10^{-2}) \times (2.0 \times 10^5)$ 1.5×10^3

e. $(3.0 \times 10^{-2}) \div (2.0 \times 10^{-5})$ 1.5×10^3

f. $(3.0 \times 10^{-2}) \times (2.0 \times 10^{-5})$ 6.0×10^{-7}

2. Round off the following numbers to one figure.

a. 3.7×10^5 4×10^5

b. 6.1×10^5 6×10^5

c. 8.2×10^{-9} 8×10^{-9}

d. 0.000067 7×10^{-5}

e. 7439262 7×10^6

f. 0.0006739 7×10^{-4}

3. Find the order of magnitude of the following results without using a calculator.

a. 97×192 10^4

b. $96.8639 \div 883.3525$ 10^{-1}

4. a. Estimate the width and height in centimeters of a half-gallon milk container. Show your assumptions and your work.
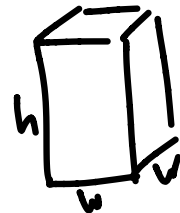
$V = hw^2$ $h = 19.6$

assume $h = 2w$

$1890 = 2w^3$ $w^3 = 945$

               $w = 9.8$

b. Use your numbers to obtain a rough estimate of the volume of milk in a half-gallon container. used approximation of $\frac{1}{2}$ gal to solve

c. The volume of a half-gallon is about 1890 cm^3. How close was your estimate? _____

used approximation of $\frac{1}{2}$ gal to solve

HOLT PHYSICS

Mixed Review

The Science of Physics

Power	Prefix	Abbreviation
10^{-18}	atto-	a
10^{-15}	femto-	f
10^{-12}	pico-	p
10^{-9}	nano-	n
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10^{15}	peta-	P
10^{18}	exa-	E

1. Convert the following measurements to the units specified.

   a. 2.5 days to seconds $2.5\,d\left(\dfrac{24h}{d}\right)\left(\dfrac{60\,min}{hr}\right)\left(\dfrac{60\,s}{min}\right)=2.16\times10^{5}\ sec$

   b. 35 km to millimeters $3.5\times10^{7}\ mm$

   c. 43 cm to kilometers $4.3\times10^{-4}\ km$

   d. 22 mg to kilograms $2.2\times10^{-5}\ kg$

   e. 671 kg to micrograms $6.71\times10^{11}\ \mu g$

   f. 8.76×10^{7} mW to gigawatts $8.76\times10^{4}\ watts=8.76\times10^{-5}\ GW$

   g. 1.753×10^{-13} s to picoseconds $1.753\times10^{-1}\ ps$

2. According to the rules given in Chapter 1 of your textbook, how many significant figures are there in the following measurements?

   a. 0.0845 kg 3

   b. 37.00 h 4

   c. 8 630 000.000 mi 10

   d. 0.000 000 0217 g 3

   e. 750 in. 2

   f. 0.5003 s 4

Chapter

1

HOLT PHYSICS

Mixed Review *continued*

3. **Without calculating the result,** find the number of significant figures in the following products and quotients.

   a. 0.005032×4.0009 **4**

   b. $0.0080750 \div 10.037$ **5**

   c. $(3.52 \times 10^{-11}) \times (7.823 \times 10^{11})$ **3**

4. Calculate $a + b$, $a - b$, $a \times b$, and $a \div b$ with the correct number of significant figures using the following numbers.

   a. $a = 0.005\,078$; $b = 1.0003$

   $a + b =$ **1.0054** $a - b =$ **−0.9952**

   $a \times b =$ **.0050795** $a \div b =$ _____

   b. $a = 4.231\,19 \times 10^7$; $b = 3.654 \times 10^6$

   $a + b =$ **4.596×10^7** $a - b =$ **3.866×10^7**

   $a \times b =$ **1.546×10^{14}** $a \div b =$ **11.58**

5. Calculate the area of a carpet 6.35 m long and 2.50 m wide. Express your answer with the correct number of significant figures.

   15.9 m²

6. The table below contains measurements of the temperature and volume of an air balloon as it heats up.

   In the grid at right, sketch a graph that best describes these data.

Temperature (°C)	Volume (m³)
2	0.0502
27	0.0553
52	0.0598
77	0.0646
102	0.0704
127	0.0748
152	0.0796